Criteria 2.2.1 : Special programmes for advance learners and slow learners

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I/C Principal
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&
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Report - Bridge course conducted by the Department of Business Communication

Title: Elements of Communication

The Department of Business Communication, S.I.W.S. N.R. Swamy College of Commerce and Economics & Smt. Thirumalai College of Science conducted The **Bridge course (Elements of Communication)** from September 25, 2021 to October 30, 2021.

The course was designed to revise concepts in communication that were learnt at the higher secondary level and essential elements of communication that are required to build an enduring foundation in the subject.

The course was conducted in the respective Google classrooms of F.Y.B.Com. students. The topics specified in the syllabus were taught concisely. The course was a blend of written and oral communication. The sessions were interactive and written assignments were submitted by the students. 335 students took the test after the course concluded.

Participants provided feedback which is represented below:

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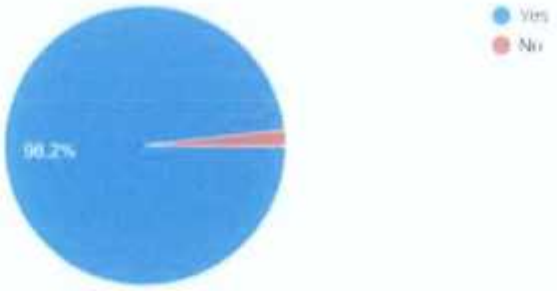
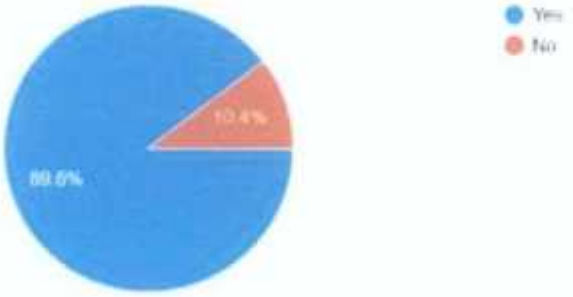
Did the course introduce you to Business Communication?

222 responses



Were you satisfied with the way in which Cs of communication were taught?

222 responses



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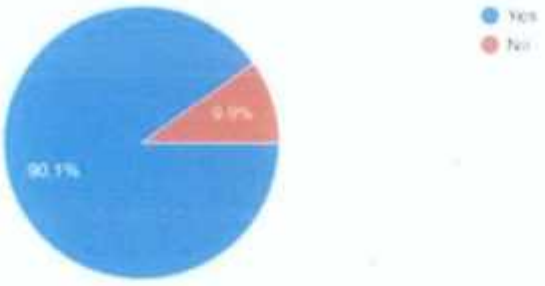
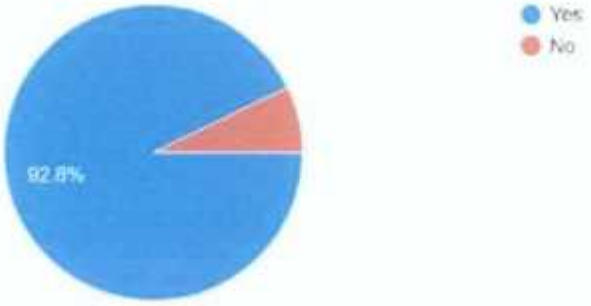
Were you satisfied with the way in which Parts of a Letter was taught?

222 responses



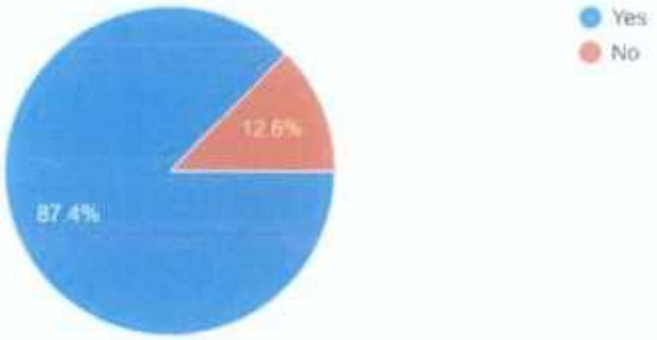
Did you enjoy making presentations in a group?

222 responses



Could you express yourself well in the creative writing exercise?

222 responses



222 responses

You are really doing good maam, I love the way you teach because it makes me feel comfortable to sit in the lecture. Thank you

Its was really a helpful section it helped to to improve my communication skills

Thanks you mama

Happy to learn this course

This course is give a knowledge to all types of latter

I satisfied with this course in which way of teacher was teaching us, I think with videos will you explain us that will be easy for us to understand

I understand all the topic of business communication. I easily understand this subject well

Nothing to suggest

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Test response-Division wise- Students:

F.Y.B.Com. :

335 responses

Dr Kirti Y. Nakhare

Department of Business Communication

18 December 2021

Dr. Usha S. Iyer

Principal

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WADALA, MUMBAI – 400 031.

16 September,2021

Bridge Course

Title: Elements of Communication

For

F.Y.B.Com. Students

This course aims at preparing students of F.Y.B.Com. for comprehending lectures in Business Communication. The primary elements of communication which essentially have been taught at the higher secondary level will be included as part of the course. The course is a blend of theory and assignments, which will also be interactive. These activities will instil confidence in the students and stand them in good stead to attend Business Communication lectures.

Schedule

Days	Date	Time
Saturday	25/09/2021	12:00 noon – 1:00 pm
Tuesday	28/09/2021	12:00 noon – 1:00 pm
Thursday	30/09/2021	12:00 noon – 1:00 pm
Tuesday	05/10/2021	12:00 noon – 1:00 pm
Thursday	07/10/2021	12:00 noon – 1:00 pm
Saturday	09/10/2021	12:00 noon – 1:00 pm
Tuesday	12/10/2021	12:00 noon – 1:00 pm
Thursday	14/10/2021	12:00 noon – 1:00 pm
Thursday	21/10/2021	12:00 noon – 1:00 pm
Saturday	23/10/2021	12:00 noon – 1:00 pm
Tuesday	26/10/2021	12:00 noon – 1:00 pm
Saturday	30/10/2021	12:00 noon – 1:00 pm

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Syllabus

Business Communication

Topics	Contents: Oral Communication	Hours Employed
Self-introduction	Introducing self on the basis of points discussed- Individual Oral Presentation	1 hour
Presentation Skills	Presenting Ideas in a logical manner Using technology to present ideas effectively-Group Presentation with written work submitted	2 hours
Topics	**Contents: Written Aspect**	
Self-introduction	Introducing self on the basis of points discussed- Written Work Uploaded on Google Classroom	1 hour
Creative Writing	Students will be provided with an opening line and an ending line to imaginatively express themselves within a certain word limit. Written Work Uploaded on Google Classroom	2 hours
Topics	**Contents: Application of rules of grammar in everyday situations**	
Parts of a letter	Compulsory and optional parts discussed and explained	2 hours
Cs of Communication	Essentials of communication- Conciseness, Clarity, Courtesy, Correctness, Comprehensiveness, Completeness, Concreteness.	4 hours

Dr. Kirti Y. Nakhare
Dept. of Business Communication

Mr. Vaibhav Banjan
Vice Principal & IQAC
Co-ordinator

Dr. Usha Iyer
Principal

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mouryalaxmi22@gmail.com	22 / 32	Laxmi Rajkishor Mourya	C	9867207405
tambidevendra77@gmail.c	19 / 32	Thambi Devendra	C	7506584779
nikitashinde101999@gmail	24 / 32	Nikita Harish Shinde	F	7977256247
solankijignesh2004@gmail.	25 / 32	Jignesh laxman solanki	C	9324487987
gsonkargauri75@gmail.con	29 / 32	Gauri ganesh ganokar	A	9426566523
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2021222163@siwscollege.	29 / 32	Gupta Sumit Santosh	B	9819770442
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koliakash2373@gmail.com	17 / 32	Akash koli	C	9821425488
shravanimogre11@gmail.c	24 / 32	Mogre Shravani Prashan	C	8451834727
2021222156@siwscollege.	32 / 32	Amar Gosavi	B	7715044588
2021222431@siwscollege.	8 / 32	Namita Shivaji Salunkhe	D	8104445964
2021222294@siwscollege.	22 / 32	MADIWAL SANTHOSHI	C	7715078422
rohitdevendra1111111111(	7 / 32	Rohit nagesh devendra	B	8291595924
reshmahadat32@gmail.con	32 / 32	Reshma kantilal hadat	B	7045253014
jigneshbariya87@gmail.cor	13 / 32	Bariya Tisha kishor	A	9867363770
2021222256@siwscollege.	25 / 32	Amreen Noor Mohammac	C	9920186525
2021222167@siwscollege.	32 / 32	Atharva hanchate	B	8104881969
2021222710@siwscollege.	24 / 32	Pankaj jain	F	8433611808
alfiyakhan2704@gmail.con	32 / 32	Khan Alfiya Raj	A	8097604779
lokeshkumarmancy123@gr	29 / 32	Lokeshkumarshetty	C	9867197420
2021222083@siwscolleg.e	17 / 32	Gupta Roshani omprakas	A	9372636716
2021222184@siwscollege.	32 / 32	Chintan Kadam	B	9152959297
2021222265@siwscollege.	21 / 32	Ashrafulnisha khan	C	8828961715
indujarajan51@gmail.cim	13 / 32	Induja Rajan	D	9769136048
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poojabirje756@gmail.com	32 / 32	Pooja Sandeep birje	C	9969606024
guptap.2611@gmail.com	30 / 32	Poonam Gupta	B	9321937278
itsmekhansakib18@gmail.c	26 / 32	Khan Sakib Hamidullah	E	8693844796
simran.nagvekar1705@gm	18 / 32	Simran Sandeep Nagvek	A	8657174395
chhayagupta862@gmail.co	15 / 32	Chhaya Gupta	C	9702538871
radhikanadimigeri0115@gr	8 / 32	Radhika Nadimigeri	C	7039676319
faizan7039433@gmail.com	30 / 32	Faizan Ah shaikh	E	7039433546
www.afroz2003@gmail.con	23 / 32	Afroz Ahmed	A	9892885812
20212222313@siwscollege	25 / 32	Aniket Shrivastav	C	9321483898
chandan.ram152003@gma	7 / 32	Chandan kumar	D	8422085667
2021222650@siwscollege.	25 / 32	MAYUR SURESH YADAV	F	8652440875
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matkarrutik33@gmail.com	23 / 32	Rutik	C	8828763081
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2021222067@siwscollege.	8 / 32	Anithapriya Selvan	A	9326601637
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ansarifaiyaz1072@gmail.co	12 / 32	Ansari faiyaz	A	9372525903
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BRIDGE COURSE - FEEDBACK			
F.Y.B.Com. Roll No	Division	Name of the student:	How would you grade the course on the scale of 1-5
2174	B	Jatin jain	5
2263	C	Khan Alisha gulam Mohamed	4
2182	B	Akshada jaldi	4
2256	C	Amreen Noor Mohammad Kazi	5
2020	A	vidya suresh	4
2045	A	Shrawani Abhay Chalke	4
2406	D	Yash Ganesh Patil	5
2259	C	Harsh Rajendra Kesarkar	5
2195	B	Aditya Navalde	3
2545	E	PRATHAMESH SINGH	5
2633	F	Ram Dindayal Upadhyay	5
2409	D	Sujal patwa	4
2018	A	Theerthana Murugan	5
2511	E	AMREEN AKHLAQUE SHAIKH	5
2155	B	Komal Shyam Goraksh	3
2328	C	Viraj Chalke	5
2702	F	Gudiya rajaram yadav	4
2722	F	Kalyani Ramesh Bhingi	3
2427	D	Lizza reddy	5
2127	B	Sanika Sudhir Dalvi	5
2603	E	Pragati	5
2383	D	Ajay Kumar Gurunathan	4
2173	B	Saloni jagtap	5
2634	F	Vadhel jay	5
2001	A	Aishwarya	4
2196	B	SUNIL CHITTARASAN	5
2598	E	Aashu rameshchandra rajbhar.	4
2570	E	Aarti Subramanian	5
2597	E	Ashika Shiva Kumar	3
2171	B	Samrudddhi Subhash jadhav	5
2265	C	Ashrafulnisha khan	5
2265	C	Ashrafulnisha khan	5
2267	C	KHAN FIRDOUS ABDUR RAUF	5
Not given	E	Tulsi cohhetal sahani	4
2653	F	Rohit yadav	4
2273	C	Shadab khan	5
2151	B	Arpita Shashikant ghawali	5

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BRIDGE COURSE - FEEDBACK			
2212	B	ABHISHEK Bnadu Shirke	5
2460	D	KANNAN DEVENDRA	3
2520	E	HAMZA SHAIKH	3
2645	F	Diksha Anil wangade	5
2260	C	Roshani Yashwant Khadtar	3
2514	E	Shaikh Fatima Begam MD Sabir	5
2650	F	MAYUR SURESH YADAV	3
2165	B	Vaishnavi Eknath Gurav	4
2148	B	Shubham ghagare	1
2424	D	Harshada Mangesh Ratodkar	4
2186	B	Shravani Pravin Ghadi	4
2191	B	Vaishnavi Trimbak Gaikwad	4
2508	E	Rehman shah	3
2476	D	Yogita balraj	3
2397	D	Eshan pange	5
2164	B	Kaushal	3
2154	B	Priti Kashinath godhade	4
2523	E	Nagma shaikh	4
2291	C	Devashree Bhikaji Lingayat	5
2271	C	Mohammed Faiz khan	5
2272	C	Khan nadeem ahmed rafiq	3
2198	B	Srushti surendra chavan	3
224674	A	Gfruvddy	3
2654	F	Rohit Ramasre Yadav	5
2537	E	SANIKA SANTOSH SHIRKE	4
2166	B	Reshma kantilal hadat	4
2350	C	Rutuja Suryakant Thotam	5
2035	A	Bariya tisha Kishor	4
2642	F	Vishwas Suraj Sameer	4
2631	F	shivani tiwari	5
2220	B	Neha Purushottam chawla	3
2288	C	Mayuresh Santosh kuveskar	5
2299	C	Ankita Nilesh Mayekar	5
2694	F	Sujal Milind Naik	5
2526	E	Salman shaikh	4
2029	A	Ansari sultana fakre alam	4
2360	C	Prathmesh raju Devendra	3
2211	B	Suraj B sharma	5

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BRIDGE COURSE - FEEDBACK			
2077	A	Krishna Kanojiya	3
9765	D	Innocent boy	1
2030	A	Jyoti jagannath Astagi	1
2463	D	Priya Yadav	4
2299	C	Ankita Nilesh Mayekar	5
2021222309@siwsc	C, D	Mahek mulla	4
2501	E	Nakul satam	5
2528	E	Tayyaba	5
2557	E	Somya soni	5
2550	E	Sohani Ankita	5
2255	C	Priyanka katkar	4
2642	F	Vishwas Suraj Sameer	5
2033	A	Rohini Rajendra Bangar	4
2628	F	Sonali Sudhakar Tambe	4
2203	B	Pooja N. Adapat	5
2219	B	Laiba noori	5
2171	B	Samrudddhi Subhash jadhav	5
2418	D	Chandan kumar	4
2649	F	krishnaveni	5
2559	E	SAURABH CHANDRAKANT SURVASE	4
2453	D	Yash Santosh Pansare	5
2082	A	Ansari faiyaz	4
2671	F	Kajal jaiswar	5
2421	D	Daiwata kishor Rane	3
2291	C	Devashree Bhikaji Lingayat	5
2251	C	Kamble Dashami	3
2266	C	Farhan Khan salim	4
2423	D	Ankush Basu Rathod	5
2300	C	Komalika Yallesh Medar	3
2701	F	Gayatri Raja Swami	3
2308	C	Laxmi Rajkishor Mourya	4
2274	C	Khan Zaherabi	5
2652	F	Yadav Pooja Rajesh	3
2330	C	Rupali gauda	5
2315	C	Sathya Sankarapandi	5
2649	F	krishnaveni murugan	5
2033	A	Rohini Rajendra Bangar	4
2054	A	2021222054	5

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BRIDGE COURSE - FEEDBACK			
2632	F	Sanket Sadashiv Toraskar	5
2126	C	Mandar Parshuram Dalvi	3
2252	C	Shrutee deepak kamble	5
2305	C	Mogre Shravani Prashant	5
2556	E	Simran soni	5
2378	D	Nadar Jency Gabrial	4
2159	B	Gupta Aman Manoj	5
2018	A	Theerthana Murugan	5
2234	B	Deepakpatwa	4
2172	B	Soham jadhav	4
546	E	Shanti ramjanam singh	3
2021222070	A	Siba bano khan tauhid	5
2431	D	Namita Shivaji Salunkhe	4
2414	D	Ruchi ashok kumar prajapati	3
2233	C	Kazi Abdul Rahman	5
2021222194	B	MAHARANA RAHUL GAUTAM	5
2019	A	Vidhyalakshmi Sankar	5
2511	E	AMREEN AKHLAQUE SHAIKH	5
2722	F	Kalyani Ramesh Bhingi	3
2697	F	Shaikh Duresha	4
2030	A	Jyoti jagannath Astagi	1
2233	C	Kazi Abdul Rahman	5
2702	F	Gudiya rajaram yadav	4
2059	A	Roshani Dakare	5
2260	C	Roshani Yashwant Khadtar	3
2648	F	Gulshan kevaldhari yadav	5
2658	F	Yadav Sneha Shyamdhari	4
2021222574	E	Yadav Suraj Kumar sherbahadur	4
2468	D	Muskan ansari	3
2593	E	Anshul sikarwar	5
2567	E	Priti goud	2
2269	C	KHAN MADIHA KHATOON ALI AHMED	5
2150	B	Archita Shashikant Ghawali	4
2729	F	Pranali Laxman kodag	1
2021222583	E	Sonu islam Mansuri	5
2114	A	Mulla zamir aslam ali	5
2661	F	Sana Nisar Ahmad	3
2427	D	Lizza reddy	5

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BRIDGE COURSE - FEEDBACK			
2063	A	Sanskruti Jadhav	5
2227	B	Shaikh Rehmat bee Abdul Kadir	4
2503	E	Mrunmayi sunil satpute	5
2542	E	Mohammad Muzammil Siddiqui	2
2503	E	Mrunmayi sunil satpute	5
2149	B	Omkar devidas ghatye	3
Roll no is not given	A	Anson Romer	4
2415	D	Anjali tilakram prasad	5
2176	B	Jaiswal pooja mohanlal	5
2643	F	Vadhel jay	5
2471	D	Muthu Saravanan	4
2332	C	Advait	4
Solankijignesh2004	C	Jignesh laxman solanki	4
2611	E	Awliya	3
2009	A	Sahaya saajan	3
2331	C	Arya Dhamale	2
2140	B	Mitesh Dhawale	4
2429	D	Nandini Sahani	5
2011	A	Sheba	5
2313	C	Aniket Shrivastav	4
2357	C	Harsh molparia	4
2660	F	Shaikh Eeram	4
2428	D	Anuja Sahani	4
2233	C	Kazi Abdul Rahman	5
2237	B	Sushmita goad	5
2644	F	NISHANT MAHENDRA WALMIKI	5
2607	E	Nisha Thakur	5
2323	C	Zakat Ali shah	3
2013	A	Sneka Venkatesh	5
2604	E	nafisa naimuddin khan	5
2319	C	afreen majibullah khan	5
2392	D	Uma Nishad	4
2232	B	Jagdale Shruti Shivdas	5
2413	D	Ponnam Pravalika	4
2292	C, D	Shruti dhanajay Lokhande	4
2226	B	khan muskan mohaamad husain	5
2645	F	Diksha wangade	3
2533	E	Samruddhi Yashwant Shigam	4

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BRIDGE COURSE - FEEDBACK			
2212	B	Abhishek Bandu Shirke	4
2514	E	Shaikh Fatima Begam MD Sabir	5
2594	E	Bhavika Phondekar	3
2469	D	Maaz Khan	5
2285	C	NAVANEETHAKRISHNAN NARAYANAN	5
2157	B	Jayesh Gotad	4
2676	F	Vaishnavi Rajendra Shinde	5
2111	A	Aditya dashrath chorghe	5
2185	B	Prajval Mahadev Kadam	5
2037	A	Akanksha Vinayak Berde	4
2130	B	Sachin Vishvas Devarde	4
2095	A	Shaikh Shagufta Ali Mohammed Aslam	5
2398	D	Parab Samarth Subhash	4
2480	D	ROHIT SAINATH GAVHANE	5
2672	F	T. Esaisurtika	4
2094	A	Siddharth kadam	2
2737	F	Jain komal Roshan	2
2391	D	NISHAD SANJANA RAJARAM	5
2021222728	F	Jennifer Dourado	4
2402	D	Virjesh Rajaram Pasi	4
2462	D	Divya Deepak Tembe	5
2509	E	Sanjeeda vahid shah	4
2043	A	Shravani Pravin Bhosale	4
2346	C	Tufel shaha	5
2183	B	Neha Madhukar Juwale	5
2216	B	Shravani dilip bandkar	5
2561	E	Sakshi garud	3
2218	B	Shaikh Nagma	3
2361	C	Sukanya Naik Dessai	5
2096	A	Gupta Roshani Omprekash	1
238	B	Ansari mantasa mohd sarfraz	2
2074	A	Yash Ramvilas Tiwari	5
2215	B	Ansari md alkama md kalam	4

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Smt. THIRUMALAI COLLEGE OF SCIENCE
PLOT NO. 337, SEWREE, WADALA ESTATE, MAJOR R. PARAMESHWARAN MARG,
WADALA, MUMBAI – 400 031.

Bridge course

Title: Foundation course in Mathematics and Statistics

For

FYBCOM Students

The aim of this course is to prepare a student of FYBCOM for understanding lectures in Mathematics & Statistics. Fundamentals of Several important topics which were taught at XI and XII standard and useful for FYBCOM will be covered in the workshop. There will be interactive sessions to give confidence to the student in understanding Mathematics and Statistics lectures.

Schedule:

Days	Date	Time
Saturday	25/09/2021	12:00 noon – 1:00 pm
Tuesday	28/09/2021	12:00 noon – 1:00 pm
Thursday	30/09/2021	12:00 noon – 1:00 pm
Tuesday	05/10/2021	12:00 noon – 1:00 pm
Thursday	07/10/2021	12:00 noon – 1:00 pm
Saturday	09/10/2021	12:00 noon – 1:00 pm
Tuesday	12/10/2021	12:00 noon – 1:00 pm
Thursday	14/10/2021	12:00 noon – 1:00 pm
Thursday	21/10/2021	12:00 noon – 1:00 pm
Saturday	23/10/2021	12:00 noon – 1:00 pm
Tuesday	26/10/2021	12:00 noon – 1:00 pm
Saturday	30/10/2021	12:00 noon – 1:00 pm

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Syllabus:

Mathematics:

Topics	Contents
Sets & Functions	Introduction, Examples: Polynomial, Exponential & logarithmic functions.
Plotting the elementary graph	Sketching of simple graphs
Permutation and Combination	Fundamental principles of counting (Addition, Multiplication) , Factorial function (Properties, Example), Permutations (Definition, Properties & examples) and Combination (Definition, Properties & examples)
Business Mathematics-I	Percentage, Computation of profit/loss
Business Mathematics-II	Simple Interest & Compound interest

Statistics:

Topics	Contents
Classification and Tabulation of data	Introduction, collection of data, Statistical series (discrete & continuous), tally marks, Frequency distribution, grouped frequency distribution & cumulative frequency distribution
Statistical Representation of Data	Diagrammatic representation of data, Graphical representation of Frequency Distribution – Histogram, Ogive, Pie-chart
Measures of central tendency-I	Arithmetic Mean (for raw, discrete and continuous data)
Measures of central tendency-II	Median, Quartile & Mode (for Raw data)
Introduction to Probability	Probability formula, Conditional probability, Properties of conditional probability, independent events, Addition and Multiple rule.

Dr. G V Hemasundar
Dept. of Mathematics

Mr. Vaibhav Banjan
Vice Principal &
IQAC Co-ordinator

Dr. Usha Iyer
Principal

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&
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WADALA MUMBAI-400031

Report for the Bridge course conducted by the Department of Mathematics

Title: Foundation course in Mathematics and Statistics

The Department of Mathematics, S.I.W.S. N.R. Swamy College of Commerce and Economics & Smt. Thirumalai College of Science conducted The **Bridge course (Foundation course in Mathematics and Statistics)** from September 25, 2021 to October 30, 2021. The course was focused to help students from Commerce background in gaining knowledge and confidence on the Basics of Mathematics and Statistics.

The Course was conducted in the respective Google classrooms of FYBCom Students. All the topics mentioned in the syllabus were covered in brief. An additional focus was given on solving problems. The sessions were interactive and encouraged to students to discuss and ask their doubts.

Around 98 students attended the course, who were admitted to FYBCom for the academic year 2021-22.

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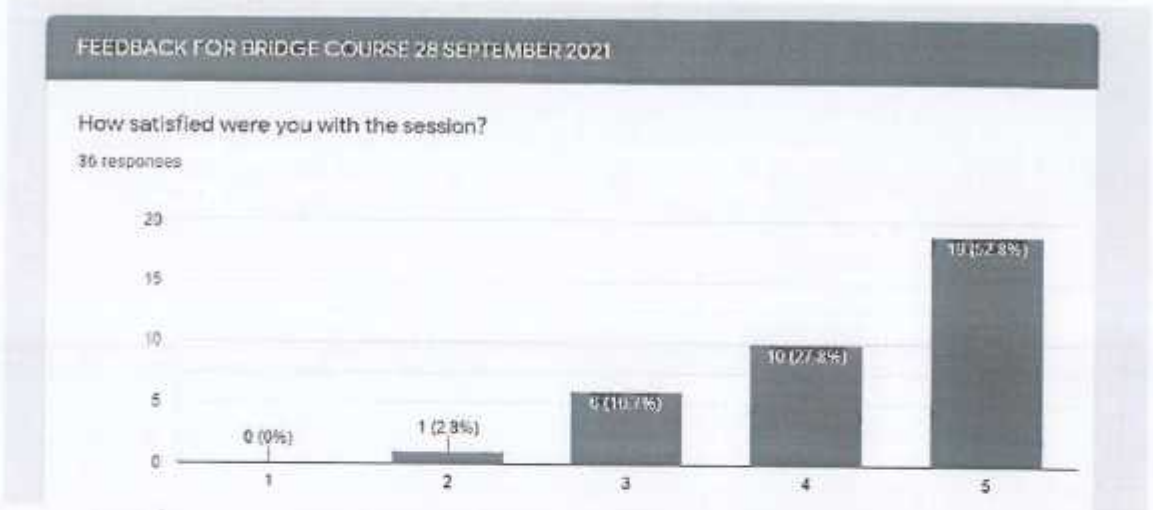
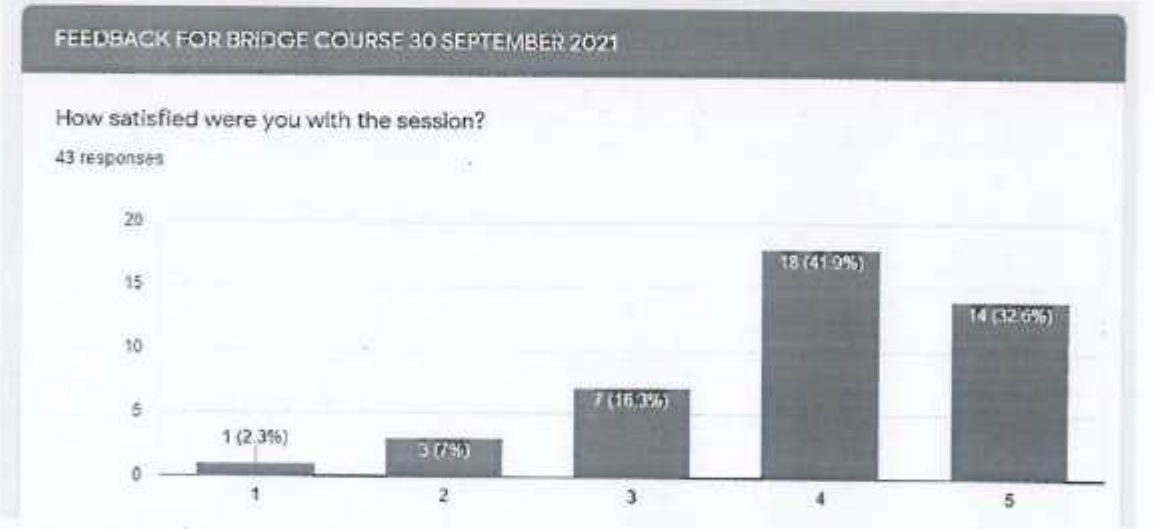
All participants provided the feedback and statistics of the feedback was shown below:





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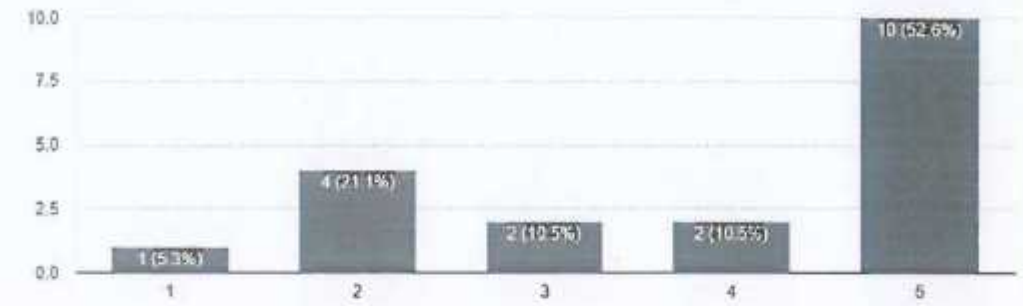
FEEDBACK FOR BRIDGE COURSE 9 OCTOBER 2021

How satisfied were you with the session?

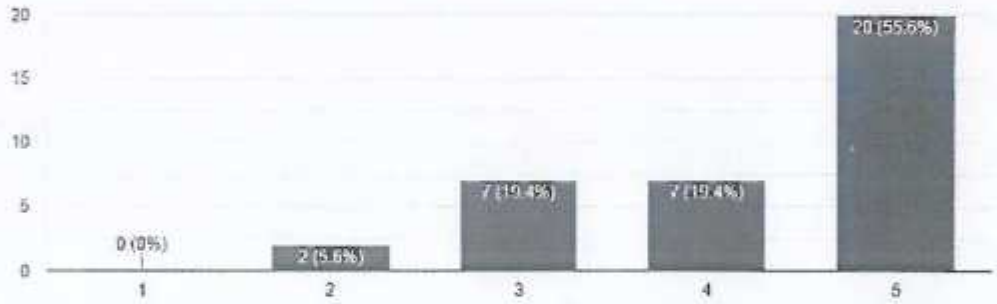
19 responses



Not very – 1, Very much – 5

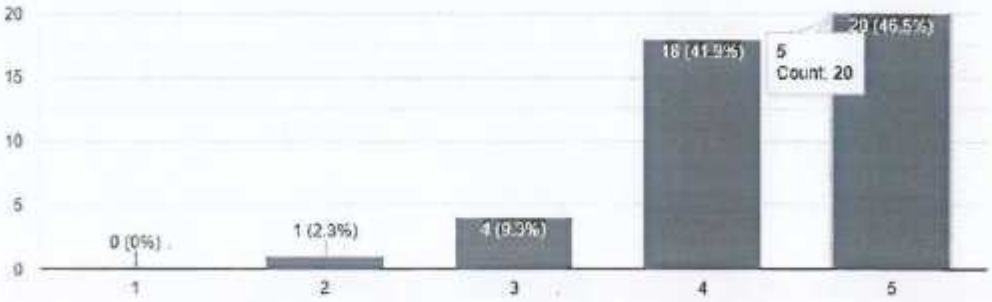
How relevant and helpful do you think it was in terms of Maths and Stats?

36 responses



How relevant and helpful do you think it was in terms of Maths and Stats?

43 responses



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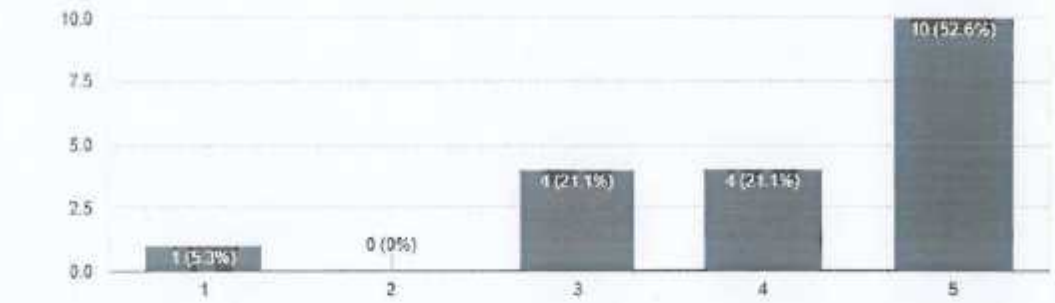
How relevant and helpful do you think it was in terms of Maths and Stats?

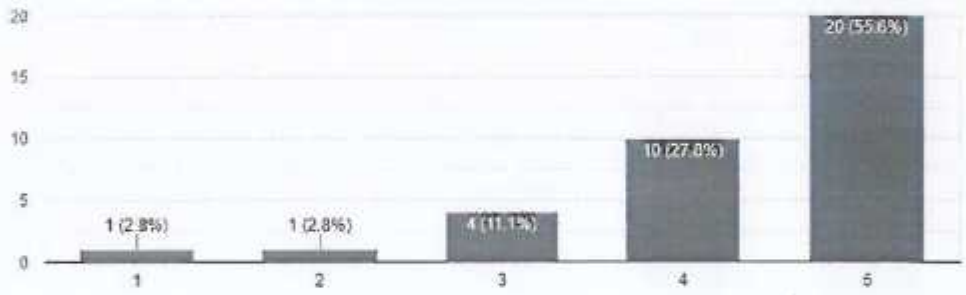
19 responses



Not very – 1, Very much – 5

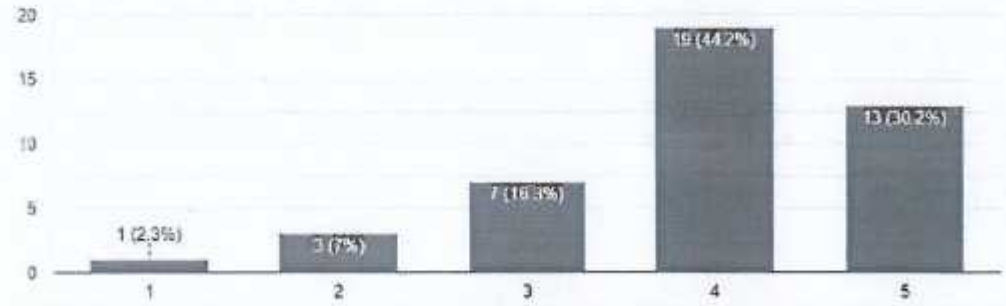
How satisfied were you with the session content?

36 responses



How satisfied were you with the session content?

43 responses



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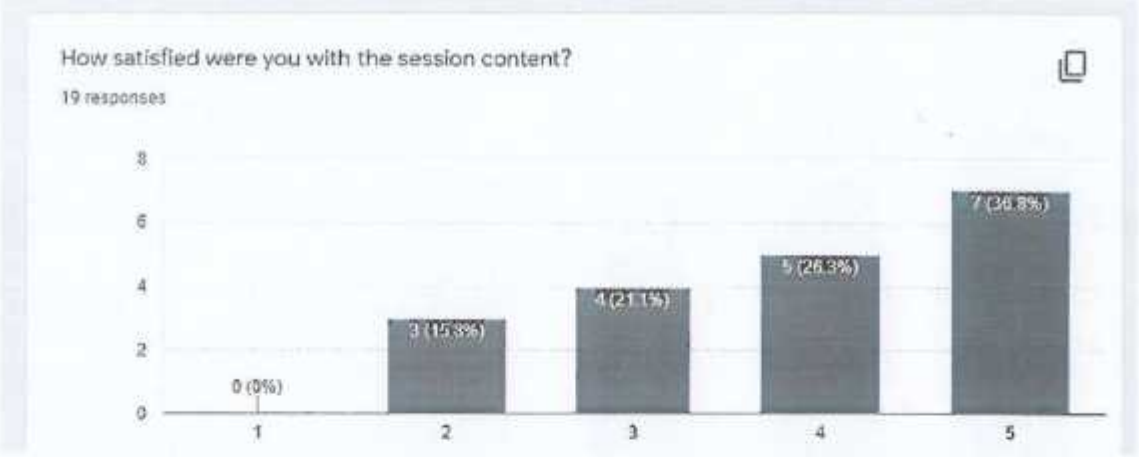
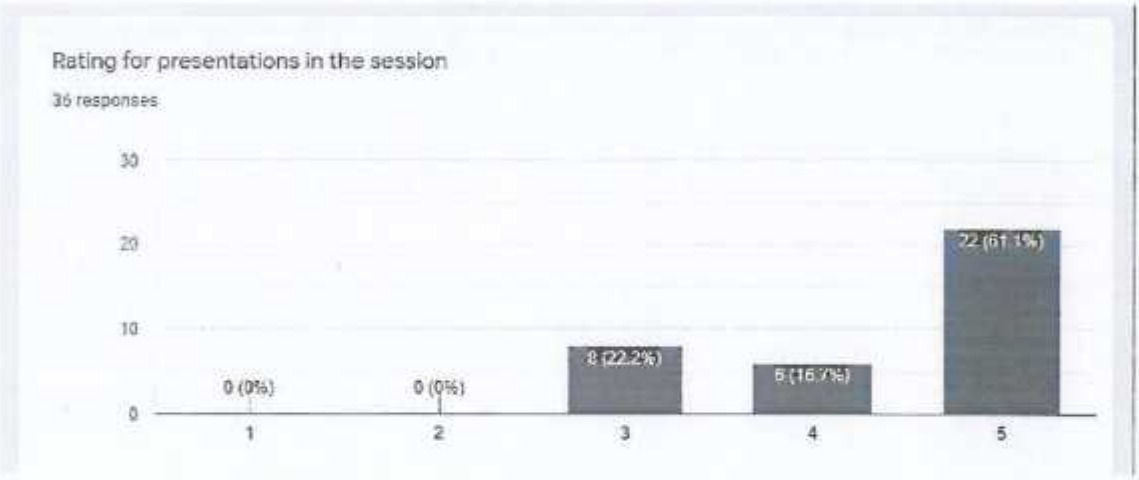
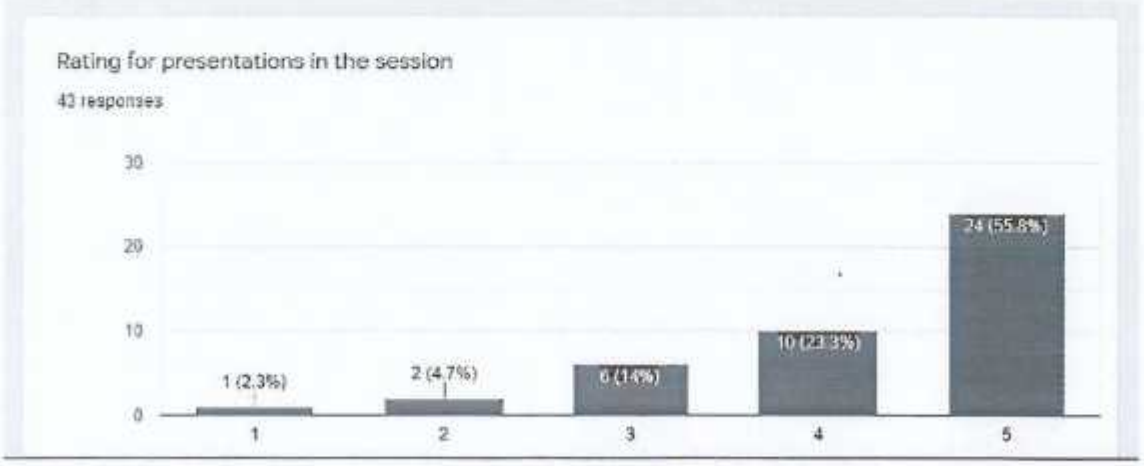


Poor – 1, Excellent – 5





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Poor – 1, Excellent – 5

Few comments made by the students in the course are as follows:

- It is knowledgeable and helpful
- Helpful course
- proved to be very good for me
- Well explained

Dr. GVV Hemasundar

Head, Department of Mathematics

Dr. Usha Iyer

Principal

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98	amitkawat93@gmail.com	Shekhar	7710924636

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T.Y.B.COM -SEM V

COMPUTER SYSTEMS & APPLICATIONS

SQL Practical Slips

a) Create a table EMPLOYEE with columns for employee id (EMPID, integer), employee name (EMPNAME, character variable width 20 columns), job id (JOBID, character width 4), salary (SAL, width of 6 with 2 decimals), and hire date (HDATE, date). Create database OFFICE, table EMPLOYEE and insert 3 rows/ values. Also write MySQL queries for the following:

1) Display the employee id, employee name and salary of employees who's the salary is 25,000 or more.
2) Display all the rows where the second letter in the employee name is 'H'.

b) Create a table called COLLEGE having the following columns Roll Number (RN, integer), Class (CLASS, character width 10), Students Name (STNAME, character variable width 20 columns), Fees Paid (FEE, width of 6 with 2 decimals) and Date of Admission (DOA, date). Create database OFFICE, table EMPLOYEE and insert 3 rows/ values. Write MySQL statements for the following:

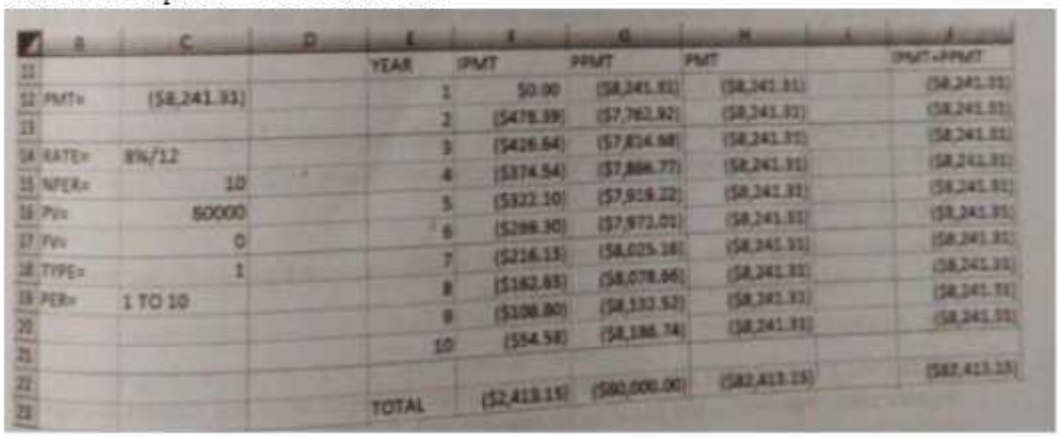
1) Display the Roll number, student name and fees whose fees is 15,000 or less.
2) Display all the rows where the last letter in the student name is 'H'.

c) Create a database with your NAME and add a table EMPLOYEE with columns for employee id (EMPID, integer), employee name (ENAME, character variable width 20 columns), job id (JOBID, character width 4), salary (SAL, width of 6 with 2 decimals), and join date (JDATE, date). Create database OFFICE, table EMPLOYEE and insert 3 rows/ values. Also write MySQL queries for the following:

1) Display the employee id, employee name and salary of employees who's the salary is 25,000 or less
2) Display all the rows where the last letter in the employee name is 'H'.

Excel Practical Slips

Calculate the monthly instalment for the loan amount of Rs 80,000 at 8% rate of interest p.a. and payment is at the beginning of the period . The amount has to be paid in 10 instalments. Also find principal and interest component of the 10 instalments along with the total principal and interest paid in 10 instalments.



	A	C	D	E	F	G	H	I	J
11				YEAR	IPMT	PPMT	PMT		IPMT+PPMT
12	PMT=	($8,241.31)		1	$0.00	($8,241.31)	($8,241.31)		($8,241.31)
13				2	($478.39)	($7,762.92)	($8,241.31)		($8,241.31)
14	RATE=	8%/12		3	($426.64)	($7,814.68)	($8,241.31)		($8,241.31)
15	NPER=	10		4	($374.54)	($7,866.77)	($8,241.31)		($8,241.31)
16	PV=	80000		5	($322.10)	($7,919.22)	($8,241.31)		($8,241.31)
17	FV=	0		6	($269.30)	($7,972.01)	($8,241.31)		($8,241.31)
18	TYPE=	1		7	($216.13)	($8,025.18)	($8,241.31)		($8,241.31)
19	PER=	1 TO 10		8	($162.63)	($8,078.66)	($8,241.31)		($8,241.31)
20				9	($108.80)	($8,132.52)	($8,241.31)		($8,241.31)
21				10	($54.58)	($8,186.74)	($8,241.31)		($8,241.31)
22									
23				TOTAL	($2,413.15)	($80,000.00)	($82,413.15)		($82,413.15)

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In the following worksheet enter the values in column B corresponding to formulas given in column A.

	A	B
1	SQRT(49)	
2	INT(-3.9)	
3	MOD(25,8)	
4	ROUND(67.35, 1)	
5	ABS(-39)	
6	MAX(34, 45, 21, 78)	

The following data has been entered in a worksheet.

	A	B	C
1	Name	Pay	DA
2	John	2100	
3	Raja	3000	
4	Ahmed	4000	
5	Usha	1800	

In the cell C2, the formula =B2*0.9 is entered. This formula is copied to cells C3, C4, and C5. What values will be displayed in cells C2, C3, C4, and C5? What will be the formula in cell C5?

The following data has been entered in a worksheet.

	A	B	C	D
1	**Name**	**Test 1 Marks**	**Test 2 Marks**	**Maximum Marks**
2	Jasmine	56	62	
3	Deepa	49	53	
4	Anjali	76	71	
5	Puneet	35	41	

Write function / formula in column D to grant maximum of the two marks.

The marks in six subjects of students is shown in the table below. Calculate the total marks obtained by each student in all the six subjects, and percentage of marks (up to 2 decimal places). Also print the highest aggregate marks obtained.

	A	B	C	D	E	F	G	H	I
1	*Name*	*English*	*Hindi*	*Eco*	*BK*	*Maths*	*Acc.*	*Total*	*Pctg.*
2	Anjali	76	63	78	66	68	86		
3	Rajesh	54	49	48	52	46	59		
4	Dilip	72	69	66	78	75	81		
5	Jasmine	87	73	84	82	91	93		
6	Mumtaz	54	49	28	31	17	21		
7	**Highest Aggregate Marks**								

Consider the following worksheet showing the Sales of 5 persons.

	A	B	C	D	E	F
1	NAME	SALES	COMMISSION	DISCOUNT	NET	TAX
2	ASIF	45000				
3	REHANA	60000				
4	SALMAN	25000				
5	ANWAR	70000				
6	AAMIR	20000				

Write steps to find for all the salesmen

(i) Commission as 6% of the Sales or 5000 whichever is more in column C.

(ii) Discount as 12% of the Sales or 4000 whichever is less in column D.

(iii) Net as Sales- Commission – Discount in column E.

(iv) Tax as 10% of Net in column F.

The following data has been entered in a worksheet.

	A	B	C	D	E	F
1	Name	Basic	DA	HRA	Total Pay	Tax
2	Ramesh	1,00,000				
3	Pooja	75,000				
4	Anjali	67,000				
5	Ajay	12,00,000				
6	Kajol	80,000				
7	Kaya	90,000				

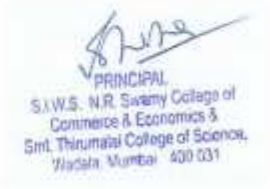
Write the steps to obtain

i) DA as130% of the Basic or 40,000 whichever is mor in column C.

ii) HRA as 18% of the Basic or 20,000 whichever is less in column D.

iii) TOTAL PAY as BASIC + DA + HRA in column E.

iv) Tax as 25% of Total Pay in column F.



Practical Problems for lab session.

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PRACTICALS FOR TYBCOM SEMESTER VI CSA

Practicals in Advanced MS-Excel

1. Prepare a work sheet containing the name and taxable income in columns A and B respectively. The first row contains the headings and 2nd row to 10th row containing the data. Enter your own data.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b) Obtain the income tax in column C using the following income tax slabs.

Taxable income (RS)	Rate
First 1,00,000	Nil
Next 60,000	10%
Next 70,000	20%
Excess	30%

c) Obtain the surcharge in column D , where surcharge is 3% of the income tax for those whose taxable income is above Rs.5,00,000.

d) Obtain total tax in column E, as the sum of income tax and surcharge.

2. Prepare a work sheet containing the name of the salesman and sales for the months of January, February and March in columns A to D

. The first row contains the headings and 2nd row to 8th row containing the data . Enter your own data ensuring that the sales entered in a month are minimum 100000 and maximum 300000.

Carry out the following operations on this work sheet.

a) Enter the following bonus table in columns H and I.

SALES	BONUS
300000	2000
400000	3000
500000	4000
600000	5000
700000	6000
800000	7000
900000	8000

b) Save the work sheet under your name followed by your roll number and question number .

c) Obtain the total sales of each salesman in the first quarter in column E.

d) Using VLOOKUP function obtain the bonus amounts to be given to each salesman in column F . (Note: if the total sales are say 5,21,000 then bonus is 4000.)

3. Prepare a work sheet containing Name and Marks in 7 subjects in column A to H . Type titles in A1 to H1 . Enter your own data from A2 to H8.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b) Obtain the total marks of each student in column I.

c) Construct the 3D pie diagram for the totals. for each name.

d) Display only those student's details that have total marks exceeding 420.

e) Display only those students's details whose name begins with 'R'.

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4 **Calculation of DA, HRA, PF, Gross Salary and Net Salary using MS-Excel.**

Prepare a worksheet containing Employee Numbers Names and Basic salarys of 5 employees in columns A , B and C respectivelly. The first row contains the headings and second to sixth row contain the data. Enter your own data.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b)Obtain DA in column D where DA is 30% of basic salary.

c)Obtain HRA in column E as per following condition.

If basic salary >= 30000, HRA is 35% of basic salary. If basic salary>=20000 but less than30000, HRA is 25% of basic. If basic salary < 20000, HRA is 20% of basic salary.

d) Obtain PF in column F where PF is 15% of basic salary.

e) Obtain Gross Salary in column G where Gross salary = Basic + DA +HRA

f) Obtain Net Salary in column H where Net salary = Gross salary - PF

5 Consider the following worksheet containing the various expenditures incurred and income of a person.

	A	B	C	D
1		A Person's Budget		
2	Particulars	Expenditure		Income
3	Rent	11000		50000
4	Food	14000		
5	Phone Bills	500		
6	Clothes	1200		
7	Travelling	3000		
8	Club	5000		
9	Internet	700		
10	Books	600		
11	Health Care	1500		
12	EMIs	8000		
13				
14	Total Exp.	45500		
15	Income left			4500

Prepare scenarios where there is a change as follows:

Travelling decreases to 2500, Club fees decreases to 2500 and Internet decreases to 500

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(6) Consider the following worksheet.

	A	B	C
1	Cost Centers	Amount in 2014	Amount in 2020
2	Fees	200000	
3	Hostel Charges	15000	
4	Food & Clothing	25000	
5	Miscellaneous	10000	
6	Total Amount required	250000	
7			
8			

In the above worksheet the costs involved for education in 2014 under four categories is given. Write the steps to calculate the Amounts required in 2020 taking in to account increase in fees by 50%, Hostel charges by 25%, Food and Clothing by 50% and Miscellaneous amounts by 30%. Find the total amount required in B6 and C6 respectively Further assuming that this target amount required in 2020 taking into account various other factors is say 4,50,000 find using goal seek, the amount that has to be saved each month in the next 6 years in the cell A8 to meet this target amount assuming no interest being received on amounts saved.

(7) A company makes four products Printers, Monitors , Keyboards and Hard Disks whose sale price is Rs. 5000, Rs. 3000, Rs.1000 and Rs.3500 respectively. For the company to break-even, it has to achieve a total sale of Rs.1,00,00,000 in a year. Using Solver write the steps to find out the number of units of each of these four products that should be sold in order to meet the desired target sale, given that the Company has the capacity to make maximum 2000,1000,3000 and 1800 units of each of these four products respectively in a year.

Practicals in Visual Basics: (VB)

8 Write a project in VB to design a suitable form to add two numbers and display their sum.

9 Write a project in VB to design a suitable form to enter sales and calculate and display the bounus which is 20% of sales.

10 Write a project in VB to design a suitable form to enter salary and calculate and display the DA which is 80% of salary.

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Solution – Computer Practical Sheet
TY.B.Com - Sem VI

PROBLEM 1

a) 1) After typing the data in columns A and B, click on the office button and select 'save as'.
2) Select Excel workbook, type the name as 'MUKESH40011' and click on save.

b) 1)Select C1 and type the heading 'INCOME TAX'.
2) Select C2 and type
=IF(B2<=100000, 0, IF(B2<=160000, (B2-100000)*10%, IF(B2<=230000,
60000*10% + (B2-160000)*20%, 60000*10% + 70000*20% + (B2-230000)*30%))) and
press enter.
3) Select C2 and drag the fill handle to C10;

c) 1)Select D1 and type the heading 'SURCHARGE'
2) Select D2 and type
=IF(B2>500000, C2*3%, 0) and press enter.
3) Select D2 and drag the fill handle to D10.

d) 1) Select E1 and type the heading 'TOTAL TAX'.
2) Select E2 and type =C2 + D2 and press enter.
3) Select E2 and drag the fill handle to E10.

PROBLEM 2

a) 1)After typing the data in columns A to D and columns H, I, click on the office button and select 'save as'.
b) Select 'Excel workbook' type the name as 'MUKESH40012' and click on save.

c) 1) Select E1 and type the heading 'TOTAL SALES'.
2) Select E2 and type = SUM(B2:D2) and press enter.
3) Select E2 and drag the fill handle to E8.

d) 1) Select F1 and type the heading 'BONUS'.
2) Select F2 and type
=VLOOKUP(E2, $H$2:$I$8,2) and press enter.
3) Select F2 and drag the fill handle to F8.

PROBLEM 3

a) 1) After typing the data in columns A to H, click on the office button and select 'save as'.
2) Select Excel Workbook, type the name as 'MUKESH40013' and click on save.

b) 1)Select I1 and type the heading 'TOTAL'.
2) Select I2 and type =SUM(B2:H2).
3) Select I2 and drag the fill handle to I8.

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c) 1) Select the non-contiguous range A1 to A8 & I1 to I8.
2) From the Insert menu, select option Pie under charts group, sub-option 3-D pie.
3) 3-D pie diagram appears.
4) Under layout menu of chart tools, select chart title, sub-option above chart and type the title 'TOTAL'.

d) 1) Select the entire data.
2) In the Data menu, select Filter under Sort and Filter group.
3) Drop down arrows appears next to each column title.
4) Select the dropdown arrow next to the total column.
5) Under the number filters, select greater than.
6) Custom Auto filter window appears, type 420 and press OK.
7) Click at filter(Drop down arrow disappers)

e) 1) Select the entire data.
2) Under Data menu, select Filter under Sort and Filter group.
3) Drop down arrows appears next to each column title.
4) Select the dropdown arrows next to the name column.
5) Under the text filters, select 'begins with'
6) Custom Auto Filter window appears, type R and press OK.

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PRACTICAL 4

a) 1)After typing the data in columns A,B &C, click on the save button and select 'save as'.
2) Select Excel workbook, type the name as 'MUKESH40091' and click on save.

b) 1) Select D1 and type the heading 'DA'
2)Select D2 and type
=30/100*C2 and press enter.
3) Select D2 and drag the fill handle to D6.

c) 1) Select E1 and type the heading 'HRA'
2) Select E2 and type
=IF(C2>=30000, 35/100*C2, IF(C2>=20000, 25/100*C2, 20/100*C2)) and press enter
3) Select E2 and drag the fill handle to E6.

d) 1)Select F1 and type the heading 'PF'
2) Select F2 and type
= 15/100*C2 and press enter
3) Select F2 and drag the fill handle to F6

e) 1)Select G1 and type the heading 'Gross salary'
2) Select G2 and type
=SUM(C2:E2) and press enter.
3) Select G2 and drag the fill handle to G6

f) 1)Select H1 and type the heading 'Net Salary'
2) Select H2 and type
=G2 - F2 and press enter.
3) Select H2 and drag the fill handle to H6

PRACTICAL 5

a)Cell B14 : Type the formula =SUM(B3:B12)
b) Cell D15 : Type the formula =D3-B14
c) Step 1: Click on Data Menu --> Data Tools --> What-If Analysis --> Scenario Manager.
Step 2: We want to create a new scenario. So click the Add button.
Step 3: In the Add Scenario Dialog Box, in Scenario Name, type Original Budget.
In Changing Cells, type B7:B9. Click on OK. In Scenario Values dialog Box,
Click on OK. Now we will get back the Scenario Manager dialog box.
Step 4 : Click the Add button again. Type a new Name as Budget Two. Click OK.
Again in Scenario values dialog box , change the values and press OK.
In Scenario Manager Dialog Box, Click on Original Budget and then click on
Show button. Now click on Budget Two and then click on Show button.
Click the Close button in this dialog box.
Step 5 :-Click on Data Menu--> Data Tools --> What-If Analysis --> Scenario Manager.
From the Scenario Manager dialog box, click the Summary button to see the
Scenario Summay dialog box. Click OK. The Scenario Summary Report appears
in a separate worksheet which has the name Scenario Summary
This report shows the effect of new budget : Observe that the balance amount after new

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budget has become more(Rs. 7700 instead of the old 4500). The total expenditure has reduced from Rs. 45500 to Rs. 43200).

		Created by MUKESH on 26/11/2014	Created by MUKESH on 26/11/2014
Changing Cells:			
$B$7	2500	3000	2500
$B$8	2500	5000	2500
$B$9	500	700	500
Result Cells:			
$D$15	7700	4500	7700
$B$14	42300	45500	42300
$D$3	50000	50000	50000

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

PRACTICAL 6

1) Select C2 and type =B2*1.50 and press enter.
2) Select C3 and type =B3*1.25 and press enter.
3) Select C4 and type = B4*1.50 and press enter.
4) Select C5 and type = B5*1.30 and press enter.
5) Select B6 and type =SUM(B2:B5) and press enter
6) Select B6 and drag the fill handle to C6.
7) Select C8 and type the formula =A8*12*6
8) From Data Tab select What-If analysis and then select Goal Seek
9) In 'Set cell' type C8.
10) In 'To value' type 450000. This is the goal seek value.
11) In 'By changing cell' type A8 and click on OK, the goal seek status dialog box indicates it has found the value, click on OK, the required amount to be saved each month is obtained in the cell A8.

Cost Centers	Amount in 2014	Amount in 2020
Fees	200000	300000
Hostel Charges	15000	18750
Food & Clothing	25000	37500
Miscellaneous	10000	13000
Total Amount required	250000	369250
	6250	450000

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Solution: (7)

1. In A1 type 5000, A2 type 3000, in A3 type 1000 and in A4 type ₹3500.
2. Type 0 in the cells B1,B2,B3 and B4.(Solver will enter the quantity to be sold of each of these 4 products in these cells.
3. Select C1 and type =A1*B1 (here we are asking Excel to multiply the selling price per unit with the quantity sold in order to obtain sales value.)
4. Select C1 and drag the fill handle to C4.
5. Select C5 and type =SUM(C1:C4) . This is the total sales to be achieved.
6. In D1 type Printer, D2 type Monitor, in D3 type Keyboard and in D4 type Hard Disk.
7. Select C5 and from the Data Tab select Solver.
8. In the dialog box in the 'Set objective' option the cell C5 is already selected.
9. In the 'To' option select 'Value of' and type 10000000 in the text box.
10. In the option 'By Changing Variable cells' text box enter B1:B4.
11. In the 'Subject to Constraints' select Add option.(as we want to add the constraints of the maximum number of units of each of these four products that the company can produce.)

12. In 'Cell Reference' type B1 and in constraint type 2000 and click on Add.
13. In 'Cell Reference' type B2 and in constraint type 1000 and click on Add.
14. In 'Cell Reference' type B3 and in constraint type 3000 and click on Add.
15. In 'Cell Reference' type B4 and in constraint type 1800 and click on ok.

5000	1058	5291005	Printer
3000	635	1904762	Monitor
1000	212	211640.2	Keyboard
3500	741	2592593	Hard Disk
		10000000	

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16. Then click on Solve. When Solver will obtain the result, click on ok.
17. Round the numbers in Column B by using the decrease decimal option from the Home Tab. These are the required number of units of each of the four products that have to be sold in order to achieve the sales goal of ₹1,00,00,000.

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Practical 8

Write a project in Visual Basic to design a suitable form to add two numbers and display their sum.

Object	Property	Value
Form	Name	frmSum
	Caption	Sum of Two variables
Lable	Name	lblNum1
	Caption	Num1
Lable	Name	lblNum2
	Caption	Num2
Lable	Name	lblSum
	Caption	Sum
Text Box	Name	txtNum1
	Text	""(blank)
Text Box	Name	txtNum2
	Text	" " (blank)
Text Box	Name	txtSum
	Text	""(blank)
Command Button	Name	cmdSum
	Caption	&Sum
Command Button	Name	cmdClear
	Caption	&Clear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmSum - 1

Private Sub cmdClear_Click()
txtNum1.Text = ""
txtNum2.Text = ""
txtSum.Text = ""
txtNum1.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub

Private Sub cmdSum_Click()
Dim a As Integer
Dim b As Integer
Dim s As Integer
a = txtNum1.Text
b = txtNum2.Text
s = a + b
txtSum.Text = s
End Sub
```

Num1

Num2

Sum

Sum Clear Quit

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16. Then click on Solve. When Solver will obtain the result, click on ok.
17. Round the numbers in Column B by using the decrease decimal option from the Home Tab. These are the required number of units of each of the four products that have to be sold in order to achieve the sales goal of ₹1,00,00,000.

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Practical 8

Write a project in Visual Basic to design a suitable form to add two numbers and display their sum.

Object	Property	Value
Form	Name	frmSum
	Caption	Sum of Two variables
Lable	Name	lblNum1
	Caption	Num1
Lable	Name	lblNum2
	Caption	Num2
Lable	Name	lblSum
	Caption	Sum
Text Box	Name	txtNum1
	Text	""(blank)
Text Box	Name	txtNum2
	Text	" " (blank)
Text Box	Name	txtSum
	Text	""(blank)
Command Button	Name	cmdSum
	Caption	&Sum
Command Button	Name	cmdClear
	Caption	&Clear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmSum - 1

Private Sub cmdClear_Click()
txtNum1.Text = ""
txtNum2.Text = ""
txtSum.Text = ""
txtNum1.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub

Private Sub cmdSum_Click()
Dim a As Integer
Dim b As Integer
Dim s As Integer
a = txtNum1.Text
b = txtNum2.Text
s = a + b
txtSum.Text = s
End Sub
```

Num1

Num2

Sum

Sum Clear Quit

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Practical 9

Write a project in Visual Basic to design a suitable form to enter sales and calcu and display the bonus which is 20% of sales.

Object	Property	Value
Form	Name	frmBonus
	Caption	Bonus Calculation
Lable	Name	lblSales
	Caption	Sales
Lable	Name	lblBonus
	Caption	Bonus
Text Box	Name	txtSales
	Text	""(blank)
Text Box	Name	txtBonus
	Text	" " (blank)
Command Button	Name	cmdCalculate
	Caption	&Calculate
Command Button	Name	cmdClear
	Caption	C&lear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmBonus - 1


Private Sub cmdCalculate_Click()
Dim s As Integer
Dim b As Double
s = txtSales.Text
b = 0.2 * s
txtBonus.Text = b
End Sub

Private Sub cmdClear_Click()
txtSales.Text = ""
txtBonus.Text = ""
txtSales.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub
```

Sales

Bonus

Calculate Clear Quit

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Practical 10

Write a project in Visual Basic to design a suitable form to enter salary and calculate and display the DA which is 80% of Salary.

Object	Property	Value
Form	Name	frmDA
	Caption	Salary Calculations
Lable	Name	lblBasic
	Caption	Basic Salary
Lable	Name	lblDA
	Caption	DA
Text Box	Name	txtBasic
	Text	""(blank)
Text Box	Name	txtDA
	Text	" " (blank)
Command Button	Name	cmdCalc
	Caption	&Calculate
Command Button	Name	cmdClear
	Caption	C&lear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmDA - 1

Private Sub cmdCalc_Click()
Dim b As Integer
Dim da As Double
b = txtBasic.Text
da = 0.8 * b
txtDA.Text = da
End Sub

Private Sub cmdClear_Click()
txtBasic.Text = ""
txtDA.Text = ""
txtBasic.SetFocus
End Sub

Private Sub cmdQu:t_Click()
End
End Sub
```

Basic Salary

DA

Calculate Clear Quit

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TYBCOM (Sem VI)- Computer Practical Sheet

1 Prepare the worksheet containing the name and taxable income in column A & B. The first row contains headings and second row to seventh row data. Enter your own data.

i. Carry out the following operations on this worksheet save the worksheet under your name, follow by your roll no. and question number.

ii. Obtain the income tax in column C using the following income tax slabs.

Taxable income	Rate
First 100000	NIL
Next 600000	10%
Excess	20%

iii. Obtain the surcharge in column D where surcharge is 3% of the income tax for those whose taxable income is above 150000.

iv. Obtain total tax in column E as sum of income tax and surcharge.

2 The following data is entered in the worksheet regarding the stocks during Jan. Feb and March

	A	B	C	D	E
1	ITEM	JAN	FEB	MARCH	TOTAL
2	PENCIL	4000	4200	4500	
3	PEN	3000	3000	3100	
4	NOTEBOOK	2000	1800	1800	
5	WRITING PAD	1000	1100	1200	

Carry out the following operations on this worksheet

A) Save the worksheet under your name followed by roll no. and question number.
B) Find the total stock of each product in the cells E2 to E5.
C) Create 3-D bar chart for the data.
D) Create 2-D pie chart for the month of March.
E) Create a line diagram for Jan and Feb.
F) Display only those item details that have total stock exceeding 9000.
G) Display only those item details whose name begins with 'P'.

3A The following data has been entered in the worksheet :

	A	B	C	D	E	F	G	H
1	NAME	DESIGNATION	HRA	DA		DESIG	HRA	DA
2	Aman	Peon				Peon	4000	5000
3	Beena	Clerk				Clerk	8000	10000
4	Chitra	Clerk				Manager	15000	20000
5	Dany	Manager						
6	Elion	Peon						
7	Fazia	Clerk						
8	Gopal	Manager						

Write the steps to find HRA and DA in column C & D respectively using VLOOKUP function. Policy to be referred for finding the HRA and DA in the range F2:H4

Visual Basic

1 Write a project in Visual Basic to design a suitable form to add the numbers and display their sum.

2 Write a project in Visual Basic to design a suitable form which allows the user to enter Basic Salary and Calculate and display the HRA as 13% of Basic Salary upto 25000 and 20% of Basic salary otherwise.

3 Write a project in Visual Basic to design a suitable form to compute and display the sum of the series: 3 + 7 + 11 + 15 +.....+ 203

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3B Roll number and marks are entered in column A & B as shown in the following worksheet. Write steps to compute grade & the award amount in columns C & D respectively using HLOOKUP functions. Policy table to be referred for finding grade & award amount is given in the range F1: J3

	A	B	C	D	E	F	G	H	I	J
1	Roll No	Marks	Grade	Award		Marks	0	50	70	90
2	231	87				Grade	D	C	B	A
3	211	56				Award	0	150	500	1000
4	345	94								
5	564	55								
6	234	77								
7	123	45								

4 The following table shows quantity cost price per unit & selling price per unit

	A	B	C	D	E	F	G
1	PRODUCT	QTY	CPRICE	SPRICE	COST	SALES	PROFIT
2	PRODUCT1	200	100	123			
3	PRODUCT2	240	75	120			
4	PRODUCT3	430	28	60			
5	PRODUCT4	120	45	70			
6	PRODUCT5	320	40	55			
7	PRODUCT6	230	50	65			

Write steps in Excel to calculate cost in column E, sales in column F, Profit in column G and total profit in G8 respectively. Write steps in Excel using Solver to find what the cost per unit should be in order to achieve the total profit of 75000.

5A The following data has been entered in the worksheet :

	A	B	C	D	E	F	G
1	ROLL NO	NAME	DIT	EXPORT	COMPUTER	AVERAGE	GRADE
2	101	A	55	43	61		
3	102	B	80	65	63		
4	103	C	40	50	45		
5	104	D	42	54	69		
6							

Write the average marks in column F. Assign the grade in column G using the following policy.

Average marks	Grade
70 and above	O
60 to 69.99	A
Below 60	B

5B The following data has been entered in the worksheet :

	A	B	C	D	E
1	Emp. no	Department	Salary	Allowance	Bonus
2	101	Export	25000		
3	102	Sales	18000		
4	103	Accounts	23000		
5	104	HR	35000		
6	105	Admin	29000		

I. Compute allowance @1% of the salary for salary upto 25000 otherwise @ 2% of the salary in column D

II. Compute bonus @20% of the salary for salary above 30000 otherwise @14% of the salary in column E

III. To find the total bonus of all employees whose salary is below 25000 in cell E8

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T.Y.B.Com - Sem VI - Computer Practical Exam

Sample sheet.

Q.1

Q 1 Write a project in VB to compute and display the sum of the series
3 + 7 + 11 + 15 + ... + 203

Q 2 Consider the following worksheet :

	A	B	C
1	NAME	TINCOME	ITAX
2	Hitesh	120000	
3	Firdosh	285000	
4	Seema	320000	
5	Malti	540000	
6	Munira	380000	

Write steps to calculate Income Tax in Column C using the following Income-Tax Rate Table.

TINCOME	RATE
First 2,50,000	Nil
Next 1,00,000	12%
Excess	20%

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Ty.B.Com — VIVA Q PRACT EXAM SEM VI — Computer System & Application.

Q 1 Q.1 What is the difference between i) %c and %s ii) putch() and puts() ?

Q.2 What is the use of main() in the C program.

Q.3 What does the i) VLOOKUP
ii) SUMIF function do ?

Q 2 Q.1 What is the difference between i) break and continue ii) getch() and gets() ?

Q.2 What is an escape sequence. Name any 2 escape sequence.

Q.3 What does the i) IF
ii) LEFT function do ?

Q 3 Q.1 What is the difference between i) if() and switch() ii) scanf() and getchar() ?

Q.2 Mention the different type of storage classes in C.

Q.3 What does the i) COUNTIF
ii) RIGHT function do ?

Q 4 Q.1 What is the difference between i) ++y and y++ ii) getche() and getchar() ?

Q.2 What is the use of the continue statement ?

Q.3 What does the i) MID
ii) TRIM function do ?

Q 5 Q.1 What is the difference between i) float and double ii) puts() and putchar() ?

Q.2 What is a unary operator ?

Q.3 What does the i) LEN
ii) TODAY function do ?

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Q 6 Q.1 What is the difference between i) %d and %ld ii) printf() and puts() ?

Q.2 What is the purpose of break statement ?

Q.3 What does the i) UPPER
ii) NOW function do ?

Q 7 Q.1 What is the difference between i) do...while and for ii) getchar() and gets() ?

Q.2 What are the basic data types in C ?

Q.3 What does the i) LOWER
ii) DATE function do ?

Q 8 Q.1 What is the difference between i) int and float ii) getchar() and putchar() ?

Q.2 How do you write comments in the C program ?

Q.3 What does the i) PROPER
ii) TIME function do ?

Q 9 Q.1 What is the difference between i) identifiers and keywords ii) scanf() and getch() ?

Q.2 What are keywords in C? Give 2 examples.

Q.3 What does the i) DAY
ii) MONTH function do ?

Q 10 Q.1 What is the difference between i) %c and %s ii) putch() and puts() ?

Q.2 What are identifiers ? State one rule to name an identifier.

Q.3 What does the i) YEAR
ii) WEEKDAY function day ?

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Practical Problems for lab Session

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(SEM V)

JOURNAL PRACTICAL PROBLEMS (SQL)

PROBLEM 1: Creating and deleting database ,table and modiftying structure of a table.

1) Create a database office. 2) Confirm that database office is created. 3) Select and open the database office to work with. 4) Create a table emp in a database office with the following fields.

Field name	Data type
ename	character with variable width of 15 columns
eno	integer, primary key
sal	with 5 integer and 2 decimal places
jdate	date

5) Confirm that table emp is created. 6) View the structure of the table. 7) Add a column dno positive integer(5) after ename. 8) Add a column bonus decimal(6,2) with defalult value 1000. 9) Change the size of the column sal from decimal(7,2) to decimal(8,2). 10) Change the name of the sal to esal. 11) Verify the above changes made 12) Remove the column bonus. 13) Verify that column bonus is removed. 14) Rename the table emp to employee. 14) Verify that table emp is renamed.

PROBLEM 2 : Populating a table and displaying contents of a table.

1) Populate table employee with the following data.

eno	ename	dno	esal	jdate
10	rakesh	42	25000	20-02-1998
14	amar	34	32000	12-09-2002
20	salim	42	27000	01-01-1998
27	anand	33	20000	15-08-2002
35	anthony	34	40000	15-08-1995

2) Display the contents of the table employee. 3) Display ename and esal as name and salary. 4) Display names and join date and salary of employees whose salary is more than Rs. 30000 as name, joindate and salary. 5) Change the name of employee with employee number 35 as kunal. 6) List records 3 to 5 from employee. 7) List name of employees who have joined after 2000. 8) Display records from employee not working in department no.34

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PROBLEM 3 : Displaying sorted and group wise data.

1) Display distinct department numbers from employee. 2) Display total number of employees. 3) Count the number of employees department number wise. 4) List the department number with only one employee working in. 5) List contents of employee in the alphabetical order of ename 6) List contents of employee in the ascending order of dno and in the descending order of eno. 7) Count the number of employees year wise of join date. 8) Delete the row of 'rakesh'. 9) Confirm that the row of 'rakesh' is deleted. 10) Delete all the rows of the table employee. 11) Confirm that all the rows of the table employee are deleted. 12) Delete the table employee. 13) Confirm that the table employee is deleted. 14) Delete the database office. 15) Confirm that the database office is deleted.

PROBLEM 4 : Summary Queries

1) Create a database siws with tables student and result.

student

rollno	int(4)
name	varchar(20)
gender	varchar(6)
fees	decimal(6,2)

result

rollno	int (4)
m1	int(3)
m2	int(3)
m3	int(3)
total	int(3)

2) Populate tables as follows:

student

rollno	name	gender	fees
7021	sakshi	f	3394.00
7828	sriram	m	5000.00
8079	mohan	m	4500.00
8170	amita	f	4000.00
7329	bina	f	3500.00

result

rollno	m1	m2	m3	total
7021	72	43	79	0
7828	49	30	82	0
8079	42	34	75	0
7329	60	58	69	0
8170	60	33	78	0

3) Show student table arranged in alphabetical order of name. 4) Sort data in student table first by gender then by roll number. 5) Count the number of male and female students. 6) Find average fees paid by male and female students. 7) Display name who pay fees either 4000 or 6000. 8) Display the average fees and sum of fees paid by the students.

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Excel Journal Practical

(SEM V)

Problem I

Prepare a work sheet containing Name and Marks in 7 subjects in column A to H. Type titles in A1 to H1. Enter your own data from A2 to H8.

Carry out the following operations on this work sheet.

a) Save the work sheet under your name followed by your roll number and question number.
b) Obtain the total marks of each student in column I.
c) Obtain the average marks of each student in column J.

Problem II

Prepare a work sheet containing the name, age, department and bonus amount in columns A to D, The first row contains the headings and 2nd row to 10th row containing the data. Enter your own data.

Carry out the following operations on this work sheet.

a) Save the work sheet under your name followed by your roll number and question number.
b) Sort the data in ascending order of age.
c) Sort the data in ascending order of department.
d) Obtain subtotals of bonus for each department.
e) Explain 1 and 2 row level symbol.
f) Remove these sub totals and return the work sheet to its previous state.

Problem III

Prepare the work sheet containing the name, join date, department and salary i columns A to D , The first row contains the headings and 2nd row to 8th row containing the data. Enter your own data.

Carry out the following operations on this work sheet.

a) Save the work sheet under your name followed by your roll number and question number.
b) Prepare a pivot table report containing Join date in the row area and sum of salary and minimum salary in the data area.
c) Prepare another Pivot table on the same data taking department in the row and average salary and maximum salary in the data area.

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PROBLEM 5 : Multiple and Sub queries:

1) Find total marks as m1+m2+m3. 2) Display the contents of the above table. 3) Display name, roll number and total marks. 4) Display marks and names of the students name starting with 's'. 5) Display name and roll number of students getting average marks more than or equal to 60 6) Write a query to display name and gender of a student who pays more than the average fees. 7) Write a query to display name and roll of a student getting maximum total marks. 8) Display roll number and marks in m1 who have scored more than average marks in m1 9) Display name , m1, m2, m3 and total marks of student with roll number 8079. 10) Display name of student getting more than or equal to 55 in all the 3 subjects 11) Display name of student getting less than 35 in atleast one of the subjects.

PROBLEM 6 : Transactions

1) Insert in transaction mode the following data in the table student and result.

student

rollno	name	gender	fees
8270	piyush	m	2700.00
8290	kavita	f	5000.00

result

rollno	m1	m2	m3	total
8270	77	54	67	198
8290	45	87	69	201

2) Save changes to tables 3) View both the tables 4) Start transaction
5) Remove all data from result 6) Display contents of table result.
7) Revert back the data in table result. 8) Delete both the tables student and result
9) Delete the database siws.

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T.Y.B.com – Sem V – Practical Exam Sample Sheet

Q.1 Create a table EMP in the data base your NAME with the following columns

Columns	Column Name	Date Type and Characteristics
Employee number	ENO	smallint unsigned
Employee name	ENAME	varchar(20)
Salary	SALARY	decimal(7,2)

Populate table EMP with the following data.

ENO	ENAME	SALARY
224	RAJESH	25000
335	JAYESH	32000
225	SHABARI	27000
337	RAMU	20000
348	JOHN	40000

a) Display the structure of the table EMP.
b) Display the contents of the table EMP.
c) List the name of employees whose salary is above Rs. 25000.
d) Delete the table EMP.

Q.2 Enter the following data in a excel worksheet

	A	B	C	D
1	ENO	ENAME	DEPT	SALARY
2	555	SSS	HR	40000
3	888	YYY	ADMIN	30000
4	333	ZZZ	HR	60000
5	444	XXX	SALES	20000
6	222	WWW	HR	50000
7	999	GGG	ADMIN	80000

a) Save the worksheet under your name followed by your roll number.
b) Prepare a pivot table report containing DEPT in the row area and sum of salary and average of salary in the data area.
c) Delete the worksheet you have created.

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Practical Problems for lab session.

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PRACTICALS FOR TYBCOM SEMESTER VI CSA

Practicals in Advanced MS-Excel

1. Prepare a work sheet containing the name and taxable income in columns A and B respectively. The first row contains the headings and 2nd row to 10th row containing the data. Enter your own data.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b) Obtain the income tax in column C using the following income tax slabs.

Taxable income (RS)	Rate
First 1,00,000	Nil
Next 60,000	10%
Next 70,000	20%
Excess	30%

c) Obtain the surcharge in column D , where surcharge is 3% of the income tax for those whose taxable income is above Rs.5,00,000.

d) Obtain total tax in column E, as the sum of income tax and surcharge.

2. Prepare a work sheet containing the name of the salesman and sales for the months of January, February and March in columns A to D

. The first row contains the headings and 2nd row to 8th row containing the data . Enter your own data ensuring that the sales entered in a month are minimum 100000 and maximum 300000.

Carry out the following operations on this work sheet.

a) Enter the following bonus table in columns H and I.

SALES	BONUS
300000	2000
400000	3000
500000	4000
600000	5000
700000	6000
800000	7000
900000	8000

b) Save the work sheet under your name followed by your roll number and question number .

c) Obtain the total sales of each salesman in the first quarter in column E.

d) Using VLOOKUP function obtain the bonus amounts to be given to each salesman in column F . (Note: if the total sales are say 5,21,000 then bonus is 4000.)

3. Prepare a work sheet containing Name and Marks in 7 subjects in column A to H . Type titles in A1 to H1 . Enter your own data from A2 to H8.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b) Obtain the total marks of each student in column I.

c) Construct the 3D pie diagram for the totals. for each name.

d) Display only those student's details that have total marks exceeding 420.

e) Display only those students's details whose name begins with 'R'.

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4 **Calculation of DA, HRA, PF, Gross Salary and Net Salary using MS-Excel.**

Prepare a worksheet containing Employee Numbers Names and Basic salarys of 5 employees in columns A , B and C respectivelly. The first row contains the headings and second to sixth row contain the data. Enter your own data.

Carry out the following operations on this worksheet.

a) Save the work sheet under your name followed by your roll number and question number.

b)Obtain DA in column D where DA is 30% of basic salary.

c)Obtain HRA in column E as per following condition.

If basic salary >= 30000, HRA is 35% of basic salary. If basic salary>=20000 but less than30000, HRA is 25% of basic. If basic salary < 20000, HRA is 20% of basic salary.

d) Obtain PF in column F where PF is 15% of basic salary.

e) Obtain Gross Salary in column G where Gross salary = Basic + DA +HRA

f) Obtain Net Salary in column H where Net salary = Gross salary - PF

5 Consider the following worksheet containing the various expenditures incurred and income of a person.

	A	B	C	D
1		A Person's Budget		
2	Particulars	Expenditure		Income
3	Rent	11000		50000
4	Food	14000		
5	Phone Bills	500		
6	Clothes	1200		
7	Travelling	3000		
8	Club	5000		
9	Internet	700		
10	Books	600		
11	Health Care	1500		
12	EMIs	8000		
13				
14	Total Exp.	45500		
15	Income left			4500

Prepare scenarios where there is a change as follows:

Travelling decreases to 2500, Club fees decreases to 2500 and Internet decreases to 500

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(6) Consider the following worksheet.

	A	B	C
1	Cost Centers	Amount in 2014	Amount in 2020
2	Fees	200000	
3	Hostel Charges	15000	
4	Food & Clothing	25000	
5	Miscellaneous	10000	
6	Total Amount required	250000	
7			
8			

In the above worksheet the costs involved for education in 2014 under four categories is given. Write the steps to calculate the Amounts required in 2020 taking in to account increase in fees by 50%, Hostel charges by 25%, Food and Clothing by 50% and Miscellaneous amounts by 30%. Find the total amount required in B6 and C6 respectively Further assuming that this target amount required in 2020 taking into account various other factors is say 4,50,000 find using goal seek, the amount that has to be saved each month in the next 6 years in the cell A8 to meet this target amount assuming no interest being received on amounts saved.

(7) A company makes four products Printers, Monitors , Keyboards and Hard Disks whose sale price is Rs. 5000, Rs. 3000, Rs.1000 and Rs.3500 respectively. For the company to break-even, it has to achieve a total sale of Rs.1,00,00,000 in a year. Using Solver write the steps to find out the number of units of each of these four products that should be sold in order to meet the desired target sale, given that the Company has the capacity to make maximum 2000,1000,3000 and 1800 units of each of these four products respectively in a year.

Practicals in Visual Basics: (VB)

8 Write a project in VB to design a suitable form to add two numbers and display their sum.

9 Write a project in VB to design a suitable form to enter sales and calculate and display the bounus which is 20% of sales.

10 Write a project in VB to design a suitable form to enter salary and calculate and display the DA which is 80% of salary.

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Solution – Computer Practical Sheet
TY.B.Com - Sem VI

PROBLEM 1

a) 1) After typing the data in columns A and B, click on the office button and select 'save as'.
2) Select Excel workbook, type the name as 'MUKESH40011' and click on save.

b) 1)Select C1 and type the heading 'INCOME TAX'.
2) Select C2 and type
=IF(B2<=100000, 0, IF(B2<=160000, (B2-100000)*10%, IF(B2<=230000,
60000*10% + (B2-160000)*20%, 60000*10% + 70000*20% + (B2-230000)*30%))) and
press enter.
3) Select C2 and drag the fill handle to C10;

c) 1)Select D1 and type the heading 'SURCHARGE'
2) Select D2 and type
=IF(B2>500000, C2*3%, 0) and press enter.
3) Select D2 and drag the fill handle to D10.

d) 1) Select E1 and type the heading 'TOTAL TAX'.
2) Select E2 and type =C2 + D2 and press enter.
3) Select E2 and drag the fill handle to E10.

PROBLEM 2

a) 1)After typing the data in columns A to D and columns H, I, click on the office button and select 'save as'.
b) Select 'Excel workbook' type the name as 'MUKESH40012' and click on save.

c) 1) Select E1 and type the heading 'TOTAL SALES'.
2) Select E2 and type = SUM(B2:D2) and press enter.
3) Select E2 and drag the fill handle to E8.

d) 1) Select F1 and type the heading 'BONUS'.
2) Select F2 and type
=VLOOKUP(E2, $H$2:$I$8,2) and press enter.
3) Select F2 and drag the fill handle to F8.

PROBLEM 3

a) 1) After typing the data in columns A to H, click on the office button and select 'save as'.
2) Select Excel Workbook, type the name as 'MUKESH40013' and click on save.

b) 1)Select I1 and type the heading 'TOTAL'.
2) Select I2 and type =SUM(B2:H2).
3) Select I2 and drag the fill handle to I8.

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c) 1) Select the non-contiguous range A1 to A8 & I1 to I8.
2) From the Insert menu, select option Pie under charts group, sub-option 3-D pie.
3) 3-D pie diagram appears.
4) Under layout menu of chart tools, select chart title, sub-option above chart and type the title 'TOTAL'.

d) 1) Select the entire data.
2) In the Data menu, select Filter under Sort and Filter group.
3) Drop down arrows appears next to each column title.
4) Select the dropdown arrow next to the total column.
5) Under the number filters, select greater than.
6) Custom Auto filter window appears, type 420 and press OK.
7) Click at filter(Drop down arrow disappers)

e) 1) Select the entire data.
2) Under Data menu, select Filter under Sort and Filter group.
3) Drop down arrows appears next to each column title.
4) Select the dropdown arrows next to the name column.
5) Under the text filters, select 'begins with'
6) Custom Auto Filter window appears, type R and press OK.

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PRACTICAL 4

a) 1)After typing the data in columns A,B &C, click on the save button and select 'save as'.
2) Select Excel workbook, type the name as 'MUKESH40091' and click on save.

b) 1) Select D1 and type the heading 'DA'
2)Select D2 and type
=30/100*C2 and press enter.
3) Select D2 and drag the fill handle to D6.

c) 1) Select E1 and type the heading 'HRA'
2) Select E2 and type
=IF(C2>=30000, 35/100*C2, IF(C2>=20000, 25/100*C2, 20/100*C2)) and press enter
3) Select E2 and drag the fill handle to E6.

d) 1)Select F1 and type the heading 'PF'
2) Select F2 and type
= 15/100*C2 and press enter
3) Select F2 and drag the fill handle to F6

e) 1)Select G1 and type the heading 'Gross salary'
2) Select G2 and type
=SUM(C2:E2) and press enter.
3) Select G2 and drag the fill handle to G6

f) 1)Select H1 and type the heading 'Net Salary'
2) Select H2 and type
=G2 - F2 and press enter.
3) Select H2 and drag the fill handle to H6

PRACTICAL 5

a)Cell B14 : Type the formula =SUM(B3:B12)
b) Cell D15 : Type the formula =D3-B14
c) Step 1: Click on Data Menu --> Data Tools --> What-If Analysis --> Scenario Manager.
Step 2: We want to create a new scenario. So click the Add button.
Step 3: In the Add Scenario Dialog Box, in Scenario Name, type Original Budget.
In Changing Cells, type B7:B9. Click on OK. In Scenario Values dialog Box,
Click on OK. Now we will get back the Scenario Manager dialog box.
Step 4 : Click the Add button again. Type a new Name as Budget Two. Click OK.
Again in Scenario values dialog box , change the values and press OK.
In Scenario Manager Dialog Box, Click on Original Budget and then click on
Show button. Now click on Budget Two and then click on Show button.
Click the Close button in this dialog box.
Step 5 :-Click on Data Menu--> Data Tools --> What-If Analysis --> Scenario Manager.
From the Scenario Manager dialog box, click the Summary button to see the
Scenario Summay dialog box. Click OK. The Scenario Summary Report appears
in a separate worksheet which has the name Scenario Summary
This report shows the effect of new budget : Observe that the balance amount after new

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budget has become more(Rs. 7700 instead of the old 4500). The total expenditure has reduced from Rs. 45500 to Rs. 43200).

		Created by MUKESH on 26/11/2014	Created by MUKESH on 26/11/2014
Changing Cells:			
$B$7	2500	3000	2500
$B$8	2500	5000	2500
$B$9	500	700	500
Result Cells:			
$D$15	7700	4500	7700
$B$14	42300	45500	42300
$D$3	50000	50000	50000

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

PRACTICAL 6

1) Select C2 and type =B2*1.50 and press enter.
2) Select C3 and type =B3*1.25 and press enter.
3) Select C4 and type = B4*1.50 and press enter.
4) Select C5 and type = B5*1.30 and press enter.
5) Select B6 and type =SUM(B2:B5) and press enter
6) Select B6 and drag the fill handle to C6.
7) Select C8 and type the formula =A8*12*6
8) From Data Tab select What-If analysis and then select Goal Seek
9) In 'Set cell' type C8.
10) In 'To value' type 450000. This is the goal seek value.
11) In 'By changing cell' type A8 and click on OK, the goal seek status dialog box indicates it has found the value, click on OK, the required amount to be saved each month is obtained in the cell A8.

Cost Centers	Amount in 2014	Amount in 2020
Fees	200000	300000
Hostel Charges	15000	18750
Food & Clothing	25000	37500
Miscellaneous	10000	13000
Total Amount required	250000	369250
	6250	450000

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Solution: (7)

1. In A1 type 5000, A2 type 3000, in A3 type 1000 and in A4 type ₹3500.
2. Type 0 in the cells B1,B2,B3 and B4.(Solver will enter the quantity to be sold of each of these 4 products in these cells.
3. Select C1 and type =A1*B1 (here we are asking Excel to multiply the selling price per unit with the quantity sold in order to obtain sales value.)
4. Select C1 and drag the fill handle to C4.
5. Select C5 and type =SUM(C1:C4) . This is the total sales to be achieved.
6. In D1 type Printer, D2 type Monitor, in D3 type Keyboard and in D4 type Hard Disk.
7. Select C5 and from the Data Tab select Solver.
8. In the dialog box in the 'Set objective' option the cell C5 is already selected.
9. In the 'To' option select 'Value of' and type 10000000 in the text box.
10. In the option 'By Changing Variable cells' text box enter B1:B4.
11. In the 'Subject to Constraints' select Add option.(as we want to add the constraints of the maximum number of units of each of these four products that the company can produce.)

12. In 'Cell Reference' type B1 and in constraint type 2000 and click on Add.
13. In 'Cell Reference' type B2 and in constraint type 1000 and click on Add.
14. In 'Cell Reference' type B3 and in constraint type 3000 and click on Add.
15. In 'Cell Reference' type B4 and in constraint type 1800 and click on ok.

5000	1058	5291005	Printer
3000	635	1904762	Monitor
1000	212	211640.2	Keyboard
3500	741	2592593	Hard Disk
		10000000	

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16. Then click on Solve. When Solver will obtain the result, click on ok.
17. Round the numbers in Column B by using the decrease decimal option from the Home Tab. These are the required number of units of each of the four products that have to be sold in order to achieve the sales goal of ₹1,00,00,000.

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Practical 8

Write a project in Visual Basic to design a suitable form to add two numbers and display their sum.

Object	Property	Value
Form	Name	frmSum
	Caption	Sum of Two variables
Lable	Name	lblNum1
	Caption	Num1
Lable	Name	lblNum2
	Caption	Num2
Lable	Name	lblSum
	Caption	Sum
Text Box	Name	txtNum1
	Text	""(blank)
Text Box	Name	txtNum2
	Text	" " (blank)
Text Box	Name	txtSum
	Text	""(blank)
Command Button	Name	cmdSum
	Caption	&Sum
Command Button	Name	cmdClear
	Caption	&Clear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmSum - 1

Private Sub cmdClear_Click()
txtNum1.Text = ""
txtNum2.Text = ""
txtSum.Text = ""
txtNum1.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub

Private Sub cmdSum_Click()
Dim a As Integer
Dim b As Integer
Dim s As Integer
a = txtNum1.Text
b = txtNum2.Text
s = a + b
txtSum.Text = s
End Sub
```

Num1

Num2

Sum

Sum Clear Quit

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16. Then click on Solve. When Solver will obtain the result, click on ok.
17. Round the numbers in Column B by using the decrease decimal option from the Home Tab. These are the required number of units of each of the four products that have to be sold in order to achieve the sales goal of ₹1,00,00,000.

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Object	Property	Value
Form	Name	frmSum
	Caption	Sum of Two variables
Lable	Name	lblNum1
	Caption	Num1
Lable	Name	lblNum2
	Caption	Num2
Lable	Name	lblSum
	Caption	Sum
Text Box	Name	txtNum1
	Text	""(blank)
Text Box	Name	txtNum2
	Text	" " (blank)
Text Box	Name	txtSum
	Text	""(blank)
Command Button	Name	cmdSum
	Caption	&Sum
Command Button	Name	cmdClear
	Caption	&Clear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmSum - 1

Private Sub cmdClear_Click()
txtNum1.Text = ""
txtNum2.Text = ""
txtSum.Text = ""
txtNum1.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub

Private Sub cmdSum_Click()
Dim a As Integer
Dim b As Integer
Dim s As Integer
a = txtNum1.Text
b = txtNum2.Text
s = a + b
txtSum.Text = s
End Sub
```

Num1

Num2

Sum

Sum Clear Quit

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Practical 9

Write a project in Visual Basic to design a suitable form to enter sales and calcu and display the bonus which is 20% of sales.

Object	Property	Value
Form	Name	frmBonus
	Caption	Bonus Calculation
Lable	Name	lblSales
	Caption	Sales
Lable	Name	lblBonus
	Caption	Bonus
Text Box	Name	txtSales
	Text	""(blank)
Text Box	Name	txtBonus
	Text	" " (blank)
Command Button	Name	cmdCalculate
	Caption	&Calculate
Command Button	Name	cmdClear
	Caption	C&lear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmBonus - 1


Private Sub cmdCalculate_Click()
Dim s As Integer
Dim b As Double
s = txtSales.Text
b = 0.2 * s
txtBonus.Text = b
End Sub

Private Sub cmdClear_Click()
txtSales.Text = ""
txtBonus.Text = ""
txtSales.SetFocus
End Sub

Private Sub cmdQuit_Click()
End
End Sub
```

Sales

Bonus

Calculate Clear Quit

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Practical 10

Write a project in Visual Basic to design a suitable form to enter salary and calculate and display the DA which is 80% of Salary.

Object	Property	Value
Form	Name	frmDA
	Caption	Salary Calculations
Lable	Name	lblBasic
	Caption	Basic Salary
Lable	Name	lblDA
	Caption	DA
Text Box	Name	txtBasic
	Text	""(blank)
Text Box	Name	txtDA
	Text	" " (blank)
Command Button	Name	cmdCalc
	Caption	&Calculate
Command Button	Name	cmdClear
	Caption	C&lear
Command Button	Name	cmdQuit
	Caption	&Quit

```
frmDA - 1

Private Sub cmdCalc_Click()
Dim b As Integer
Dim da As Double
b = txtBasic.Text
da = 0.8 * b
txtDA.Text = da
End Sub

Private Sub cmdClear_Click()
txtBasic.Text = ""
txtDA.Text = ""
txtBasic.SetFocus
End Sub

Private Sub cmdQu:t_Click()
End
End Sub
```

Basic Salary

DA

Calculate Clear Quit

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KAMH

T.Y.B.Com - Sem VI — Computer Systems & Application

E-COMMERCE

MULTIPLE CHOICE QUESTIONS

Select the appropriate option from the following.

1. Buying and selling products on the internet is called
   1) E-market 2) **E-commerce** 3) E-Business 4) EDI
2. **A computer to computer exchange of business transactions is called_____.**
   (Oct-2012)
   1) **EDI** 2) E-commerce 3) E-Business 4) E-Market
3. **EDI stands for_____.(Apr-2011,Apr-2012)**
   (a) Electronic Data Internet (b) Electronic Data Interface
   (c) **Electronic Data Interchange** (d) Electronic data Intake
4. _____is a feature of E-commerce.
   (a) Ubiquity (b) Universal Standards (c) **both (a) & (b)** (d) None of these
5. In E-commerce_____ refers to availability of e-commerce.
   (a) **Ubiquity** (b) Universal Standards (c) Richness (d) None of these
6. _____refers to business selling goods to other business.
   (a) **B2B** (b) B2C (c) C2C (d) P2P
7. **Which segment of E-commerce focuses consumers dealing with each other?**
   (Apr-2013)
   (a) B2B (b) C2B (c) **C2C** (d) B2C
8. _____earn their revenue from advertisements and referrals.
   (a) **Portals** (b) Content Providers (c) E-Tailer (d) None of these
9. _____make money each time a transaction occurs.
   (a) **Transaction Brokers** (b) Portals (c) Content Providers (d) None of these
10. **The revenue model in E-commerce where companies earn revenue by publicizing Products/services is called_____. (Apr-2010)**
    (a) Sales Revenue (b) Transaction Fee Revenue
    (c) **Advertising Revenue** (d) Affiliate Revenue
11. **The model in E-commerce where companies earn revenue by referring users to other websites providing products/services is called____. (Apr-2011)**
    (a) Sales Revenue (b) Transaction Fee Revenue
    (c) Advertising Revenue (d) **Affiliate Revenue**
12. **In____ revenue model, revenue is generated from sales of goods, information or services. (Apr-2013)**
    (a) **Sales** (b) Transaction Fee (c) Advertising (d) Affiliate
13. Money received by selling goods or services to customers is
    1) **Sales Revenue** 2) Transaction Fee Revenue
    3) Advertising Revenue 4) Affiliate Revenue
14. Money received by referring customers to other websites providing products/services is
    1) Sales Revenue 2) Transaction Fee Revenue
    3) Advertising Revenue 4) **Affiliate Revenue**
15. _____business model offer users powerful web search tools as well as content and services such as news, email, calendars, shopping, music, video and more, all in one place.
    (a) **Portal** (b) Content provider (c) E-tailor (d) Market creator

16. _____business model build a digital environment in which buyers and sellers can meet.
(a) Portal (b) Content provider (c) E-tailor (d) **Market creator**

17. **Google is a_____(Oct-2011)**
1) **Portal** 2) E-tailer 3) Transaction Broker 4) None of these

18. _____ensures that the message was not read by others.
(a) Authenticity (b) **Integrity** (c) Privacy (d) None of these

19. **In E-commerce the assurance that the message is not altered is known as (Oct-2010)**
1) Authentication 2) Privacy 3) Confidentiality 4) **Integrity**

20. ____dimension of E-commerce security deals with alteration done during transmission.
(a) Authenticity (b) Confidentiality (c) **Integrity** (d) Privacy

21. In E-commerce the process to identify the identity of a person is known as
1) **Authentication** 2) Privacy 3) Domain Name System 4) Identification

22. Encryption means_____.
(a) **Converting readable text into cipher text** (c) Hacking
(b) Converting cipher text into readable text (d) none of these

23. Encryption refers to
1) Converting plain text into binary numbers 2) **Converting plain text to cipher text** 3) Converting cipher text to plain text 4) none of the above

24. _____means converting readable text into cipher text.
(a) **Encryption** (b) Decryption (c) Hacking (d) None of these

25. The process of converting intelligible data into unintelligible data is called
1) **Encryption** 2) Decryption 3) EDI 4) E-market

26. **Conversion of data into code is called (Oct-2012)**
1) **Encryption** 2) Decryption 3) Hacking 4) Firewall

27. **What type of technology scrambles the contents of files sent via the internet? (Apr-2013)**
(a) **Encryption** (b) SSL (c) HTTPS (d) Digital Signature

28. **Converting cipher text to plain text is called (Apr-2012)**
1) Encryption 2) **Decryption** 3) Hacking 4) Firewall

29. Decryption refers to **(Oct-2011)**
1) Converting plain text into binary numbers 2) Converting plain text to cipher text
3) **Converting cipher text to plain text** 4) none of the above

30. **A public key differs from the private key due to_____. (Oct-2010)**
(a) It being used only for encryption (b) It being used only for decryption
(c) It being shorter length (d) **none of the above**

31. **Sender and Receiver have same keys in ____.(Apr-2011, Apr-2013)**
(a) **Symmetric key encryption** (b) asymmetric key encryption (c) DES (d) PKI

32. **In E-commerce, to authenticate the sender of the message we use_____.(Apr-2010, Apr-2011)**
(a) Digital Sending (b) **Digital Signature** (c) Digital Protocol (d) Privacy Protocol

33. **In E-commerce, digital signature is used to_____ the sender of the message (Apr-2012)**
(a) Digital sending (b) **Authenticate** (c) Digital Protocol (d) Privacy Protocol

34. **SET stands for_____. (Oct-2012)**

1) Secure Electronic Transactions 2) Secrete Electronic Transactions
3) Session Electronic Transactions 4) Secure Electronic Transports

35. SET is an open standard in E-commerce offered by: (Oct-2010)
1) Master and Visa 2) Microsoft 3) World Bank 4) Certification Authorities

36. SET ensures_____. (Apr-2013)
(a) Authentication (b) Non Repudiation (c) Both (i) & (ii) (d) None of these

37. SSL stands for_____.(Apr-2010)
(a) Single Socket Layer (b) Secure Standard Layer
(c) Simple Socket Layer (d) Secure Socket Layer

38. It is a convention that all sites that use SSL connection while making a secure connection, use instead of HTTP_____.(Apr-2010,Apr-2012)
(a) HTTPS (b) POP (c) FTP (d) TCP/IP

39. It is a convention that all sites that use SSL connection while making a secure connection use _____instead of HTTP. (Oct-2012)
1) HTTPS 2) POP 3) FTP 4) TCP/IP

40. The Electronic parallel of notes and coins is _____.(Apr-2012)
(a) Digital Cash (b) Debit Card (c) Petro Card (d) Credit Card

41. _____payment system allows users to make micro payments and purchases on web from accumulated debit balance.
(a) Digital Cash (b) smart card
(c) Digital accumulating balance (d) Online Store value systems

42. In online store value systems, cards that have embedded chips that store personal information are called_____.
(a) Credit card (b) Smart card (c) chip card (d) stored card

43. The most popular way of making payment of the net is by_____. (Oct-2010)
(a) Digital Cash (b) Credit card (c) Direct debit (d) Online Store value systems

44. The most commonly used payment system in ecommerce is (Oct-2011,Oct-2012)
1) Credit card 2) Petro card 3) Pay pal 4) Digital cash

45. Commercial transactions done with the help of cell phones or PDA's is called___.(Apr-2013)
(a)M-commerce (b) E-commerce (c) E-business (d) none of these

46. M-commerce means buying and selling of goods & services using a_____.(Apr-2012)
(a) Laptop (b) pc (c) Mobile Phone (d) None of these

47. The full form of WAP is _____.
(a) Wireless Application Protocol (b) Wireless Antenna Protocol
(c) Wireless Application Photo (d) None of these

48. Criminally acquiring passwords is called_____.(Oct-2012)
(a)Phishing (b) Hacking (c) Encryption (d) Decryption

49. ____is the cheaper, faster and reliable commerce.
(a) Traditional commerce (b) E-commerce (c) M-commerce (d) None of these

50. A criminally fraudulent process of attempting to acquire sensitive information such as user names and password by masking as a trustworthy entity is called as
1) Impersonation 2) Phishing 3) hacking 4) none of the above

51. Which term describes the percentage of people who visit a website and buy something?

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1) **Conversion rate** 2) Spam 3) Click-Through 4) Affiliates

52. **There are many techniques used by B2C companies to attract customers except(Oct-2011)**
1) **Viral Marketing** 2) Online Ads 3) Discount price 4) Registering with search engine

TRUE OR FALSE

State whether the following are true or false

1) E-commerce stands for electronic commerce = **TRUE**
2) E-commerce stands for electrical commerce = **FALSE**
3) E-commerce makes market highly competitive = **TRUE**
4) E-commerce provides the capability of buying and selling of products, services and information on the internet = **TRUE**
5) E-commerce reduces the level of customer service = **FALSE**
6) E-commerce encourages competition between small and large online retailers = **TRUE**
7) E-commerce is a broader concept than e-business = **TRUE**
8) E-commerce may be nontraditional = **TRUE**
9) In traditional commerce, all products are digital = **FALSE**
10) E-commerce and e-business are synonymous terms = **FALSE**
11) E-commerce uses smart phones for transaction = **FALSE**
12) All products can be purchased and sold through E-commerce = **FALSE**
13) E-markets are a virtual representation of the physical market = **TRUE**
14) **E-market is a subset of e-commerce. (Apr-2011) = TRUE**
15) **EDI is a part of E-commerce.(Oct-2011) = TRUE**
16) EDI is a subset of E-commerce = **TRUE**
17) EDI increases the speed of the transaction and delays the payments = **FALSE**
18) EDI requires a invoice=**FALSE**
19) A large volume of EDI transactions are exchanged using VAN = **TRUE**
20) The scope of e-commerce is local = **FALSE**
21) The scope of e-commerce is global = **TRUE**
22) **In E-commerce Ubiquity refers to Universal Standards. (Apr-2010) = FALSE**
23) **Ubiquity is a feature of E- commerce. (Oct-2010) = TRUE**
24) **Non- repudiation refers to non denial of E-commerce transactions.(Oct-2011) = TRUE**
25) B2C E-commerce involves E-tailoring = **TRUE**
26) In B2C companies buying and selling to each other on line = **FALSE**
27) **B2C refers to business selling goods other business. (Apr-2010) = FALSE**
28) B2B e-commerce refers to a business communicating with or selling to an individual rather than a company = **FALSE**
29) The volume of B2B transactions is more than B2C transactions = **TRUE**
30) The volume of C2C transactions is more than B2B transactions = **FALSE**
31) There is a lot of scope for negotiations in B2C transactions performed on internet = **FALSE**
32) **Portals earn revenue from advertising and referral fees. (Oct-2010,Apr-2011) = TRUE**
33) Banners and sponsorships are examples of subscription revenue model = **FALSE**
34) Transaction fees are commissions based on volume of transactions made, fixed or incremental = **TRUE**
35) Transaction broker gets brokerage for online transaction = **TRUE**
36) **Transactions brokers make money each time a transaction occurs. (Oct-2010) = TRUE**
37) In an affiliate model the site have to pay referred fee to other site = **TRUE**
38) E-trailers differentiate from existing stores and develop a niche strategy = **TRUE**
39) Job placement services are content providers = **FALSE**
40) E-stores is one of the models of B2C E-commerce = **TRUE**
41) Nokari.com is very good example of B2B and B2C E-commerce = **TRUE**
42) E-trailers is an online stores = **TRUE**
43) Orkut is a type of service provider = **TRUE**

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44) Non – repudiation refers to a sender's refusal of message in E-commerce = **TRUE**
45) **Authentication ensures that the message was not read by others. (Oct-2010) = FALSE**
46) Encryption means converting cipher text into readable text = **FALSE**
47) **Decryption means converting readable text into cipher text. (Apr-2010,Apr-2011) = FALSE**
48) Encryption is done with the help of private key by sender = **FALSE**
49) Encryption is the process of converting encrypted data back into its original form = **FALSE**
50) Public key encryption guarantees the sender authentication = **FALSE**
51) **In public key encryption receivers private key is used for Decryption. (Oct-2011) = TRUE**
52) In public key encryption non-denial of the sender is assured = **FALSE**
53) In case of public encryption ,the public key will convert cipher text into original message= **FALSE**
54) Asymmetric key encryption requires that both parties share the same key = **FALSE**
55) Hash functions are used in digital signatures =**TRUE**
56) Digital signature changes for every document = **TRUE**
57) In SSL, URL will change from HTTP to HTTPS = **TRUE**
58) SSL provides sender authentication to data transfer = **TRUE**
59) Digital credit card payment systems extends the functionality of existing credit cards of use as online shopping payment = **TRUE**
60) **A debit card cannot be used in E-commerce.(Oct-2011) = FALSE**
61) Payment is done only credit cards in e-commerce= **FALSE**
62) Digital cash is not the electronic parallel of notes and coins= **FALSE**
63) Digital wallets bill users at the end of the month = **FALSE**
64) SET protocol is used in credit transactions through internet = **TRUE**
65) In SET the customer 's credit card number is never seen by merchant = **TRUE**
66) There are three entities in a SET transaction = **FALSE**
67) E-commerce is the most secure and private system = **FALSE**
68) Security is the major drawback of E-commerce = **TRUE**
69) **On limitation of E-commerce is lack of PC penetration. (Apr-2010) = TRUE**
70) M-commerce means buying and selling of goods and services using a mobile phone or a PDA device = **TRUE**
71) **The full form of WAP is Wireless Antenna Protocol. (Apr-2011) = FALSE**
72) WAP forum is founded by four companies = **TRUE**

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T.Y.B.Com – Sem VI – Computer Systems & Application

ASSIGNMENT (E - COMMERCE)

Q.1 What is E-Commerce? What are the advantages of E-Commerce?
Q.2 What is E-Commerce? What are the limitations of E-Commerce?
Q.3 What are the features of E-Commerce?
Q.4 What are the elements of E-Commerce?
Q.5 What is the scope of E-Commerce?
Q.6 Explain the terms E-Commerce and E-business.
Q.7 Explain B2C & B2B E-Commerce.
Q.8 Explain C2C & P2P E-Commerce;
Q.9 What are different types of Revenue models in E-Commerce?
Q.10 What are different types of B2C business models in E-Commerce?
Q.11 Discuss the various security issues in E-Commerce.
Q.12 Explain the terms : Encryption and Decryption.
Q.13 Discuss Private key encryption and Public key encryption.
Q.14 What are digital signatures? What are they used for ? Explain SSL.
Q.15 Discuss the payment systems used in E-Commerce.
Q.16 How an on line credit card transation works?
Q.17 What are the limitations of credit card payment systems? Explain SET protocol.
Q.18 What is M-Commerce? What are its applications?

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Wadala, Mumbai - 400 031

Ty.B.Com — VIVA Q PRACT EXAM SEM VI — Computer System & Application.

Q 1 Q.1 What is the difference between i) %c and %s ii) putch() and puts() ?

Q.2 What is the use of main() in the C program.

Q.3 What does the i) VLOOKUP
ii) SUMIF function do ?

Q 2 Q.1 What is the difference between i) break and continue ii) getch() and gets() ?

Q.2 What is an escape sequence. Name any 2 escape sequence.

Q.3 What does the i) IF
ii) LEFT function do ?

Q 3 Q.1 What is the difference between i) if() and switch() ii) scanf() and getchar() ?

Q.2 Mention the different type of storage classes in C.

Q.3 What does the i) COUNTIF
ii) RIGHT function do ?

Q 4 Q.1 What is the difference between i) ++y and y++ ii) getche() and getchar() ?

Q.2 What is the use of the continue statement ?

Q.3 What does the i) MID
ii) TRIM function do ?

Q 5 Q.1 What is the difference between i) float and double ii) puts() and putchar() ?

Q.2 What is a unary operator ?

Q.3 What does the i) LEN
ii) TODAY function do ?

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Q 6 Q.1 What is the difference between i) %d and %ld ii) printf() and puts() ?

Q.2 What is the purpose of break statement ?

Q.3 What does the i) UPPER
ii) NOW function do ?

Q 7 Q.1 What is the difference between i) do...while and for ii) getchar() and gets() ?

Q.2 What are the basic data types in C ?

Q.3 What does the i) LOWER
ii) DATE function do ?

Q 8 Q.1 What is the difference between i) int and float ii) getchar() and putchar() ?

Q.2 How do you write comments in the C program ?

Q.3 What does the i) PROPER
ii) TIME function do ?

Q 9 Q.1 What is the difference between i) identifiers and keywords ii) scanf() and getch() ?

Q.2 What are keywords in C? Give 2 examples.

Q.3 What does the i) DAY
ii) MONTH function do ?

Q 10 Q.1 What is the difference between i) %c and %s ii) putch() and puts() ?

Q.2 What are identifiers ? State one rule to name an identifier.

Q.3 What does the i) YEAR
ii) WEEKDAY function day ?

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T.Y.B.Com Sem V
Computer Assignment Sheet
(Data communication, networking and Internet)

1. What is data communication? Explain its components.
2. What is Computer network? What are the advantages and disadvantages of computer network?
3. Explain different types of computer network with proper example.
4. Define client server model. State the advantages and disadvantages of client server model.
5. Define the term topology. Explain three topologies commonly used in networks.
6. Explain different types of wired media with proper diagram.
7. Write a short note on wireless media.
8. Write a note on hub, bridge, switch and router.
9. What is the function of the OSI model? Explain the different layers of OSI model.
10. What is TCP/IP protocol? Explain the layers of TCP/IP model.
11. What is internet? Explain different uses of internet.
12. Explain different types of accounts available to connect to the internet.
13. Explain blogs, search engine and meta search engine?
14. What is Email? State advantages and importance of email. What are the parts of email address? What precaution must one take while sending or receiving emails with attachments?
15. What is hacking? Explain different types of hackers.
16. What is an IP address? Explain with an example.
17. What is domain name system? Explain its purpose.
18. What is the full form of URL? Explain the part of URL address.
19. Define Cyber crime. Explain different types of cybercrimes.
20. Write a short note on: i)Sniffing ii) Spoofing iii) Session hijacking iv) Man in the middle attack.

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Sample Test Tape: 40041 300+153

T.Y.B.Com - Sem V

COUNT :- Syntax :- Select Count (Value 1, Value 2, ...)

FV :- Syntax :- FV (formula)

LOWER :- Syntax :- Lower(str)

MONTHNAME(date) :- Syntax :- MONTHNAME (2019-9-20); gives September

SQRT(x) :- Syntax :- SQRT (x)

Example :- mysql > SQRT(16); gives 4

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PV :- Create a present value of Inuetery.

UPPER :- Return the ~~[illegible] as~~ character of ~~upper case.~~
convert the upper case.

DAYNAME(date) :- Return the DAYNAME for the date.
Sytax (Dayname date)

ROUND(n, d) :- n (number), d(decimal)
create a numanical data.

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F.Y.B.COM- MATHEMATICAL & STATISTICAL TECHNIQUES

SEMESTER-I

Mathematics Tutorial Problems

1 Find the total dividend Kabir got when he invested Rs. 12,000 in 10% share of Market Value Rs. 250 and Face Value Rs. 10.

2 Find the face value of a 7.5% share of a company, if Rs. 9000 were invested to purchase shares at Market Price of Rs. 450 and a total dividend of Rs. 150 was obtained.

3 Harry purchased 440 shares of face value Rs. 10 each at a market price of Rs. 150 per share at 0.5% brokerage. Find the total amount he had to pay.

4 Find

i) P (8, 5)
ii) P (7, 5)
iii) P (7, 4)

5 Find

i) C (15, 7)
ii) C (6, 2)
iii) C (11, 3)

6 Find P (10, 3)

7 Find C (8, 2).

Statistics Tutorial Problems

1 Calculate the Arithmetic mean and mode of marks of students from the following frequency distribution:

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	7	12	15	10	5

2 Calculate the mean and mode for the following data:

Age in Years	0-20	20-40	40-60	60-80	80-100
No. of Persons	4	5	15	11	5

3 Find coefficient of variation from the following data

Age in Years	10-20	20-30	30-40	40-50	50-60
No. of mobile person	8	12	20	14	10

4 Draw less than ogive curve for the following frequency distribution and hence locate the median graphically.

Production in number of units	0-10	10-20	20-30	30-40	40-50
No. of days	12	16	24	15	13

5 Draw less than cumulative frequency curve for the following data and hence locate the median and two quartiles graphically.

Daily wages	0-100	100-200	200-300	300-400	400-500	500-600
No. of workers	10	30	45	60	35	20

6 The following data gives the distribution of weights of boys and girls in the class find the combined arithmetic means and decide which group is more consistent.

	Boys	Girls
Number	55	65
Mean weight	58 kgs	44 kgs
S.D	3 kgs	2kgs

7 The following data gives the means and standard deviations of wages of two groups of workers.

	Group I	Group II
Number	50	100
Mean wages(RS)	120	85
Variance of Wages(Rs)	9	16

In Which group is there greater variation in the distribution of wages?

9 Find Quartile Deviation for the following data.

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	12	18	26	15	09

10 Three coins are tossed find the probability of getting
i) All tails
ii) At most two tails.

11 Find E(X) and V(X) for the following probability mass function of random variable X

X	1	2	3	4
P(X=x)	0.2	0.3	0.4	0.1

12 If $P(A^c)=2/3$, $P(B)=1/4$, $P(A \cup B)=5/12$ Find $P(A \cap B)$ and $P(A/B)$

13 A ticket is drawn from 35 lottery tickets numbered from 1 to 35. Find the probability that the number on the ticket is divisible by 5 or 7.

14 Given $P(A)= 0.5$, $P(B)=0.4$ & $P(A/B) =0.25$ find $P(\bar{B})$, $P(A \cap B)$ & $P(A \cup B)$.

15 A box contains 4 blue, 3 red and 2 black balls. If two balls are selected at random from the box, what is the probability that one is blue and one is red ball.

16 A problem on mathematics is given to 2 students A and B who attempt it independently. Their chances of solving the problem are 1/3 and ¾ respectively. What is the probability that (i) the problem is solved (ii)it is solved by only one.

17 Following is the probability distribution of number of smart phones sold in a shop per day.

Number	0	1	2	3	4	5
Probability	K	0.3	0.15	0.15	0.1	2K

18 Given the following pay off table, find optimal decision using i) laplace criterion ii) Maximax criterion iii) maximin criterion.

Course of action	States of Nature		
	S1	S2	S3
A1	65	45	30
A2	75	25	105
A3	90	70	75

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19 A Physicians purchase a particular vaccine on Monday of each week. The vaccine must be used within the week following, otherwise it becomes worthless. The vaccine cost Rs. 20 per dose and the physician charges Rs 50 per dose.In the past 50 weeks, the physician has administered the vaccine in the following quantities.

Doses per week	20	30	40
No. of weeks	5	25	20

i) Construct pay off table

ii) Determine the optimium number of doses the physician should buy using EMV criterion.

20 For the following pay off table, select best decision using EOL criterion

States of Nature	ACTS			Probability
	A1	A2	A3	
S1	80	40	100	0.3
S2	60	0	-20	0.2
S3	110	50	70	0.5

21 Draw the decision tree for the decision problem below and suggest the optimal choice (use EMV criteria)

Product option	Market demand		
	Poor	Average	Good
P	100	350	100
Q	150	250	150
Probablilty	0.3	0.55	0.15

22 For the following pay off table, select best decision using EMV criterion

States of Nature	ACTS			Probability
	A1	A2	A3	
S1	20	30	10	0.5
S2	60	40	30	0.3
S3	30	70	40	0.2

23 Construct the regret table and find the best decision by Minimax Regret Criterion

States of Nature	Course of Action		
	A1	A2	A3
S1	30	25	39
S2	42	47	40

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S.Y.B.Sc - 8002

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PRACTICAL - 5

Q.1 Express the following systems of equations in the matrix form.

1) $3x + 2y + 4z = 7,\ 2x + y + z = 7,\ x + 3y + 5z = 2$

Sol^n:

Here no. of variables = 3 and equation = 3

$\therefore$ coefficient matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$

Variable matrix $= \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ & solution matrix $= \begin{bmatrix} 7 \\ 7 \\ 2 \end{bmatrix}$

Equation in matrix form is $Ax = b$

$\therefore \begin{bmatrix} 3 & 2 & 4 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7 \\ 7 \\ 2 \end{bmatrix}$

2) $2x - z - 2u = -8,\ y + 2z - u = -1,\ x - y - u = -6,\ -x + 3y - 2u = 7$

Sol^n:

Here no. of variables = 4 and equation = 4

$$\therefore \text{Coefficient matrix } A = \begin{bmatrix} 2 & 0 & -1 & -2 \\ 0 & 1 & 2 & -1 \\ 1 & -1 & 0 & -1 \\ -1 & 3 & 0 & -2 \end{bmatrix}$$

$$\text{Variable matrix} = \begin{bmatrix} x \\ y \\ z \\ u \end{bmatrix} \quad \& \quad \text{Solution matrix} = \begin{bmatrix} -8 \\ -1 \\ -6 \\ 7 \end{bmatrix}$$

Equation in matrix form is $Ax = b$

$$\therefore \begin{bmatrix} 2 & 0 & -1 & -2 \\ 0 & 1 & 2 & -1 \\ 1 & -1 & 0 & -1 \\ -1 & 3 & 0 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ u \end{bmatrix} = \begin{bmatrix} -8 \\ -1 \\ -6 \\ 7 \end{bmatrix}$$

Q. 2. Find the product of the following matrices

i) $A = \begin{bmatrix} 2 & 5 & -2 \\ -1 & 0 & 0 \\ 2 & 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 5 \\ 1 & 0 \\ 2 & 0 \end{bmatrix}$

Soln:

Here A is 3×3 matrix and B is 3×2 matrix

$\therefore$ AB will be 3×2 matrix.

$$\therefore AB = \begin{bmatrix} 2 & 5 & -2 \\ -1 & 0 & 0 \\ 2 & 3 & 4 \end{bmatrix} \begin{bmatrix} 3 & 5 \\ 1 & 0 \\ 2 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 6+5-4 & 10 \\ -3 & -5 \\ 6+5+8 & 10 \end{bmatrix}$$

$$= \begin{bmatrix} 7 & 10 \\ -3 & -5 \\ 17 & 10 \end{bmatrix}$$

2) $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 0 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 3 \end{bmatrix}$

Sol^n:

Here A is 3×3 matrix and B is 3×3 matrix.

∴ AB will be 3×3 matrix.

$$AB = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix} \begin{bmatrix} -1 & 0 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 2 & 2-2+9 \\ 0 & 1 & -1+6 \\ 0 & 0 & 12 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 2 & 9 \\ 0 & 1 & 5 \\ 0 & 0 & 12 \end{bmatrix}$$

Q.3 Factorize the following matrices into the product LU, where L is unit lower and U is upper triangular matrix.

(4) $A = \begin{bmatrix} 4 & 3 & -1 \\ 1 & 1 & 1 \\ 3 & 5 & 3 \end{bmatrix}$

Soln:

Let $L = \begin{bmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{bmatrix}$ and $U = \begin{bmatrix} U_{11} & U_{12} & U_{13} \\ 0 & U_{22} & U_{23} \\ 0 & 0 & U_{33} \end{bmatrix}$

Now, $A = LU$

$$\therefore \begin{bmatrix} 4 & 3 & -1 \\ 1 & 1 & 1 \\ 3 & 5 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{bmatrix} \begin{bmatrix} U_{11} & U_{12} & U_{13} \\ 0 & U_{22} & U_{23} \\ 0 & 0 & U_{33} \end{bmatrix}$$

Here, $a_{11} = 4$, $a_{12} = 3$, $a_{13} = -1$, $a_{21} = 1$, $a_{22} = 1$, $a_{23} = 1$, $a_{31} = 3$, $a_{32} = 5$, $a_{33} = 3$

$U_{11} = a_{11} = 4$, $U_{12} = a_{12} = 3$, $U_{13} = a_{13} = 1$

$$l_{21} = \frac{a_{21}}{a_{11}} = \frac{1}{4} = 0.25$$

$$U_{22} = \frac{a_{22}a_{11} - a_{21}a_{12}}{a_{11}} = \frac{(1\times4) - (1\times3)}{4}$$

$$= \frac{4-3}{4} = \frac{1}{4} = 0.25$$

$$U_{13} = \frac{a_{23}a_{11} - a_{12}a_{13}}{a_{11}} = \frac{(1\times4)-(1\times-1)}{4}$$

$$= \frac{4+1}{4} = \frac{5}{4} = 1.25$$

$$J_{31} = \frac{a_{31}}{a_{11}} = \frac{3}{4} = 0.75$$

$$J_{32} = \frac{a_{32}a_{11} - a_{31}a_{12}}{a_{22}a_{11} - a_{21}a_{12}}$$

$$= \frac{(5\times4)-(3\times3)}{(1\times4)-(1\times3)} = \frac{20-9}{4-3} = \frac{11}{1} = 11$$

$$U_{33} = a_{33} = \frac{a_{31}a_{13}}{a_{11}} - \frac{(a_{32}a_{11} - a_{31}a_{12})(a_{23}a_{11} - a_{21}a_{13})}{a_{11}(a_{22}a_{11} - a_{21}a_{12})}$$

$$= 3 - \frac{(3\times-1)}{4} - \frac{(5\times4)-(3\times3)}{4}\,\frac{(1\times4)-(1\times-1)}{(1\times4)-(1\times3)}$$

$$= 3 + \frac{3}{4} - \frac{(20-9)(4-1)}{4\times(4-3)}$$

$$= 3 + 0.75 - \frac{11\times5}{4\times1} = 3.75 - \frac{55}{4}$$

$$= 3.75 - 13.75$$

$$= -10$$

$$\therefore L = \begin{bmatrix} 1 & 0 & 0 \\ 0.25 & 1 & 0 \\ 0.75 & 11 & 0 \end{bmatrix}, \quad U = \begin{bmatrix} 4 & 3 & -1 \\ 0 & 0.25 & 1.25 \\ 0 & 0 & -10 \end{bmatrix}$$

2> $A = \begin{bmatrix} 4 & 3 & 2 \\ 2 & 3 & 4 \\ 1 & 2 & 1 \end{bmatrix}$

Soln:

Let $L = \begin{bmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{bmatrix}$ and $U = \begin{bmatrix} U_{11} & U_{12} & U_{13} \\ 0 & U_{22} & U_{23} \\ 0 & 0 & U_{33} \end{bmatrix}$

Now, $A = LU$

$$\therefore \begin{bmatrix} 4 & 3 & 2 \\ 2 & 3 & 4 \\ 1 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{bmatrix} \begin{bmatrix} U_{11} & U_{12} & U_{13} \\ 0 & U_{22} & U_{23} \\ 0 & 0 & U_{33} \end{bmatrix}$$

Here, $a_{11} = 4$, $a_{12} = 3$, $a_{13} = 2$, $a_{21} = 2$, $a_{22} = 3$, $a_{23} = 4$, $a_{31} = 1$, $a_{32} = 2$, $a_{33} = 1$

$U_{11} = a_{11} = 4$, $U_{12} = a_{12} = 3$, $U_{13} = a_{13} = 2$

$$l_{21} = \frac{a_{21}}{a_{11}} = \frac{2}{4} = 0.5$$

$$U_{22} = \frac{a_{22}a_{11} - a_{21}a_{12}}{a_{11}} = \frac{(3 \times 4) - (2 \times 3)}{4}$$

$$U_{22} = \frac{12-6}{4} = \frac{6}{4} = 1.5$$

$$U_{13} = \frac{a_{23}\,a_{11} - a_{21}\,a_{13}}{a_{11}}$$

$$= \frac{(4\times4)-(2\times2)}{4}$$

$$= \frac{16-4}{4} = \frac{12}{4} = 3$$

$$l_{31} = \frac{a_{31}}{a_{11}} = \frac{1}{4} = 0.25$$

$$l_{32} = \frac{a_{32}\,a_{11} - a_{31}\,a_{12}}{a_{22}\,a_{11} - a_{21}\,a_{12}} = \frac{(2\times4)-(1\times3)}{(3\times4)-(2\times3)}$$

$$= \frac{8-3}{12-6} = \frac{5}{6}$$

$$l_{32} = 0.83$$

$$U_{33} = a_{33} - \frac{a_{31}\,a_{13}}{a_{11}} - \frac{(a_{32}\,a_{11}-a_{31}\,a_{12})(a_{23}\,a_{11}-a_{21}\,a_{13})}{a_{11}(a_{22}a_{11}-a_{21}a_{12})}$$

$$= 1 - \frac{1\times2}{4} - \frac{(2\times4)-(1\times3)}{4}\,\frac{(4\times4)-(2\times2)}{(3\times4)-(2\times3)}$$

$$= 1 - \frac{2}{4} - \frac{(8-3)(16-4)}{4(12-6)}$$

$$= 1 - \frac{2}{4} - \frac{5\times12}{4\times6}$$

$$= 1 - \frac{2}{4} - \frac{60}{24}$$

$$= 1 - 0.5 - 2.5$$

$$= -2$$

$$\therefore L = \begin{bmatrix} 1 & 0 & 0 \\ 0.5 & 1 & 0 \\ 0.25 & 0.83 & 1 \end{bmatrix}, \quad U = \begin{bmatrix} 4 & 3 & 2 \\ 0 & 1.5 & 3 \\ 0 & 0 & -2 \end{bmatrix}$$

Q.4. Solve the following systems of equations by Gauss-Sidle method.

14 $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$

Soln:

Here, $x = 0$, $y = 0$, $z = 9$

Satisfy 1st in given system

∴ We will consider above value as 1st approximation.

$\therefore x^{(1)} = 0$, $y^{(1)} = 0$, $z^{(1)} = 9$

Now, we can write given system of equations in matrix form as

$$\begin{bmatrix} 10 & 2 & 1 \\ 2 & 20 & -2 \\ -2 & 3 & 10 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 9 \\ -44 \\ 22 \end{bmatrix}$$

$\therefore a_{11} = 10$, $a_{12} = 2$, $a_{13} = 1$, $a_{21} = 2$, $a_{22} = 20$, $a_{23} = -2$, $a_{31} = -2$, $a_{32} = 3$, $a_{33} = 10$, $b_1 = 9$, $b_2 = -44$, $b_3 = 22$

2nd approximation is

$$(x)^{(2)} = \frac{b_1}{a_{11}} - \frac{a_{12}}{a_{11}} y^{(1)} - \frac{a_{13}}{a_{11}} z^{(1)}$$

$$= \frac{9}{10} - \frac{2}{10} \times 0 - \frac{1}{10} \times 9$$

$$= \frac{9}{10} - 0 - \frac{9}{10} = 0$$

$$y^{(2)} = \frac{b_2}{a_{22}} - \frac{a_{21}}{a_{22}} x^{(2)} - \frac{a_{23}}{a_{22}} z^{(1)}$$

$$= \frac{-44}{20} - \frac{2}{20} \times 0 - \frac{(-2) \times 9}{20}$$

$$= \frac{-44}{20} - 0 + \frac{18}{20} = \frac{18-44}{20}$$

$$= \frac{-26}{20} = -1.3$$

$$z^{(2)} = \frac{b_3}{a_{33}} - \frac{a_{31}}{a_{33}} x^{(2)} - \frac{a_{32}}{a_{33}} y^{(2)}$$

$$= \frac{22}{10} - \frac{(-2)}{10} \times 0 - \frac{3}{10} \times (-1.3)$$

$$= 2.2 + 50 + \frac{3.9}{10} = 2.2 + 0.39 = 2.59$$

∴ 2nd approximation is

$x^{(2)} = 0$, $y^{(2)} = 1.3$, $z^{(2)} = 2.59$

2) $28x + 4y - z = 32$, $2x + 17y + 4z = 35$, $x + 3y + 10z = 24$

Sol^n:

Here, $x = 0$, $y = 0$, $z = 32$

satisfy 1st in given system.

$\therefore$ We will consider above value as 1st approximation

$\therefore x^{(1)} = 0, y^{(1)} = 0, z^{(1)} = 32$

Now, we can write given system of equation in matrix form as

$$\begin{bmatrix} 28 & 4 & -1 \\ 2 & 17 & 4 \\ 1 & 3 & 10 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 32 \\ 35 \\ 24 \end{bmatrix}$$

$\therefore a_{11} = 28, a_{12} = 4, a_{13} = -1, a_{21} = 2, a_{22} = 17, a_{23} = 4,$
$a_{31} = 1, a_{32} = 3, a_{33} = 10, b_1 = 32, b_2 = 35, b_3 = 24$

2nd approximation is

$$x^{(2)} = \frac{b_1}{a_{11}} - \frac{a_{12}}{a_{11}} y^{(1)} - \frac{a_{13}}{a_{11}} z^{(1)}$$

$$= \frac{32}{28} - \frac{4}{28} \times 0 - \frac{1}{28} \times 32$$

$$= \frac{32}{28} - 0 + \frac{32}{28} = 0$$

$$y^{(2)} = \frac{b_2}{a_{22}} - \frac{a_{21}}{a_{22}} x^{(2)} - \frac{a_{23}}{a_{22}} z^{(1)}$$

$$= \frac{35}{17} - \frac{2}{17} \times 0 - \frac{4}{17} \times 32$$

$$= \frac{35}{17} - 0 - \frac{128}{17}$$

$$= \frac{128 + 35}{17} = \frac{163}{17}$$

$$= 9.588$$

$$z^{(2)} = \frac{b_3}{a_{33}} - \frac{a_{31}}{a_{33}} x^{(2)} - \frac{a_{32}}{a_{33}} y^{(2)}$$

$$= \frac{24}{10} - \frac{1}{10} \times 0 - \frac{3}{10} \times 9.58$$

$$= \frac{24}{10} - 0 - \frac{3 \times 9.58}{10}$$

$$= 2.4 - \frac{28.74}{10}$$

$$= 2.4 - 2.874$$

$$= -0.474$$

$\therefore$ 2nd approximation is

$x^{(2)} = 0$, $y^2 = 9.588$, $z^2 = -0.474$

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1st September, 2021

ACADEMIC YEAR 2021-2022

Student Guidance Webinar on First Year Online Admission Process organized by I.Q.A.C.

Date : 7th August, 2021

Objective :

1) To make students aware about overall admission process
2) To acquaint students on the procedure to fill online admission form on the University of Mumbai portal
3) To familiarize students on the procedure to fill online admission form on College website
4) To make students understand the specializations available in the programs
5) To make students aware about the common mistakes done by students while filling online admission forms

Number of participants : 68

Teacher Incharges:

1) Principal Dr. Usha Iyer
2) Vice Principal Mr. Vaibhav Banjan
3) Vice Principal Mrs. Neeta Khanolkar
4) Vice Principal Mr. Ayyappan Iyer
5) Mrs. Anagha Bapat
6) Dr. Swapnesh Rangnekar
7) Mr. Krishna Ramanujan, Online Admission Service Provider

Report : In an effort to digitalize the admission process and make it more transparent and speedy, the entire admission process was made online. The entire process starting from the sale of digital admission forms, online filling up of the University form and College form,

SIWS NR Swamy College Wadala, Mumbai-31.

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submission of digital copies of documents, checking by teaching and office staff, corrections / modifications, fees allotment, fees payment, receipt generation, allotment of Google classroom, login ID and password and finalization of admission were all completely online for all the programmes. The College website was extensively used to guide students about steps in admission process. An admission Committee was formed and a helpdesk email was created on College website to address technical doubts raised by students. For the students who needed personal attention, help desk was started in College. Teachers guided students in offline / online mode and tried to solve their difficulties in order to make admission process smooth and faster. The guidance webinar video was made on SIWS College youtube channel. The webinar was viewed by 2280 participants.

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Dr. Swapnesh Rangnekar explains the procedure to fill the Online admission form on the University of Mumbai portal

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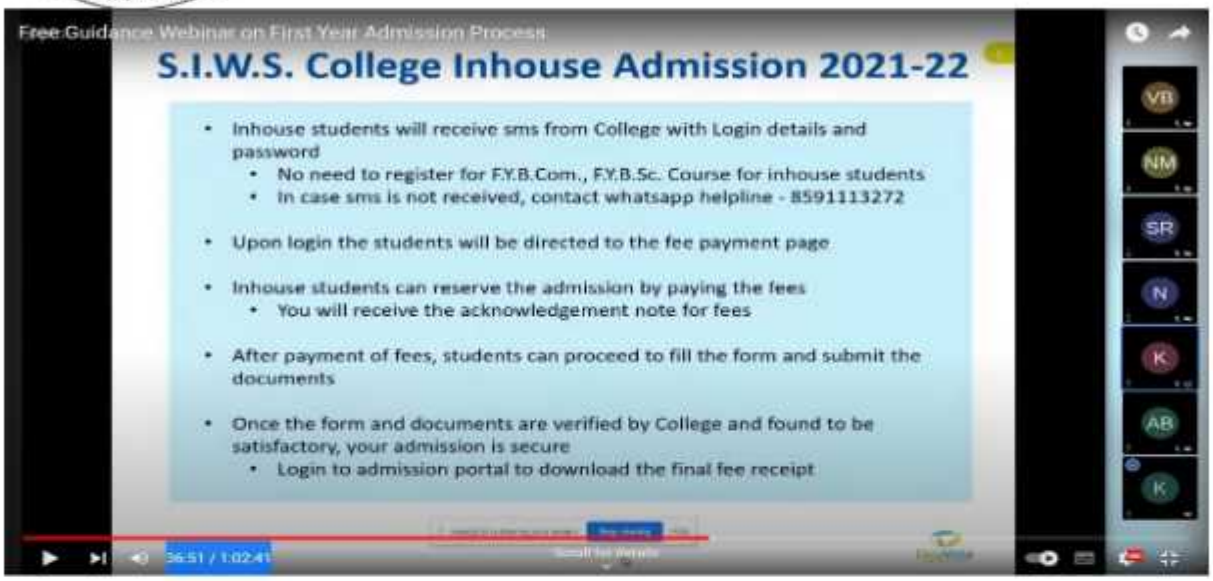

Mr. Krishna Ramanujan from Datavista Solutions explain the Online Admission Process on the College website

Vice Principal Mr. Vaibhav Banjan clarifies the queries raised by the student participants during the webinar

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S.I.W.S.
N.R. SWAMY COLLEGE OF COMMERCE & ECONOMICS
AND SMT. THIRUMALAI COLLEGE OF SCIENCE
Plot No. 337 , sewree-wadala estate, Major R Parameswaran Marg , Wadala Mumbai-400031

22nd September 2021

Academic year 2021-22

Orientation Lecture for F.Y.B.Sc. students

Objective :

1. To make students aware of the rules and regulations about college.
2. To discuss academic pattern with new admission F.Y.B.Sc. students.
3. To upgrade students with various academic and co-curricular and extra curricular activities conducted by college.
4. To create awareness about the university pattern of three year undergraduate B.Sc. program and examination system of University of Mumbai.

An orientation lecture was organised for new batch of F.Y.B.Sc. students of academic year 2021-22 on 21st September 2021.

The lecture was conducted by Mrs. Anagha Bapat and I was attended by 17 students who were admitted to F.Y.B.Sc.

The main agenda for the orientation lecture was to make sudents comfortable. The general college rules and regulation were discussed wih students. the entire three year pattern of undergraduate B.Sc. program was explained to students. students were aware of the specialisations available at the third year.

Students were also made familiar with passing criteria and various examination and ATKT rules. Time table for the academic year 2021-22 was also discussed with students.

Ms. Anagha Bapat	Ms. Neeta Khanolkar	Dr. Usha Iyyer
Department of Physics	VicePrincipal(science)	Principal

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WADALA, MUMBAI-

Attendance for: Orientation Lecture			FYBSC 2122									
Date:	"2021-09-21"	"Time:"	"10:56"	"Meet ID	"ypq-qwgi-bhs"							
Names	"2021-09-21"	"Email"	"Comme	"Arrival t	"Last Seen	"# of Cl	"Joined"	"Details"				
Gulnaz Ali	"✓"	""	""	"11:23"	"11:35"	"7"	"1"					
Umang Jadav	"✓"	""	""	"11:00"	"11:42"	"43"	"1"					
Yash Jadhav	"✓"	""	""	"11:04"	"11:42"	"39"	"2"	"11:04 (6	11:10 (33min) [11:42]			
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Saif Khan	"✓"	""	""	"11:13"	"11:43"	"31"	"1"					
Gautamrishi Namdev	"✓"	""	""	"11:31"	"11:39"	"9"	"1"					
0 Others	"✓"	""	""	"11:24"	"11:31"	"8"	"1"					
3 Others	""	""	""									
5 Others	""	""	""									
Trushita Patil	"✓"	""	""	"11:07"	"11:42"	"36"	"1"					
Sagarikapaul Paul	"✓"	""	""	"11:03"	"11:42"	"34"	"1"					
Aqsa Sayyed	"✓"	""	""	"11:15"	"11:43"	"29"	"1"					
Roshani Singh	"✓"	""	""	"11:37"	"11:42"	"6"	"1"					
Anushree Sonawane	"✓"	""	""	"10:58"	"11:42"	"45"	"2"	"10:58 (9	11:07 (36min) [11:42]			
Bhavani Student	"✓"	""	""	"11:18"	"11:43"	"20"	"1"					
Purva Sudam	"✓"	""	""	"10:58"	"11:42"	"45"	"1"					
Omkar Tekale	"✓"	""	""	"11:28"	"11:43"	"15"	"3"	"11:42 (2	11:42 (1n	11:28 (12min) [11:41]		
Aniket Torane	"✓"	""	""	"11:04"	"11:42"	"39"	"1"					
Raj Yadav	"✓"	""	""	"11:22"	"11:42"	"21"	"1"					
Help/more info:	"https://tinyurl.com/y5peu3nk"											
© Google Meet Attendance	https://tinyurl.com/y6k2yqts											

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Aberrations

Aberration is defined as the defects produced in an image with respect to its shape or colour of image.

When light falls on a lens ,it undergoes refraction. The incident rays bend while passing through the lens and an image is produced on the other side of lens. this image is expected to be exact replica of object with respect to its size and shape. The image should be very sharp, focussed and bright.

But the actual image formed by any lens is always spread-out and may be sightly deformed. This is called as aberration. There are various reasons for aberrations to be caused.

Types of aberrations :

1. Chromatic Aberrations :

This aberration occurs if incident light is a mixture of two or more wavelengths.

2. Monochromatic Aberration :

This aberration occurs due to spherical shape of lens even if incident light is monochromatic.

Monochromatic Aberration :

This aberration occurs due to spherical shape of lens even if incident light is monochromatic.

Types of monochromatic aberrations :

1. Spherical aberration
2. Coma
3. Astigmatism

Spherical aberration:

When a beam of parallel rays falls on a convex lens, each ray of light bends through a slightly different angle.

This angle depends on the position of the point where ray meets the lens.

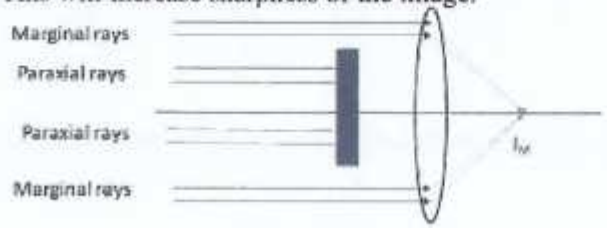
The rays closer to optic axis are called paraxial rays. The rays away from optic axis are called marginal rays.

Paraxial rays bend through smaller angles and form an image at a point away from lens whereas marginal rays bend by larger angles and form an image closer to lens.

The separation between two images is called as spherical aberration.

Methods to reduce Spherical Aberration :

1. **Reducing lens aperture** : Spherical aberration can be reduced by blocking one set of rays ,either paraxial rays or marginal rays. Thus only one image would be generated. This will increase sharpness of the image.



2. **Using Plano-convex lens**
3. **Using A combination of a convex and a concave lens**
4. **Using a convex with very high value of refractive index**
5. **Using crossed lens :**

A crossed lens is the one for which there is large difference between both radii of curvature. Ideally the relation between two radii should be

$$\frac{R2}{R1} = \frac{\mu(2\mu+1)}{\mu(2\mu-1)-4}$$

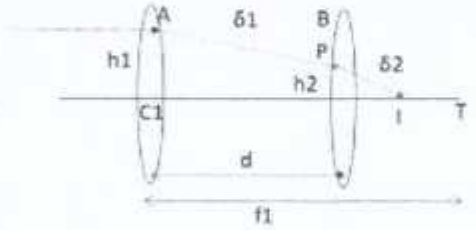
e.g.

If $\mu = 1.5$,

$$\frac{R2}{R1} = \frac{\mu(2\mu+1)}{\mu(2\mu-1)-4} = \frac{1.5(2*1.5+1)}{1.5(2*1.5-1)-4} = \frac{1.5(3+1)}{1.5(3-1)-4} = \frac{6}{3-4} = -6$$ i.e. R_2 should be equal to $-6*R_1$

6. **Using system of two lenses**

We should select both focal lengths f_1 and f_2 and distance between two lenses d such that all rays always have same amount of bending.



i.e. $\delta 1 = \delta 2$

i.e. $\frac{h1}{f1} = \frac{h2}{f2}$ ---------- (1)

Consider triangles AC_1T and BC_2T

$$\frac{AC1}{C1T} = \frac{PC2}{C2T}$$

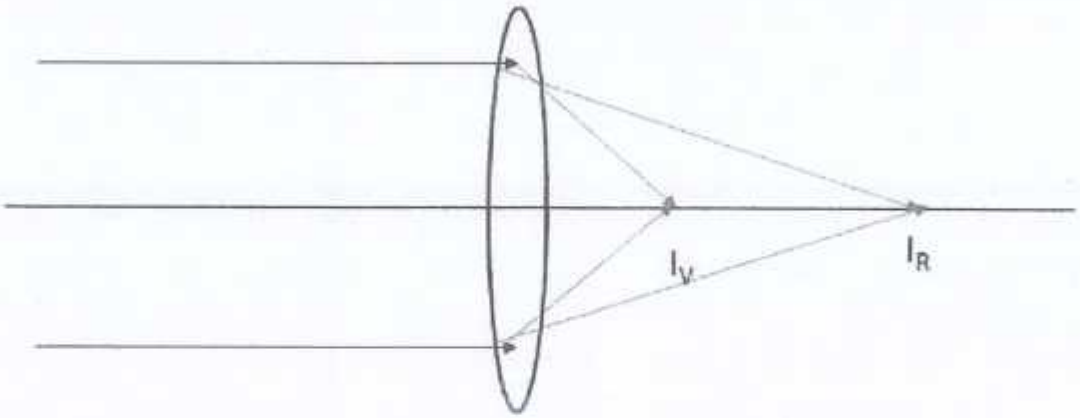
$$\frac{h1}{f1} = \frac{h2}{f1-d}$$ ---------- (2)

From equ 1 and 2 we get, $f2 = f1 - d$ i.e. **$d = f1 - f2$**

Chromatic aberration :

Chromatic aberration is the defect introduced in the image due to multiple wavelengths present at the source. (e.g. white light)

Focal length of a lens depends on its refractive index. R.I. is different for different wavelengths (colours).
When a white light is incident on a lens, violet ray bends maximum and red ray bends minimum.
Violet rays converge at a closer point compared to red rays.
Hence violet image is formed very close to lens and red image is formed far away from **lens.**



Dispersive power :

Dispersive power of a lens is the capacity of the lens to separate white light into its seven constituent colours.

White light is polychromatic light. It is actually a mixture of seven different colours **Violet , Indigo , Blue , Green , Yellow , Orange** and **RED.** When white light passes through a lens, colours get separated. This is called dispersion of light.

Dispersive Power is given by the formula

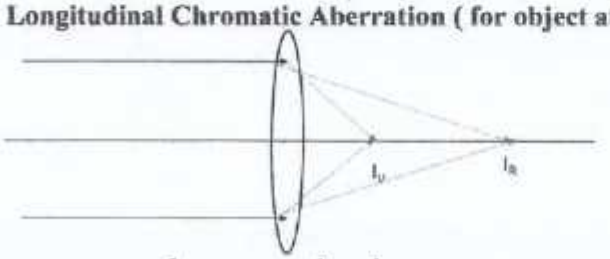
$$\omega = \frac{\mu v - \mu R}{\mu avg - 1}$$

Longitudinal Chromatic aberration :

Longitudinal Chromatic aberration is the distance between focal points for violet rays and rays, when white light is incident on a lens.

$$X = \Delta f = f_R - f_V$$

Longitudinal Chromatic Aberration (for object at infinite distance)



For any lens : $\frac{1}{f} = (\mu - 1)(\frac{1}{R1} - \frac{1}{R2})$ ----------(1)

Hence we can write $(\frac{1}{R1} - \frac{1}{R2}) = \frac{1}{f*(\mu - 1)}$ ---------- (2)

For Red rays : $\frac{1}{fR} = (\mu R - 1)(\frac{1}{R1} - \frac{1}{R2})$ ----------(3)

For Violet rays : $\frac{1}{fv} = (\mu V - 1)(\frac{1}{R1} - \frac{1}{R2})$ ----------(4)

Subtracting equ (3) from equ (4)

$$\frac{1}{fv} - \frac{1}{fR} = (\mu V - 1)(\frac{1}{R1} - \frac{1}{R2}) - (\mu R - 1)(\frac{1}{R1} - \frac{1}{R2})$$

$$= (\frac{1}{R1} - \frac{1}{R2})[\mu V - \mu R]$$

$$\frac{1}{fv} - \frac{1}{fR} = (\frac{1}{R1} - \frac{1}{R2})[\mu V - \mu R]$$

$$\frac{fR - fV}{fv * fR} = (\frac{1}{R1} - \frac{1}{R2})[\mu V - \mu R]$$

$$\frac{\Delta f}{fv * fR} = (\frac{1}{R1} - \frac{1}{R2})[\mu V - \mu R] \quad \text{----------(5)}$$

Let $f_{avg} = \sqrt{fv * fR}$ and $\mu_{avg} = \sqrt{\mu v * \mu R}$

Hence equ (4) will become

$$\frac{\Delta f}{favg2} = (\frac{1}{R1} - \frac{1}{R2})[\mu V - \mu R] \quad \text{----------(6)}$$

Using equ (2) we get,

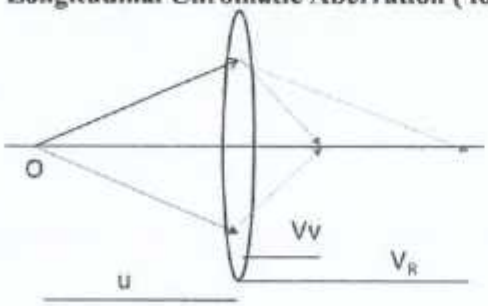
$$\frac{\Delta f}{favg2} = \frac{1}{favg * (\mu avg - 1)}[\mu V - \mu R] \quad \text{----------(7)}$$

$$\frac{\Delta f}{favg2} = \frac{1}{favg} * \frac{[\mu V - \mu R]}{(\mu avg - 1)}$$

$$= \frac{1}{favg} * \omega$$

$$\Delta f = favg * \omega \quad \text{----------(8)}$$

Longitudinal Chromatic Aberration (for object at finite distance)



For any lens : $\frac{1}{f} = (\frac{1}{v} - \frac{1}{u})$ ----------(1)

For Red rays : $\frac{1}{fR} = (\frac{1}{vR} - \frac{1}{u})$ ----------(2)

For Violet rays : $\frac{1}{fv} = (\frac{1}{vv} - \frac{1}{u})$ ----------(3)

Subtracting equ (2) from equ (3)

$$\frac{1}{fv} - \frac{1}{fR} = (\frac{1}{vv} - \frac{1}{u}) - (\frac{1}{vR} - \frac{1}{u})$$

$$= \frac{1}{vv} - \frac{1}{u} - \frac{1}{vR} + \frac{1}{u} = \frac{1}{vv} - \frac{1}{vR}$$

$$\frac{1}{fv} - \frac{1}{fR} = \frac{1}{vv} - \frac{1}{vR} \quad \text{i.e.} \frac{1}{vv} - \frac{1}{vR} = \frac{1}{fv} - \frac{1}{fR}$$

$$\frac{vR - vV}{vR * vv} = \frac{fR - fV}{fR * fV}$$

Let $f_{avg} = \sqrt{fv * fR}$ and $V_{avg} = \sqrt{vv * vR}$

Hence $\frac{\Delta V}{vR * vv} = \frac{\Delta f}{fR * fV}$

$$\frac{\Delta V}{V_{avg}^2} = \frac{\Delta f}{f_{avg}^2} = \frac{\Delta f}{f_{avg}} * \frac{1}{f_{avg}} = \frac{\omega}{f_{avg}}$$

$$\Delta V = = \frac{\omega * V_{avg}^2}{f_{avg}}$$

Achromatism:

Def : Achromatism is a method to reduce chromatic aberration.

1. **Using two lenses of focal lengths f_1 and f_2 and having refractive indices μ_1 and μ_2 . Two lenses are kept touching each other.**

For any lens $\frac{1}{f} = (\mu - 1)(\frac{1}{R1} - \frac{1}{R2}) = (\mu - 1)K$ ----------(1)

Differentiating w.r.t. μ we get ,

$$\frac{d}{d\mu}(\frac{1}{f}) = K$$

$$\frac{-1}{f2}\frac{df}{d\mu} = K \quad \text{Hence} - \frac{df}{f2} = K d\mu \quad \text{---------- (2)}$$

Dividing equ (2) by equ (1) $\frac{-\frac{df}{f2}}{\frac{1}{f}} = \frac{K d\mu}{(\mu - 1)K}$

Hence $- \frac{df}{f} = \frac{d\mu}{(\mu - 1)} = \omega$

Hence $- \frac{df}{f} = \omega$ ---------- (3)

For a combination of two lenses $\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2} - \frac{d}{f1 * f2}$ ---------- (4)

Since two lenses are touching each other, d = 0

Hence equation (4) will change as, $\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2}$ ---------- (5)

Differentiating equ.(5) we get $\frac{-dF}{F2} = \frac{-df1}{f12} + \frac{-df2}{f22}$

Using equ. (3) we get , $\frac{-dF}{F2} = \frac{\omega 1}{f1} + \frac{\omega 2}{f2}$

But if we want lens combination to generate zero chromatic aberration , $dF = F_R - F_V = 0$.

Hence $\frac{\omega 1}{f1} + \frac{\omega 2}{f2} = 0$ OR $\frac{\omega 1}{f1} = -\frac{\omega 2}{f2}$

2. **Using two lenses of focal lengths f_1 and f_2 and having same refractive indices μ. Two lenses are kept at a distance D from each other.**

For a combination of two lenses $\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2} - \frac{D}{f1*f2}$ ---------- (1)

Differentiating equ. (1) we get ,

$\frac{-dF}{F2} = \frac{-df1}{f12} + \frac{-df2}{f22} - D\ (-\frac{1}{f1} * \frac{df2}{f22} - \frac{1}{f2} * \frac{df1}{f12})$

But if we want lens combination to generate zero chromatic aberration , $dF = F_R - F_V = 0$.

Hence $\frac{-df1}{f12} + \frac{-df2}{f22} - D\ (-\frac{1}{f1} * \frac{df2}{f22} - \frac{1}{f2} * \frac{df1}{f12}) = 0$ ---------- (2)

But for any lens $\omega = \frac{-df}{f}$. ---------- (3)

Hence $\frac{\omega 1}{f1} + \frac{\omega 2}{f2} - D\ (\frac{1}{f1} * \frac{\omega 2}{f2} + \frac{1}{f2} * \frac{\omega 1}{f1}) = 0$ ---------- (4)

Hence $\frac{\omega 1}{f1} + \frac{\omega 2}{f2} - D\ (\frac{\omega 2}{f1*f2} + \frac{\omega 1}{f2f1}) = 0$

$\frac{\omega 1}{f1} + \frac{\omega 2}{f2} - D\ (\frac{\omega 2+\omega 1}{f1*f2}) = 0$ ---------- (5)

Since both lenses have same refractive index, they must be made from same material and hence $\omega 2 = \omega 1 = \omega$

Hence equ. (5) will change as $\frac{\omega}{f1} + \frac{\omega}{f2} - D\ (\frac{\omega+\omega}{f1*f2}) = 0$

$\omega\ (\frac{1}{f1} + \frac{1}{f2}) = D\ (\frac{2\omega}{f1*f2})$

$\omega\ (\frac{1}{f1} + \frac{1}{f2}) = D\ (\frac{2\omega}{f1*f2})$

Hence $\omega\ (\frac{f1+f2}{f1*f2}) = D\ (\frac{2\omega}{f1*f2})$

Hence $f_1 + f_2 = 2D$

$$D = \frac{f_1 + f_2}{2}$$

The distance between two lenses of same material should be equal to average of two focal lengths.

Numericals:

1. Two convex lenses of focal lengths 20cm and 18 cm are placed at a distance d from each other. Find the value of d to get 1) minimum spherical aberration 2) minimum chromatic aberration.

Data : f1 = 20cm , f2 = 18cm

Find : d

Formulae :

For minimum spherical aberration : d = f1 – f2 = 2cm

For minimum chromatic aberration : d $= \frac{f_1 + f_2}{2} = \frac{20+18}{2} = 19$cm

2. For a convex lens refractive index for red ray is 1.5236 and for violet ray is 1.587. Calculate its dispersive power.

Data : $\mu_v = 1.587$, $\mu_R = 1.5236$

Find : ω

Formula : $\omega = \frac{\mu v - \mu R}{\mu avg - 1}$ where $\mu avg = \sqrt{\mu v * \mu R}$

$\mu avg = \sqrt{\mu v * \mu R} = \sqrt{(1.587 * 1.5236)} = \sqrt{(2.4179)} = 1.554$

$\omega = \frac{\mu v - \mu R}{\mu avg - 1} = \frac{1.587-1.5236}{1.554-1} = \frac{0.0634}{0.554} = 0.1144$

3. Dispersive powers of two lenses are 0.015 and 0.030 and their focal lengths are f1 and f2. The lens combination has a total focal length of 50cm. The lens combination does not produce any chromatic aberration. Find f1 and f2.

Data : zero chromatic aberration , ω1 = 0.015 , ω2 = 0.030, F = 50cm

Find : f1 and f2

Formula:

for any lens combination, $\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2} - \frac{d}{f1*f2}$ ---------- (1)

since lenses have different dispersive powers and produce zero chromatic aberration,

$\frac{\omega 1}{f1} = -\frac{\omega 2}{f2}$ ---------- (2) and d = 0 cm ---------- (3)

$\frac{\omega 1}{f1} = -\frac{\omega 2}{f2}$ Hence $\frac{0.015}{f1} = -\frac{0.030}{f2}$

Hence f1 *(- 0.030) = f2 * 0.015 Hence **f2 = - 2*f1 ---------- (4)**

Substituting equ. 3 and 4 in equ. (1) we get $\frac{1}{50} = \frac{1}{f1} - \frac{1}{2*f1}$

$\frac{1}{50} = \frac{1*2}{f1*2} - \frac{1}{2*f1} = \frac{+1}{2*f1}$

Hence $1*50 = 2 * f1$

f_1 = 25 cm hence f2 = - 2*f1 = - 50 cm

4. The average focal length of a convex lens is 27. cm . If refractive indices for violet rays is 1.6822 and that for red ray is 1.6157, calculate longitudinal chromatic aberration when object is at infinity.

Data : f = 27cm , $\mu_V = 1.6822$ and $\mu_R = 1.6157$

Find : Δf

Fomula : $\omega = \frac{\mu v - \mu R}{\mu avg - 1}$, $\mu_{avg} = \sqrt{\mu v * \mu R}$ and $\Delta f = favg * \omega$

$\mu_{avg} = \sqrt{\mu v * \mu R} = \sqrt{(1.6822 * 1.6157)} = \sqrt{(2.7179)} = 1.6486$

$\omega = \frac{\mu v - \mu R}{\mu avg - 1} = \frac{1.6822 - 1.6157}{1.6486 - 1} = \frac{0.0665}{0.6486} = 0.1025$

$\Delta f = favg * \omega = 27 * 0.1025 = 2.7675$cm

5. Two lenses having same refractive index and focal lengths f1 and f2 have total focal length 60cm. The lens combination is free of spherical aberration as well as chromatic aberration. Find f1 and f2.

Data : F =60cm , zero spherical aberration , zero chromatic aberration.

Find : f1 and f2

Fomula : For zero spherical aberration : d = f1 – f2 ---------- (1)

For zero chromatic aberration : $d = \frac{f_1 + f_2}{2}$ ----------(2)

for any lens combination, $\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2} - \frac{d}{f1 * f2}$ ---------- (3)

From equ 1 and 2 we get , $f1 - f2 = \frac{f_1 + f_2}{2}$

Hence $2*(f1 - f2) = f_1 + f_2$

$2*(f1 - f2) = f_1 + f_2$

$2f1 - 2f2 = f_1 + f_2$

$f1 = 3f2$ ---------- (4)

Substituting in equ 1 and 4 in equ (3)

$\frac{1}{F} = \frac{1}{f1} + \frac{1}{f2} - \frac{d}{f1 * f2}$

$\frac{1}{F} = \frac{1}{3f2} + \frac{1}{f2} - \frac{2f2}{3f2 * f2} = \frac{1}{3f2} + \frac{3}{3f2} - \frac{2}{3f2} = \frac{2}{3f2}$

Hence $\frac{1}{60} = \frac{2}{3f2}$

Hence $3f_2 = 60*2 = 120$

Hence $f_2 = 40$cm and $f_1 = 120$cm

****

Microprocessor 8085

Instruction set

The instruction set is group of all legal 8085 instructions. The instructions available with μP 8085 are classified into 5 major categories depending on the function they perform. These categories are :

- Data transfer instructions
- Arithmetic instructions
- Logical instructions
- Branching instructions
- Machine control instructions

Data transfer instructions:

In this group of instructions , 8 or 16 bit data is copied from one location to another location. The location where the data already exists is called as source where as the location where the data is transferred is called as destination. The source and /or destination can be a register or a memory location or an input-output device. But data transfer directly between two memory locations or between two input-output devices or between a memory location and an i/p-o/p device is not possible. Either source or destination has to be a register. **Even though these instructions are called as data transfer instructions, the source does not lose its contents but a copy of it is created at the destination.**

The original contents of source are retained but the original contents of destination are erased and the new contents are added to it.

No flags are modified in case of data transfer instructions.

1. MOV Rd , Rs

Move the number from register Rs to register Rd. A data byte from a source register Rs is copied into another destination register Rd. It is single byte instruction. It corresponds to register addressing mode. Both registers Rs and Rd can be any one of the general purpose registers A,B,C,D,E,H & L.

e.g MOV A , B
MOV B , B
MOV H , L etc.

2. MVI Rd, 8bit data

Move immediately the 8 bit number in the register R. An 8 bit data byte specified in the instruction is copied into the destination register Rd. Rd can be any one of the general purpose register A,B, C,D,E,H &L. It is a two byte instruction and corresponds to immediate addressing mode.

e.g. MVI A , 94H
MVI B , 50H
MVI H , 00H etc.

3. LXI Rp,16 bit number(data)

Load the register pair Rp immediately with the 16 bit number indicated within the instruction. Here any register pair out of HL , BC , DE or 16 bit register SP can be used. In case of HL , BC or DE, the higher byte of the number is stored in the first register where as lower byte of the number is stored in the second

e.g. LXI H, 1500H will load 15H in register H and 00H in register L.

4. STA 16 bit number(address)

Store the contents of the accumulator in the memory location whose address is directly specified within the instruction. The 16 bit number indicated within the instruction points to a memory location. The contents of the accumulator are copied in to this location. Only accumulator can be used in this instruction. Note : Here the 16 bit number is not stored directly as in LXI instruction but some number from A moves to a memory location.

e.g. [A] = 35H [1500] = 20H

STA 1500H ⇒ [A] = 35H [1500] = 35H

5. LDA 16 bit number(address)

Load the accumulator with the contents of the memory location whose address is directly specified within the instruction. The 16 bit number indicated within the instruction points to a memory location. The contents of this location are copied in to the accumulator. Only accumulator can be used in this instruction. Note : Here the 16 bit number is not stored directly as in LXI instruction but some number from a memory location moves to A.

e.g. [A] = 35H [1500] = 20H

LDA 1500H ⇒ . [A] = 20H [1500] = 20H

Arithmetic instructions :

This group of instructions allows the 8085 microprocessor to perform arithmetic operations on the data bytes. 8085 supports basic arithmetic operations such as

- addition
- subtraction
- increment
- decrement

Addition :

The addition instructions work on two data bytes (8 or 16) X and Y. In all the addition instructions, accumulator plays a very important role. The first number X is always fetched from the accumulator where as the second number y can be present either in any one register or in a memory location or it can be directly specified within the instruction. The result of the addition is also automatically stored in the accumulator. All the flags are modified according to the result of addition. If the result is more than 8 bit long, carry flag is SET. If the result of addition is zero, zero flag is SET. If the addition of D_3 bits generates a carry, auxiliary carry flag is SET.

1. ADD R

The contents of accumulator are added to the contents of register R and the result is stored back in the accumulator. Here R can be any one of the registers A,B,C,D,E,H & L.

[A] = 34H [B] = 2DH

ADD B ⇒ 34H 0011 0100

+

2DH 0010 1101

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0110 0001 CY = 0

2. ADI 8 bit data

The contents of the accumulator are added to the 8 bit number specified in the instruction. The result is stored again in the accumulator. Various flags are altered as per the result.

e.g. ADI 43H

3. ADD M

The contents of accumulator are added to the contents of the memory location M and the result is stored back in the accumulator. The exact value of the address of M is obtained from the contents of the register pair HL. Various flags are altered as per the result.

Subtraction :

The subtraction instructions work on two data bytes (8 or 16) X and Y. In all the subtraction instructions, accumulator plays a very important role. The first number X is always fetched from the accumulator where as the second number y can be present either in any one register or in a memory location or it can be directly specified within the instruction. The result of the subtraction is also automatically stored in the accumulator. All the flags are modified according to the result of addition. If the result is more than 8 bit long, carry flag is SET. If the result of subtraction is zero, zero flag is SET.

The 8085 performs subtraction instruction in the following 4 steps.

1. Generates 1's complement of Y
2. Adds 1 to 1's complement of Y to generate 2's complement of Y.
3. Adds 2's complement of Y to X.
4. Complements the carry generated during addition.

1. SUB R

The contents of register R are subtracted from the contents of accumulator and the result is stored back in the accumulator. Here R can be any one of the registers A,B,C,D,E,H & L.

2. SUB M

The contents of the memory location M are subtracted from the contents of the accumulator and the result is stored back in the accumulator. The exact value of the address of M is obtained from the contents of the register pair HL. Various flags are altered as per the result.

3. SUI 8 BIT NO.

The 8 bit number specified in the instruction is subtracted from the contents of the accumulator. The result is stored again in the accumulator. Various flags are altered as per the result.

Increment operation:

Increment instructions are used to increment the contents of source location by 1. The result is stored back in the same place. Carry flag remains unaffected but all the other flags (S, Z, AC & P) are modified as per the result. The source location can be either any register or any memory location.

1. INR R

The contents of register R are incremented by 1 and the result is stored in the same register. R can be any one register out of A, B, C, D, H or L.

e.g. Let [B] = 27H and [C] = 39H
Hence INR B ⇒ [B] = 28H
Similarly INR C ⇒ [C] = 3AH

2. INR M

The contents of memory location M are incremented by 1 and the result is stored in the same **memory location M. The exact value of the address of M is obtained from the contents of the register pair HL.**

3. INX R_P

The contents of register pair R_P are incremented by 1 and the result is stored in the same register pair . R_P can be any one register pair out of BC, DE, HL or SP.

e.g. Let [B] = 27H and [C] = 39H
Hence INX B ⇒ [B] = 27H and [C] = 3AH.

Decrement operation:

Decrement instructions are used to decrement the contents of source location by 1. The result is stored back in the same place. Carry flag remains unaffected but all the other flags (S, Z, AC & P) are modified as per the result. The source location can be either any register or any memory location.

1. DCR R

The contents of register R are decremented by 1 and the result is stored in the same register. R can be any one register out of A, B, C, D, H or L.

e.g. Let [B] = 27H and [C] = 39H
Hence DCR B ⇒ [B] = 26H
Similarly DCR C ⇒ [C] = 38H

2. DCR M

The contents of memory location M are decremented by 1 and the result is stored in the same **memory location M. The exact value of the address of M is obtained from the contents of the register pair HL.**

3. DCX R_P

The contents of register pair R_P are decremented by 1 and the result is stored in the same register pair . R_P can be any one register pair out of BC, DE, HL or SP.

e.g. Let [B] = 27H and [C] = 39H
Hence DCX B ⇒ [B] = 27H and [C] = 38H.

Logical instructions :

This group of instructions allows the 8085 microprocessor to perform logical operations on the data bytes. 8085 supports basic logical operations such as

- AND
- OR
- EX-OR

- NOT (Complement)
- Rotate
- Compare
- Set and complement carry flag

AND instructions:

The AND instructions work on two data bytes (8 or 16) X and Y. In all the AND instructions, accumulator plays a very important role. The first number X is always fetched from the accumulator where as the second number Y can be present either in any one register or in a memory location or it can be directly specified within the instruction. The result of the AND operation is also automatically stored in the accumulator. All the flags are modified according to the result of addition. If the result is more than 8 bit long, carry flag is SET. If the result of AND is zero, zero flag is SET.

1. ANA R

The contents of accumulator are logically ANDed with the contents of register R and the result is stored back in the accumulator. Here R can be any one of the registers A,B,C,D,E,H & L.

Flags S, P & Z are modified to reflect the result of operation. CY is RESET where as AC is SET.

[A] = 34H **[B] = 2DH**

ANA B ⇒ 34H **0011 0100**

AND

2DH **0010 1101**

0010 0100 **CY = 0**

2. ANA M

The contents of accumulator are logically ANDed with the contents of memory location M and the result is stored back in the accumulator. The exact value of the address of M is obtained from the contents of the register pair HL.

Flags S, P & Z are modified to reflect the result of operation. CY is RESET where as AC is SET.

3. ANI 8bit no.

The contents of the accumulator are logically ANDed with the 8 bit number specified in the instruction. The result is stored again in the accumulator. Flags S, P & Z are modified to reflect the result of operation. CY is RESET where as AC is SET.

OR operation :

The OR instructions work on two data bytes (8 or 16) X and Y. In all the OR instructions, accumulator plays a very important role. The first number X is always fetched from the accumulator where as the second number Y can be present either in any one register or in a memory location or it can be directly specified within the instruction. The result of the OR operation is also automatically stored in the accumulator. All the flags are modified according to the result of addition. If the result is more than 8 bit long, carry flag is SET. If the result of OR is zero, zero flag is SET.

1. ORA R

The contents of accumulator are logically ORed with the contents of register R and the result is stored back in the accumulator. Here R can be any one of the registers A,B,C,D,E,H & L.

Flags S, P & Z are modified to reflect the result of operation. AC & CY are RESET.

[A] = 34H [B] = 2DH

ANA B ⇒ 34H 0011 0100

OR

2DH 0010 1101

0011 1101 CY = 0

2. ORA M

The contents of accumulator are logically ORed with the contents of memory location M and the result is stored back in the accumulator. The exact value of the address of M is obtained from the contents of the register pair HL. Flags S, P & Z are modified to reflect the result of operation. AC & CY are RESET.

3. ORI 8bit no.

The contents of the accumulator are logically Or-ed with the 8 bit number specified in the instruction. The result is stored again in the accumulator. Flags S, P & Z are modified to reflect the result of operation. AC & CY are RESET.

Complement:

CMA :

The contents of the accumulator are complemented. No flags are affected in this instruction.

Compare:

In these instructions , the contents of the accumulator are compared with the contents of any other register or memory location or with an 8 bit number directly specified within the instruction. The microprocessor performs comparison by subtracting the second number form the number in the accumulator. At the end of this instruction , both the numbers remain unchanged, but the result is indicated in the form of carry and zero flags. Other flags are also modified.

If **[A] > second number : CY = 0 and Z=0**
If **[A] < second number : CY = 1 and Z=0**
If **[A] = second number : CY = 0 and Z=1**

1. CMP R

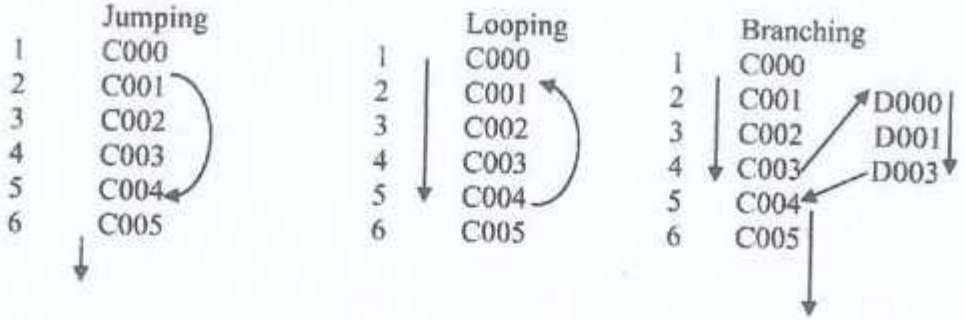
The contents of the accumulator are compared with the contents of any other register. Here R can be any one of the registers A,B,C,D,E,H & L.

e.g. [A] = 57H and [B] = A0H
CMP B ⇒ CY = 1 and Z = 0

Branching instructions:

The branch instructions are the most powerful instructions because they allow the microprocessor to change the sequence of program execution. The microprocessor is a sequential device and it executes instructions in a sequential manner i.e. d\goes from one memory location to the immediately next one. When any program is executed , the address of the memory location being executed is stored in the program counter. When the execution of one instruction is over, program counter increments by 1 ,

from this routine. We either need to skip some instructions and jump ahead or we need to jump backward and repeat certain instructions. These two techniques are called as branching and looping. In both these techniques we don't want the program counter to advance by the default value 1 , but we want to load a totally new address in the program counter. This is achieved with the help of branching instructions.



Branch instructions allow the microprocessor to go to a new location by skipping certain instructions in between. Then again from this point onwards microprocessor can continue to execute in a sequential manner. This branching away from the sequential order and directly jumping to a new location can be achieved either conditionally by checking the status of few flags or it can be done unconditionally. The address of new location can be specified within the instruction itself or can be provided by the microprocessor itself.

There are basically three types of branching instructions available with 8085 µP. **Jump , Call & return** and **Restart.**

Jump :

The Jump instruction transfers the execution control to a location specified within the instruction. The jump instructions are of two type : unconditional and conditional jump instruction.

Unconditional jump : JMP 16 bit hex address

Jump to the memory location specified within the instruction unconditionally. i.e. without checking any flag status. The program counter gets loaded with the 16 bit memory address given in the instruction and starts executing the program from that point onwards. No flags are affected. The unconditional jump is used to set up loops in the program.

Conditional Jump instructions:

The conditional jump instruction allows the microprocessor to make decisions based on certain conditions indicated by the flags. Most of the arithmetic and logical instructions modify different flags. The conditional jump instruction checks the flag status and then decides whether the program sequence should be modified or not. These instructions use four flags : carry, sign, zero and parity flag. The program sequence can be altered either when a particular flag is SET or when the flag is RESET.

1. **JC 16 bit address :**
   Jump to new location if the carry flag is SET (CY = 1)
2. **JNC 16 bit address :**
   Jump to new location if the carry flag is not SET (CY = 0)
3. **JZ 16 bit address :**
   Jump to new location if the zero flag is SET (Z = 1)

4. **JNZ 16 bit address :**
   Jump to new location if the zero flag is not SET (Z = 0)
5. **JPE 16 bit address :**
   Jump to new location if the parity flag is SET (P = 1)
6. **JPO 16 bit address :**
   Jump to new location if the parity flag is not SET (P= 0)
7. **JP 16 bit address :**
   Jump to new location if the sign flag is SET (S = 1)
8. **JM 16 bit address :**
   Jump to new location if the sign flag is not SET (S= 0)

Machine control instructions:

These instructions do not operate on any data but just controls the functioning of the microprocessor. Do not involve any data and no flags are affected.

1. HLT

The microprocessor finishes executing the current instruction and halts further execution. The contents of none of the registers are affected. An interrupt or reset is necessary to exit from halt state.

2. NOP

No operation is performed. Microprocessor remains idle for a machine cycle and then resumes program execution again. No flags are affected.

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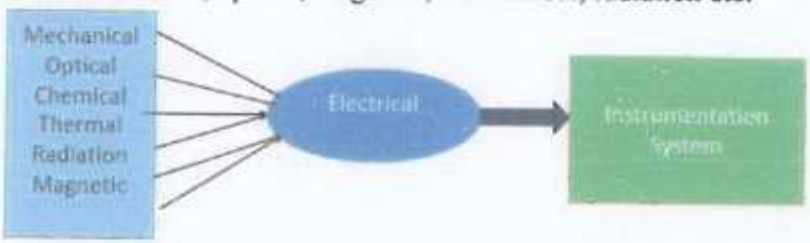
Transducers

A Transducer is a device that converts one form of energy into another form. A transducer is an important part of any instrumentation system. Different forms of energy are electrical, thermal, optical, magnetic, mechanical, radiation etc.



Types of Transducers

Sensor :

1. It detects change in one form of parameter like temperature, velocity, pressure, light intensity, sound intensity, wavelength of light, humidity , pH value, concentration of a particular gas etc and generates a electrical signal proportional to it.
2. It is used at input of instrumentation system.
3. E.g. thermistor , LDR , solar cell , strain gauge .

Actuator :

1. It converts electrical signals into light or sound or displacement
2. It is used output of instrumentation system.
3. E.g. LED, Piezoelectric crystal

Factors that decide selection criteria of a transducer:

1. Physical size: Should be as small as possible so that it does not disturb experimentation technique.
2. Dynamic range : The should be usable over a wide range.
3. Sensitivity : should be very high. Should be capable of detecting very small changes.
4. Repeatability : Should produce same result when repeated again and again under same external conditions:
5. Linearity : The relation between input and output should be linear.
6. Stability : The output should not change due to change in external parameters. It should withstand overloads with in built safty precautions.
7. Accuracy : The output produced should be very close to the expected value.

Thermo-Electric Transducers:

Thermistor :

Thermistor is a thermal resistor. It a semiconductor device whose resistance depends on temperature. It has negative temperature coefficient of resistance.

It has very high temperature sensitivity and very high repeatability. The normal value of resistances are over the range 0.5Ω to few MΩ. The Thermistors are available in variety of shapes and sizes. The value of temperature coefficient depends on amount of doping and type of impurity used.

Thermal characteristics :

It is the relation between resistance of thermistor and temperature. As the temperature increases, its resistance decreases. The relation is given as, $Rt = Ro(1+\alpha t)$. It is applicable only for small range of temperature

$\alpha = \frac{Rt - R_0}{Ro \cdot t}$ Here α is the temperature coefficient of resistance.

Def : It is defined as change in resistance per unit original resistance per degree rise in temperature. Its unit is per ^{0} C or per ^{0} F.

If the thermistor is to be used for larger temperature range , the relation is given as

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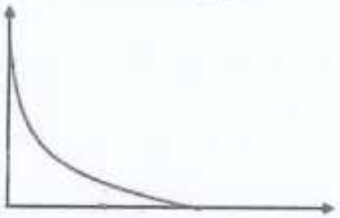
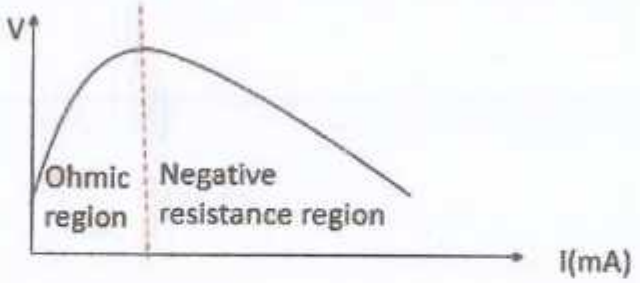
$R_{T1}=R_{T0}\exp\left[\beta\left(\frac{1}{T1}-\frac{1}{T0}\right)\right]$ where β is a constant depending on material.



Current –voltage characteristic :

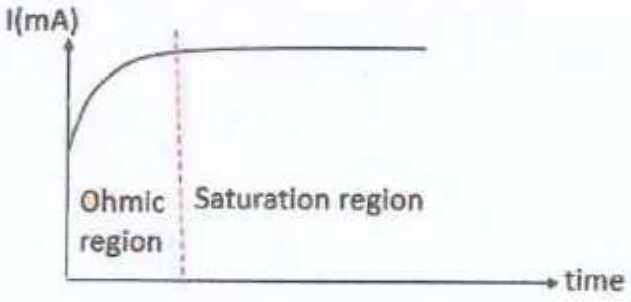
As the voltage drop across thermistor increases, current flowing through the thermistor also increases. This is ohmic behaviour of thermistor. After certain voltage, current suddenly increases even if supply voltage is kept constant. As an effect the voltage drop across thermistor reduces. This continues automatically till current reaches a peak value. This is called as negative resistance region. This happens due to self-heating.



Current –time characteristic :

This characteristic indicates delay time. It is the time the current needs to reach its peak value for a given voltage. Initially current is less. But as device gets heated up , self-heating mode is activated and current starts increasing till it reaches peak value.

For lower voltages delay time can be in minutes also where as for higher voltages it can be as fast as few miliseconds. This helps ingenerating delay time in various applications.



Thermocouple

Principal of operation : When two dissimilar metals are joined together and if the junction is heated, a voltage is developed between two free ends. This is called as Peltier and Thomson effect. The Thermocouple may be shielded or exposed depending on application.

For high temperature or chemical applications, Wires should be insulated.

Factors to be considered :

1. Temperature range
2. Temperature sensitivity
3. Linearity

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4. Homogenity of two materials
5. Specific resistance should be comparable
6. Choice of metals

Two methods of forming a Thermocouple :

1. Welding two wires :

The joint is brittle. Can break when exposed to stress. During welding process gases may fuse with metals , affecting Characteristics.

2. Soldering two wires :

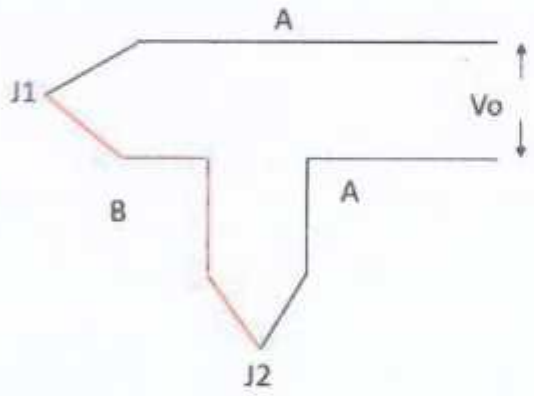
When used for higher temperatures (more than melting point of soldering material) , soldering may break. Normal temperature range : -273^{0}C to 2500^{0}C.

Merits :

1. very high accuracy
2. Very small response time
3. Good reproducibility
4. Very cheap
5. Bridge circuit not required
6. Very high temperature range

Demerits :

1. One junction has to be maintained at a very low temperature
2. Output signal is very low and need to be amplified
3. Non-linear



Mechanical Transducers:

These transducers respond to changes to changes in pressure or displacement. As a result , there is a change in resistance or voltage.

Examples :

- Strain gauge
- LVDT
- Variable capacitance transducer
- Piezoelectric transducer

Strain gauge: It is a device where resistance changes as per changes in applied pressure.

Working Principal :

As per Hook's law, within elastic limits, stress is directly proportional to strain. **Stress / strain = modulus of elasticity (E)** . Stress is force per unit area. Strain is change in dimension per unit original dimension. Due to applied pressure , the length and thickness of wire changes. Hence its resistance also changes.

Types of strain gauges :

1. **Unbonded wire strain gauge :**

It consists of a wire stretched between two points in an insulating medium as air. The wire is very thin of the order of μm. Wires are kept under tension to avoid sagging or vibrations. It is normally a part of bridge circuit. Bridge is balanced in no load condition. When pressure is applied , resistance changes, generating output voltage .

2. **Bonded strain gauge:**

Wires made from Platinum, Nickel , constantan, Nichrome . Diameter of wire is of the order of μm. The wires are bonded to carrier material like plastic or paper using an adhesive material that allows evenly spreading of pressure

3. **Foil strain gauge :**

Thin foils of metals are used as sensing agents. This provides large surface area of contact. These strain gauges can be easily fabricated on mass scale. The foil thickness is of the order of μm.

4. **Semiconductor strain gauge**

These strain gauges are in the form of semiconductor filament or wafers. Thickness of the semiconductor wafer is of the order of μm. Gold leads are used for ohmic contacts. Semiconductor wafers are bonded on insulating surface. These strain gauges have high value of gauge factor. Strain against pressure relation is non-linear for light doping and perfectly linear in case of high doping. These strain gauges have very small physical size.

Gauge Factor :

It is defined as unit change in resistance per unit change in length.

$K=\frac{\Delta R/R}{\Delta l/l}=\frac{\Delta R/R}{\sigma}$ where σ is the strain developed in the wire due to applied pressure.

Resistance of a wire is given as $R=\frac{\rho l}{A}=\frac{\rho l}{\pi r2}=\frac{4\rho l}{\pi d2}$

Due to applied pressure, length will change by Δl and resistance will change by ΔR

$Rs=\frac{4\rho(l+\Delta l)}{\pi(d-\Delta d)2}=\frac{4\rho l\,(1+\Delta l/l)}{\pi d2(1-\Delta d/d)2}=\frac{4\rho l\,(1+\Delta l/l)}{\pi d2(1-2\Delta d/d)}$

Poisson's ration is given as , $\sigma=\frac{\Delta d/d}{\Delta l/l}$

Poisson's ration is given as , $\mu=\frac{\Delta d/d}{\Delta l/l}$ hence $\Delta d/d=\mu.\Delta l/l$.

Hence

$Rs=\frac{4\rho l\,(1+\Delta l/l)}{\pi d2(1-2\mu.\Delta l/l)}=\frac{4\rho l}{\pi d2(1-2\mu.\Delta l/l)}+\frac{4\rho l\,(\Delta l/l)}{\pi d2(1-2\mu.\Delta l/l)}=R+\Delta R$

where $\Delta R=\frac{4\rho l\,(\Delta l/l)}{\pi d2(1-2\mu.\Delta l/l)}=R\,(1+2\mu)\frac{\Delta l}{l}$

$K=\frac{\Delta R/R}{\Delta l/l}=1+2\mu$

LVDT (Linear Variable Differential Transducer) :

The differential transformer is a passive transformer. The transformer consists of a single primary winding P1 and two secondary windings S1 and S2 wound on a hollow cylindrical base. Both the secondary windings have equal no. of turns and are identically placed on either side of primary winding. The primary winding is connected to an ac source.

A movable soft iron core slides within the hollow base and controls the magnetic coupling between the primary and the secondaries. The displacement to be measured is applied the arm attached to the soft iron core.

When the core is in its normal position, equal voltages are induced in the two secondary windings ($E_{S1}=E_{S2}$). Hence the final output of the LVDT is zero.

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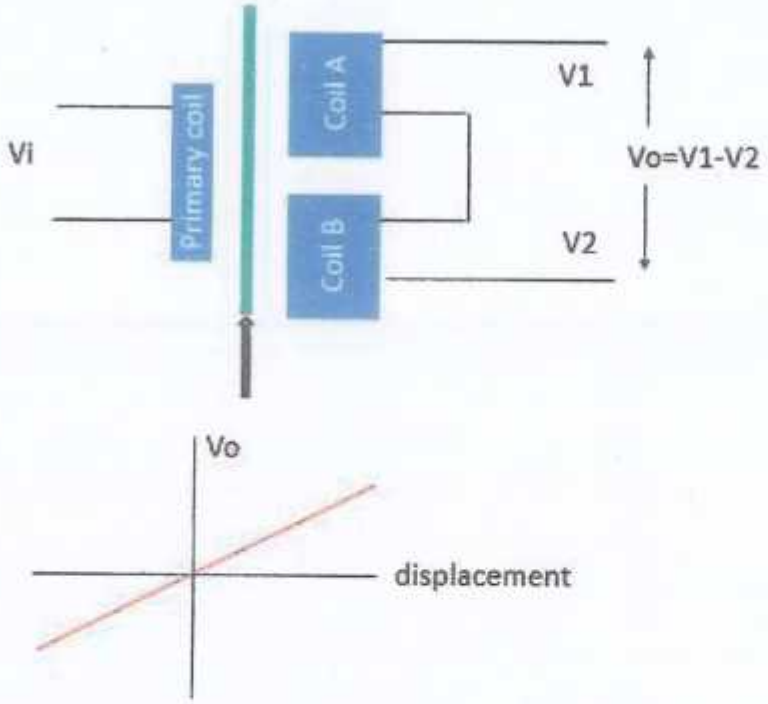
If the core is moved to the left of the normal position , more flux links with s1 than S2. Hence ES1 > ES2. The final output of LVDT will be in phase with ES1.

If the core is moved to the right of the normal position , more flux links with s2 than S1. Hence ES2 > ES1. The final output of LVDT will be in phase with ES2.

Thus the final output of LVDT is proportional to the amount of movement of the core. Thus output is an indication of linear motion. The amplitude of the output indicates the distance core has moved and the polarity of the output indicates the direction in which core is moving



Variable capacitance transducer

A capacitive transducer works on the principle that capacitance changes with the physical position of moving element. The capacitance is given as $c = \frac{KA}{d}$, where K = the dielectric constant , A = total area of capacitor surface and d = distance between two capacitive surfaces. Capacitance increases if effective area of the plate is increased or if the material has high dielectric constant or if the spacing between two surfaces is reduced.

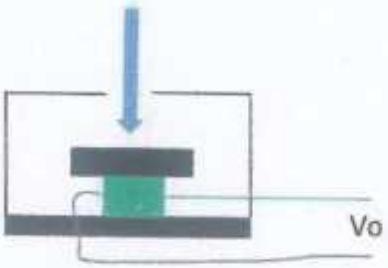
A capacitive pressure transducer contains a metallic diaphragm that moves to left when exposed to pressures and it moves to right when subjected to vaccum. This diaphragm is used as one plate of a variable capacitor. Its distance from the stationary plate is a function of applied pressure and thus its capacitance value is a function of applied pressure. The capacitance of such a device can be given as $c = 0.885 \frac{K(n-1)A}{t}$ Here n = number of plates and t = thickness of dielectric.

The capacitive transducer is easy to construct and inexpensive to produce.

Piezoelectric Transducer

Certain materials like Quartz, Barium Titanite have asymmetric structure. When pressure is applied to these crystals along one direction, a voltage is produced along another perpendicular direction.

The piezoelectric crystal is placed on a solid base. It is covered by another insulating material. Pressure is applied on the crystal through a small window. A small voltage is developed across another pair of sides of crystal. The output voltage is of the order of 50mV. The main disadvantage is that Vo changes with temperature.



Opto-electronic Transducers:

These transducers convert either light energy into electrical energy or electrical energy into light energy.

Optoelectronic transducers can also be classified as

1. Photoconductive transducers : These require external voltage source.
2. Photovoltaic transducers: These generate voltage

Photoconductive transducers :

When an electromagnetic radiation falls on a semiconductor material, its conductivity increases. Photoconductivity is directly proportional to the concentration of charge carriers. The energy of incident photons is given as $E = h\nu$ and Band gap energy $Eg = E_c - E_v$

If incident energy $E < Eg$, no electron can move from valence band to conduction band and hence no electron can be made free.

If incident energy $E \geq Eg$, few electrons can move from valence band to conduction band and hence some electrons can be made free. Thus conductivity of semiconductor will increase.

Critical wavelength is given as $\lambda = \frac{1.24}{Eg \text{ in } eV}$ **µm**

Light Dependent Resistor (LDR)

LDR is a photoconductive device where resistance changes with intensity and wavelength of incident radiation.

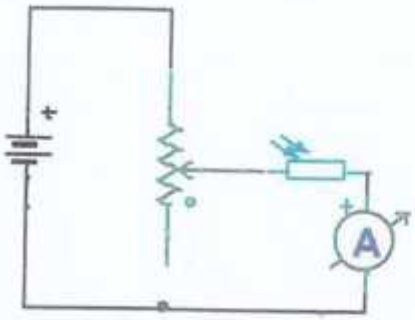
Construction :

1. It is made up of thin layer of photoconductive material like CdS (Cadmium Sulphide) , PbS (Lead Sulphide) or CdSe(Cadmium selenide).
2. This layer is deposited on insulating ceramic base.
3. Two terminals are taken out for connection.
4. The entire assembly is enclosed in a metal case with a glass window over photoconductive material.
5. Its resistance can be as high as few MΩ in dark . It can reduce to few Ω when exposed to bright light.

Applications :

1. Light detector circuit
2. Automatic street lighting
3. Counting objects on a conveyor belt

A typical LDR circuit can be shown as,



Light Emitting Diode(LED) :

It is basically a PN junction diode. When it is forward biased , large no of holes and electrons recombine, giving out excess of energy . In ordinary junction diode, this energy is in the form of heat. In case of LEDs , it is in the form of visible light. Intensity of emitted light is directly proportional to magnitude of current. LEDs are available in different shapes and sizes. For a LED Cathode lead is shorter than anode lead. A LED needs typically 1.6V and 20mA to produce proper illumination. LEDs are available in variety of colors such as Blue, Red, Green , Yellow, Orange and even White. LEDs can be switched ON & OFF at a very fast speed of 1ns.

LED symbol :

Applications : The typical LED applications are As a display device or indicator

1. SSD used in calculators and digital watches
2. LEDs along with photo detectors can be used for reading punched cards
3. Infrared LEDS used in remote control and optical fiber communication.

Alphanumeric Displays :

Alphanumeric displays are used to generate visual display of various alphabets and digits. These display units mainly consist of number of LEDs arranged in a format.

There are mainly two types of alphanumeric displays.

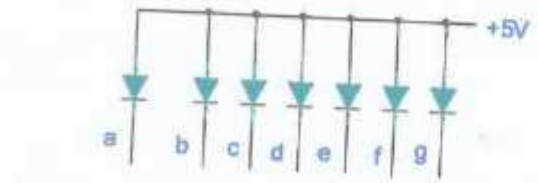
1. SSD (Seven Segment Display)
2. Dot Matrix display

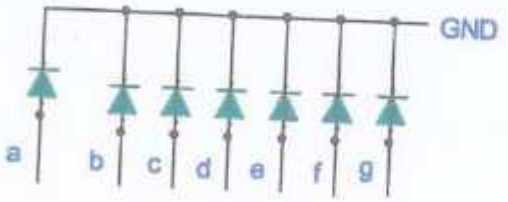
SEVEN SEGMENT LED DISPLY:

The seven segment display is a arrangement of 7 LEDs in a specific format to generate different digits and certain alphabets. The particular section of the LED becomes bright when the LED is forward biased. The seven LEDs are arranged as shown below

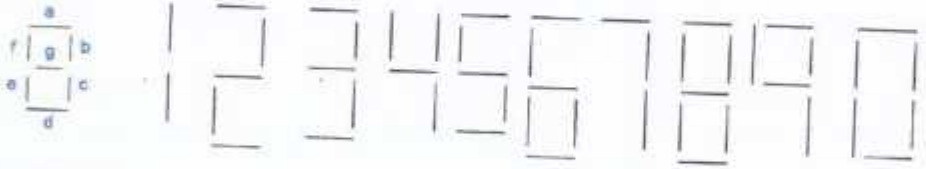
The different LEDs that are to be forward biased to generate digits are as given below. There are two different types of SSDs: common anode and common cathode.

In case of common anode type SSD, the anode terminals of all the LEDs are shorted and connected to common +5V supply. The cathode terminal of the LED which is required to be bright, is connected to ground.





In case of common cathode type SSD , the cathode terminals of all the LEDs are shorted and connected to ground. The cathode terminal of the LED which is required to be bright, is connected to common +5V supply.



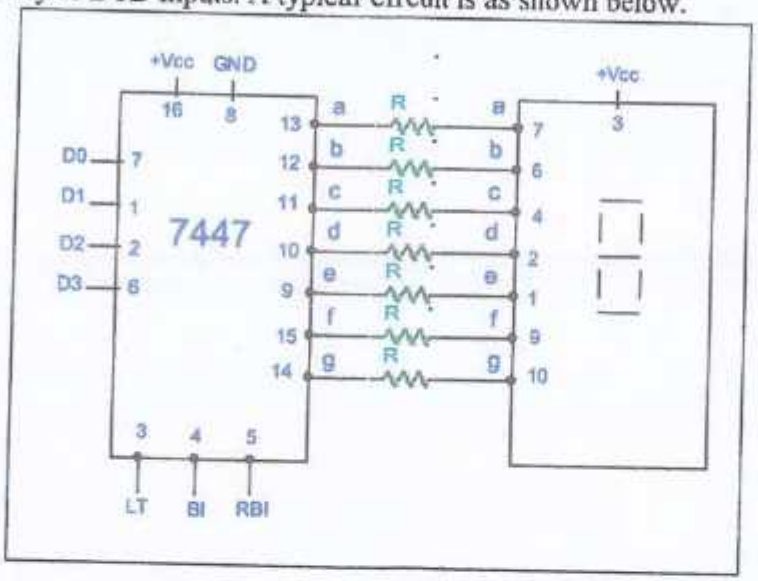
Truth table:

type	Selected LED to be connected to	Selected LED	output
Common anode	**ground**	**a , b , c , d , e , f**	**0**
		b , c	**1**
		a, b, d , e ,g	**2**
		a , b , c , d , g	**3**
		b , c , f ,g	**4**
		a , c , d ,f ,g	**5**
		a , c , d , e ,f ,g	**6**
		a , b , c	**7**
		a ,b, c, d ,e , f ,g	**8**
		a , b , c , f ,g	**9**
Common cathode	**+5V**	**a , b , c , d , e , f**	**0**
		b , c	**1**

		a, b, d , e ,g	2
		a , b , c , d , g	3
		b , c , f ,g	4
		a , c , d ,f ,g	5
		a , c , d , e ,f ,g	6
		a , b , c	7
		a ,b, c, d ,e , f ,g	8
		a , b , c , f ,g	9

BCD TO SSDECODER/DRIVER:

A SSD normally receives its input through a decoder/ driver chip. The input to this chip are binary or BCD inputs. A typical circuit is as shown below.



Truth table: For IC 7447

Control inputs			BCD inputs to 7447				O/p of 7447 same as Inputs to SSD							o/p of SSD
$\overline{LT}$	$\overline{BI}$	$\overline{RBI}$	D_3	D_2	D_1	D_0	a	b	c	d	e	f	g	
1	1	1	0	0	0	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	1	1	0	0	1	1	1	1	1
1	1	1	0	0	1	0	0	0	1	0	0	1	0	2
1	1	1	0	0	1	1	0	0	0	0	1	1	0	3
1	1	1	0	1	0	0	1	0	0	1	1	0	0	4
1	1	1	0	1	0	1	0	1	0	0	1	0	0	5
1	1	1	0	1	1	0	1	1	0	0	0	0	0	6
1	1	1	0	1	1	1	0	0	0	1	1	1	1	7
1	1	1	1	0	0	0	0	0	0	0	0	0	0	8
1	1	1	1	0	0	1	0	0	0	1	1	0	0	9
0	1	1	X	X	X	X	0	0	0	0	0	0	0	8
1	op en	0	0	0	0	0	1	1	1	1	1	1	1	off
1	op en	0	all other inputs 0001 to 1001				Relevant outputs as per above table							1 to 9
1	0	1	X	X	X	X	1	1	1	1	1	1	1	off

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The different control pins of IC 7447 are as given below:

1. When $\overline{LT}$ = logic 0 and $\overline{BI}$ = $\overline{RBI}$=logic 1

   The figure of 8 is displayed irrespective of all the inputs. This is used for checking if all the LED segments are properly working.

2. When $\overline{RBI}$ = logic 0 and $\overline{LT}$ = logic 1 and $\overline{BI}$ = open

The display remains ON for all input combinations from 0001 to 1001. For input 0000 the display chip is switched off.

3. When $\overline{BI}$ = logic 0 and $\overline{LT}$ = $\overline{RBI}$ = logic 1

   Display remains off for all input combinations from 0000 to 1001

DOT MATRIX DISPLAY :

The different alphanumeric characters can be displayed by using dot matrix LED. A dot matrix LED consists of large number of LEDs arranged in a matrix format.the common formats are 5 x 7 , 5 x 8 and 7 x 9. By forward biasing any LED , any alphabet , digit or any other character can be generated.

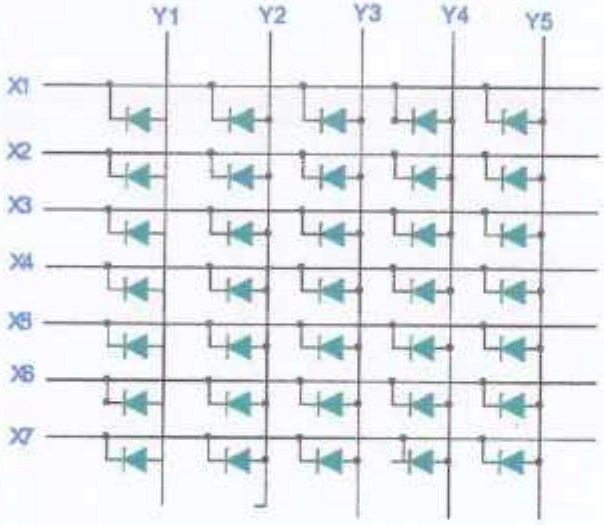


Photo diode and Phototransistor:

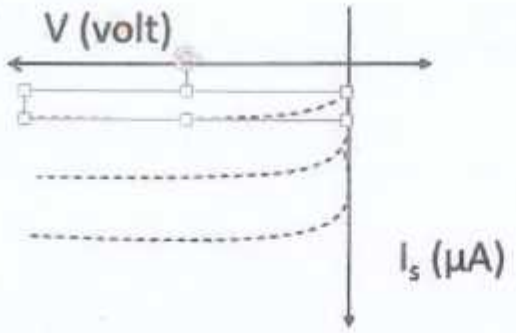
Photodiode:

It is a PN junction diode. It is operated in revered biased condition. The reverse current increases as junction is exposed to light. I_R is directly proportional to intensity of light. I_R obtained in absence of light is called as dark current. Dark current (I_d) is due to thermally generated electron-hole pairs. When light falls on junction , additional electron-hole pairs are generated. Resistance of photodiode in dark is given as $R_{dark} = \frac{VR}{Id}$

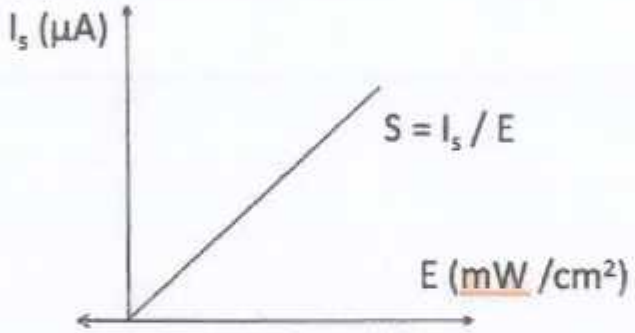
The PN junction diode is sealed in a plastic or glass case. Only a small glass window is provided such that light rays fall on junction. Remaining surface is painted to avoid extra penetration of light.

Photodiode Characteristics :

1. Current voltage characteristic : It is a relation between reverse current flowing through photodiode and reverse voltage applied across photo diode. The graphs do not pass through origin indicating that even in absence of any reverse voltage some current is present due to thermal effect.



2. Current intensity characteristic. : It shows a linear relationship between intensity of incident light and reverse current. The ratio of reverse current and light intensity is called as sensitivity of photodiode.



Phototransistor:

Phototransistor is a semiconductor device with three terminals , collector , base and emitter. It is normally operated in CE configuration. The base terminal is left open. The radiation is allowed to fall on C-B junction. When there is no radiation incident on phototransistor, there few minority carriers due to thermal energy. When light falls on junction, additional minority carriers are generated. Reverse current in phototransistor is much higher than reverse current of photodiode.

Chemical sensors :

pH Sensor :

In chemical industry acidity or alkalinity of chemicals need to be closely monitored. The pH value of a chemical depends on the concentration of hydrogen (H+) and hydroxyl (OH-) ions. If concentration of hydrogen (H+) > concentration of and hydroxyl (OH-) ions , solution is acidic. If concentration of hydrogen (H+) = concentration of and hydroxyl (OH-) ions , solution is neutral. If concentration of hydrogen (H+) < concentration of and hydroxyl (OH-) ions , solution is alkaline. The product of concentration of hydrogen (H+) and concentration of hydroxyl (OH-) ions , is called as dissociation constant. It is always equal to 10^{-14}. pH value of any solution can be determined simply by measuring concentration of hydrogen ions. $pH = - \log_{10} (H+)$

For neutral solution, pH value is 7

For acidic solution, pH value is between o and 7

For Alkaline solution, pH value is between 7 and 14

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Measurement of pH :

A pair of electrodes is immersed in the solution under test. The voltage developed across the electrodes is measured. The two electrodes are called reference electrode and measuring electrode. Reference electrode always generates constant potential irrespective of solution under test. Measuring electrode generates different potentials depending on pH value of solution under test.

Reference electrode :

It is made up of glass. It has two layers of glass. Inner glass tube contains solution of mercury chloride and mercury. The space between two glass tubes is filled with potassium chloride solution. There is a tiny opening at the bottom of electrode through which KCL solution very slowly mixes with solution under test.

Measuring electrode :

The structure is same as reference electrode. Here the space between two glass tubes is filled with buffer solution of constant pH value. Here bottom of electrode does not have any opening. The KCL solution gets accumulated near the tip of glass tube. Due to difference in pH value, a voltage is developed at this tip.

Measurement of voltage : The potential difference is measured by a voltmeter . The voltmeter is calibrated in terms of pH value.

Gas sensor:

Gas Sensors are required to monitor presence of hazardous gases. Gas sensing is useful for fire detection and fire prevention. Gas sensors also play important role in environmental studies and pollution control.

Gas sensing Technologies:

Methods based on variation in electrical parameters

Methods based on Variation in optical, sound parameters

Applications :

1. Mine industry
2. Automobile industry
3. Medical applications
4. Indoor air quality supervision and maintenance
5. Greenhouse monitoring

Various types of Gas sensors :

1. Calorimetric gas sensor :

Calorimetry is the measurement of the transfer of heat into or out of a system during a **chemical** reaction or physical process.

The **principle** of **calorimetry** indicates the law of conservation of energy, i.e. the total heat lost by the hot body is equal to the total heat gained by the cold body. Heat Lost = Heat Gained.

When two bodies of different temperatures (preferably a solid and a liquid) are placed in physical contact with each other, the heat is transferred from the body with higher temperature to the body with lower temperature until thermal equilibrium is attained between them. The body at higher temperature releases heat while the body at lower temperature absorbs heat.

They are widely used for detection for flammable gases.

2. Electrochemical gas sensors :

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These sensors are used to monitor presence of specific toxic gases like H_2S , CO, SO_2 , Cl_2, NO_2 etc at ppm (part per million by volume) level.

Air supply is passed through region between two electrodes. Due to presence of certain gases which react with these electrodes, voltage is developed.

Hygrometer:

It is a device used to measure humidity . Humidity is defined as amount of water vapour in air or in any gas. Operation of electronic components , industrial equipments and high voltage devices depend on humidity levels. Sensing, measuring and controlling humidity levels is significant for such sensitive devices.

Humidity : Mass of water vapour present per unit volume of air.

Dew Point Temperature : The temperature at which water vapour content is saturated in air. i.e. humidity becomes 100%

Resistive Hygrometer :

Some hygroscopic salts show changes in their resistivity as the humidity changes.
e.g. Lithium Chloride
Change in resistance is measured using bridge circuit.
As humidity increases, resistance decreases.
Advantages :

1. Low cost
2. Small size
3. Suitable for remote sensing and controlling

Disadvantages :

1. Sensitive to chemical vapours and other contaminants
2. Need constant temperature environment
3. Need more complex supporting circuitry

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Sem I Unit 3: Microbial Nutrition: Cultivation, Isolation and Preservation

Reference Books – Prescott 8th edition
Talaro 7th edition
Brock 11th edition
Pelczar 5th edition

Nutritional requirements

Nutrition is the part of microbial physiology that deals with the nutrients required for growth. Different organisms need different complements of nutrients, and not all nutrients are required in the same amounts.

Elements of life

All microbial nutrients are compounds constructed from the chemical elements (**Table1**). However, just a handful of elements dominate living systems and are essential: hydrogen (H), oxygen (O), carbon (C), nitrogen (N), phosphorus (P), sulfur (S), and selenium (Se). In addition to these, at least 50 other elements, although not required, are metabolized in some way by microorganisms (**Figure 3.1**).

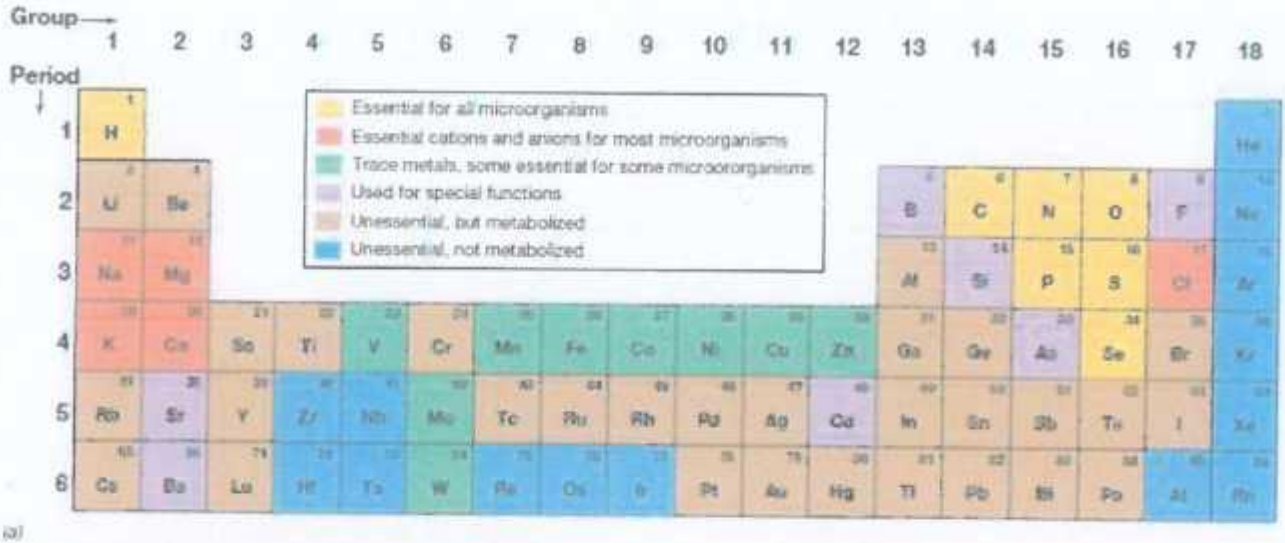
Table 3.1: Elemental makeup of important cell molecules

Molecule	Elements
Proteins	C, H, O, N, S
Carbohydrates	C, H, O,
Lipids	C, H, O, P
Nucleic acids	C, H, O, N, P

Besides water, which makes up 70–80% of the wet weight of a microbial cell (a single cell of Escherichia coli weighs just 10^{-12} g), cells consist primarily of macromolecules (**Table 3.2**).

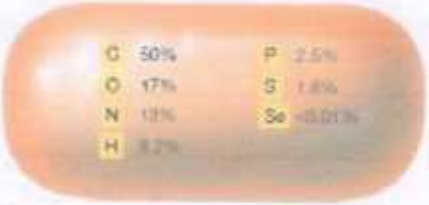
Chemical analysis of cells shows that over 95% of cell dry weight is made up of a few major elements: carbon, oxygen, hydrogen, nitrogen, sulfur, phosphorus, potassium, calcium, magnesium, and iron. These are called **macroelements** or **macronutrients** because they are required in relatively large amounts. The first six (C, O, H, N, S, and P) are components of carbohydrates, lipids, proteins, and nucleic acids. The essential elements make up the building blocks (monomers) of macromolecules, the amino acids, nucleotides, fatty acids, and sugars. Proteins

Figure 3.1: Elemental and macromolecular composition of a bacterial cell



(a)

Essential elements as a percent of cell dry weight



(b)

Macromolecular composition of a cell

Macromolecule	Percent of dry weight
Protein	55
Lipid	9.1
Polysaccharide	5.0
Lipopolysaccharide	3.4
DNA	3.1
RNA	20.5

(c)

Table 3.2: Elemental composition of *Escherichia coli*

Elements	C	O	N	H	P	S	K	Na	Ca	Mg	Fe	Mn, ZN. Cu, CO
% dry weight	50	20	14	8	3	1	1	1	0.5	0.5	0.2	0.3

dominate the macromolecular composition of a cell, making up 55% of total cell dry weight. Moreover, the diversity of proteins exceeds that of all other macromolecules combined. But in any microbial cell, carbon and nitrogen are important macronutrients. The remaining four macroelements exist in the cell as cations and play a variety of roles.

In addition to macroelements, all microorganisms require several nutrients in small amounts—amounts so small that in the lab they are often obtained as contaminants in water, glassware, and growth media. Likewise in nature, they are ubiquitous and usually present in adequate amounts to support the growth of microbes. These nutrients are called **micronutrients** or **trace elements** . The micronutrients—manganese, zinc, cobalt, molybdenum, nickel, and copper—are needed by most cells. Micronutrients are normally a part of enzymes and cofactors, and they aid in the catalysis of reactions and maintenance of protein structure. For example, zinc (Zn^{2+}) is present at the active site of some enzymes but can also be involved in the

association of different subunits of a multimeric protein. Manganese (Mn 2+) aids many enzymes that catalyze the transfer of phosphate. Molybdenum (Mo 2+) is required for nitrogen fixation, and cobalt (Co 2+) is a component of vitamin B 12 . Besides the common macroelements and trace elements, some microorganisms have particular requirements that reflect their specific morphology or metabolic capabilities. For instance, diatoms, members of the eucaryotic taxon *Stramenopiles,* need silicic acid (H_4SiO_4) to construct their beautiful cell walls of silica [(SiO_2) n]. But no matter what their nutritional requirements, microbes require a balanced mixture of nutrients. If an essential nutrient is in short supply, microbial growth will be limited regardless of the concentrations of other nutrients.

Requirements for carbon, hydrogen, oxygen and electrons

All organisms need carbon, hydrogen, oxygen, and a source of electrons. **Carbon** is needed to synthesize the organic molecules from which organisms are built. **Hydrogen and oxygen** are also important elements found in many organic molecules. **Electrons** are needed for two reasons. The movement of electrons through electron transport chains and during other oxidation-reduction reactions can provide energy for use in cellular work. Electrons also are needed to reduce molecules during biosynthesis (e.g., the reduction of CO_2 to form organic molecules).

The requirements for carbon, hydrogen, and oxygen usually are satisfied together because molecules serving as carbon sources often contribute hydrogen and oxygen as well. For instance, many **heterotrophs** —organisms that use reduced, preformed organic molecules as their carbon source—can also obtain hydrogen, oxygen, and electrons from the same molecules (**table 3.3**).

Table 3.3: Sources of carbon, Energy and Electrons

Carbon sources	
Autotrophs	CO_2 sole or principal biosynthetic carbon source
Heterotrophs	Reduced, preformed, organic molecules from other organisms
Energy sources	
Phototrophs	Light
Chemotrophs	Oxidation of organic or inorganic compounds
Electron sources	
Lithotrophs	Reduced inorganic molecules
Organotrophs	Organic molecules

Because the electrons provided by these organic carbon sources can be used in electron transport as well as in other oxidation reduction reactions, many heterotrophs also use their carbon source as an energy source. Indeed, the more reduced the organic carbon source (i.e., the more electrons it carries), the higher its energy content. Thus lipids have higher energy content than carbohydrates.

A most remarkable characteristic of heterotrophic microorganisms is their extraordinary flexibility with respect to carbon sources. Laboratory experiments indicate that all naturally occurring organic molecules can be used as a source of carbon or energy or both by at least some microorganisms. Actinomycetes, common soil bacteria, degrade amyl alcohol, paraffin, and even rubber. The bacterium *Burkholderia cepacia* can use over 100 different carbon compounds. Microbes can degrade even relatively indigestible human-made substances such as pesticides. This is usually accomplished in complex microbial communities. These molecules sometimes are degraded in the presence of a growth-promoting nutrient that is metabolized at the same time—a process called **cometabolism.** Other microorganisms can use the products of this breakdown process as nutrients. In contrast to these **bacterial omnivores**, some microbes are exceedingly fastidious and catabolize only a few carbon compounds. Cultures of methylotrophic bacteria metabolize methane, methanol, carbon monoxide, formic acid, and related one-carbon molecules. Parasitic members of the genus *Leptospira* use only long-chain fatty acids as their major source of carbon and energy.

Other microbes are **autotrophs** —organisms that use carbon dioxide (CO_2) as their sole or principal source of carbon **(table 3.3)**. Although CO_2 is plentiful, its use as a carbon source presents a problem to autotrophs. CO_2 is the most oxidized form of carbon, lacks hydrogen, and is unable to donate electrons during oxidation-reduction reactions. Therefore CO_2 cannot be used as a source of hydrogen, electrons, or energy. Because CO_2 cannot supply their energy needs, autotrophs must obtain energy from other sources such as light or reduced inorganic molecules.

Requirements for Nitrogen, Phosphorous and Sulfur

To grow and reproduce, a microorganism must be able to incorporate large quantities of nitrogen, phosphorus, and sulfur. Although these elements may be acquired from the same nutrients that supply carbon, microorganisms usually employ inorganic sources as well.

A bacterial cell is about 13% nitrogen. **Nitrogen** is needed for the synthesis of amino acids, purines, pyrimidines, some carbohydrates and lipids, enzyme cofactors, and other substances. Many microorganisms can use the nitrogen in amino acids. Others can incorporate ammonia directly through the action of enzymes such as glutamate dehydrogenase or glutamine synthetase and glutamate synthase.

The bulk of nitrogen available in nature is in inorganic form as ammonia (NH_3), nitrate (NO_3), or nitrogen gas (N_2). Virtually all prokaryotes can use NH3 as their nitrogen source, and many can also use NO_3. Most phototrophs and many chemotrophic microorganisms reduce nitrate to ammonia and incorporate the ammonia in a process known as **assimilatory nitrate reduction.** A variety of bacteria (e.g., many cyanobacteria and the symbiotic bacterium *Rhizobium)* can assimilate atmospheric nitrogen (N_2) by reducing it to ammonia (NH_3). This is called **nitrogen fixation.**

Nitrogen in organic compounds, for example, in amino acids, may also be available to microorganisms; if organic N is available and is taken up, the compound can

immediately enter the monomer pool for biosynthesis or be catabolized as an energy source.

Phosphorus is present in nucleic acids, phospholipids, nucleotides such as ATP, several cofactors, some proteins, and other cell components. Almost all microorganisms use inorganic phosphate as their phosphorus source and incorporate it directly. Low phosphate levels can limit microbial growth in aquatic environments. Some microbes, such as *Escherichia coli*, use both organic and inorganic phosphate. Some organophosphates such as hexose 6-phosphates are taken up directly by the cell. Other organophosphates are hydrolyzed in the periplasm by the enzyme alkaline phosphatase to produce inorganic phosphate, which then is transported across the plasma membrane.

Sulfur is needed for the synthesis of substances such as the amino acids cysteine and methionine, some carbohydrates, and also in several vitamins, including thiamine, biotin, and lipoic acid.. Sulfur can be supplied to cells in several forms, including sulfide (HS2) and sulfate (SO4). Most microorganisms use sulfate as a source of sulfur after reducing it; a few microorganisms require a prereduced form of sulfur such as cysteine.

Other macronutrients

Potassium (K) is required for the activity of several enzymes, including some involved in protein synthesis; whereas **magnesium (Mg)** complexes with ATP; functions to stabilize ribosomes, membranes, and nucleic acids and is also required for the activity of many enzymes (as cofactor). **Calcium (Ca)** is not required by all cells but can play a role in helping to stabilize microbial cell walls, and it plays a key role in the heat stability of bacterial endospores. **Sodium (Na)** is required by some, but not all, microorganisms, and its requirement is typically a reflection of the habitat. For example, seawater contains relatively high levels of Na^+, and marine microorganisms typically require Na^+ for growth. By contrast, freshwater species are usually able to grow in the absence of Na^+. K, Mg, Ca, and Na are all supplied to cells as salts, typically as chloride or sulfate salts.

Micronutrients: Iron and Other Trace Metals

Microorganisms require several metals for growth. Chief among these is **iron (Fe)**, which plays a major role in cellular respiration. Iron is a key component of cytochromes and of iron–sulfur proteins involved in electron transport reactions Under anoxic conditions, iron is generally in the ferrous (Fe^{2+}) form and soluble. However, under oxic conditions, iron is typically in the ferric (Fe^{3+}) form as part of insoluble minerals. To obtain Fe^{3+} from such minerals, cells produce ironbinding molecules called **siderophores** that function to bind Fe^{3+} and transport it into the cell. However, as important as iron is for most cells, some organisms can grow in the absence of iron. For example, many lactic acid bacteria such as species of Lactobacillus do not contain detectable iron and grow normally in its absence. In these organisms, **manganese (Mn^{2+})** often plays a role similar to that just described for iron. Many other metals are required or otherwise metabolized by

microorganisms (**Table 3.4**) . Like iron, these micronutrients are called **trace elements or trace metals.** Micronutrients typically play a role as cofactors for enzymes.

Table 3.4: Micronutrients (trace elements) needed by microorganisms

Element	*Cellular function or molecule of which a part*
Boron (B)	Autoinducer for quorum sensing in bacteria; also found in some polyketide antibiotics
Chromium (Cr)	Possible but not proven component for glucose metabolism (necessary in mammals)
Cobalt (Co)	Vitamin B_{12}, transcarboxylase (only in propionic acid bacteria)
Copper (Cu)	In respiration, cytochrome c oxidase; in photosynthesis, plastocyanin; some superoxide dismutases
Iron (Fe)[2]	Cytochromes, catalases, peroxidases, iron–sulfur proteins, oxygenases, all nitrogenases
Manganese (Mn)	Activator of many enzymes; component of certain superoxide dismutases and of the water-splitting enzyme in oxygenic phototrophs (photosystem II)
Molybdenum (Mo)	Certain flavin-containing enzymes; some nitrogenases, nitrate reductases, sulfite oxidases, DMSO-TMAO reductases, some formate dehydrogenases
Nickel (Ni)	Most hydrogenases, coenzyme F_{430} of methanogens, carbon monoxide dehydrogenase, urease
Selenium (Se)	Formate dehydrogenase, some hydrogenases, the amino acid selenocysteine
Tungsten (W)	Some formate dehydrogenases, oxidoreductases of hyperthermophiles
Vanadium (V)	Vanadium nitrogenase, bromoperoxidase
Zinc (Zn)	Carbonic anhydrase, alcohol dehydrogenase, RNA and DNA polymerases, and many DNA-binding proteins

[1]Not every micronutrient listed is required by all cells; some metals listed are found in enzymes or cofactors present in only specific microorganisms.
[2]Needed in greater amounts than other trace metals.

Growth factors

Organic compounds that must be supplied in the diet for growth because they are essential cell components or precursors of such components and may not be synthesized by the organism are called **growth factors** . They are similar to micronutrients as they are required in only very small quantities. Although most microorganisms are able to biosynthesize the growth factors they need, some must obtain one or more of them from the environment and thus must be supplied with these compounds when cultured in the laboratory.

There are three major classes of growth factors: (1) amino acids, (2) purines and pyrimidines, and (3) vitamins. Amino acids are needed for protein synthesis, purines and pyrimidines for nucleic acid synthesis. **Vitamins** are small organic molecules that usually make up all or part of enzyme cofactors. They are needed in only very small amounts to sustain growth. Most vitamins function as coenzymes, which are nonprotein components of enzymes. The functions of selected vitamins and examples of microorganisms requiring them are given in **table 3.5** . Vitamin requirements vary among microorganisms, ranging from none to several. Lactic acid bacteria, which include the genera Streptococcus, Lactobacillus, and Leuconostoc are renowned for their many vitamin requirements, which are even more extensive than those of humans.

Table 3.5: Functions of some common vitamins in microorganisms

Vitamin	Functions	Examples of Microorganisms Requiring Vitamin*
Biotin	Carboxylation (CO_2 fixation) One-carbon metabolism	*Leuconostoc mesenteroides* (B) *Saccharomyces cerevisiae* (F) *Ochromonas malhamensis* (P) *Acanthamoeba castellanii* (P)
Cyanocobalamin (B_{12})	Molecular rearrangements One-carbon metabolism—carries methyl groups	*Lactobacillus* spp. (B) *Euglena gracilis* (P) Diatoms (P)
Folic acid	One-carbon metabolism	*Acanthamoeba castellanii* (P) *Enterococcus faecalis* (B) *Tetrahymena pyriformis* (P)
Lipoic acid	Transfer of acyl groups	*Lactobacillus casei* (B) *Tetrahymena* spp. (P)
Pantothenic acid	Precursor of coenzyme A—carries acyl groups (pyruvate oxidation, fatty acid metabolism)	*Proteus mirabilis* (B) *Hansenuspora* spp. (F) *Prototheca* spp. (P)
Pyridoxine (B_6)	Amino acid metabolism (e.g., transamination)	*Lactobacillus* spp. (B) *Tetrahymena pyriformis* (P)
Niacin (nicotinic acid)	Precursor of NAD and NADP—carry electrons and hydrogen atoms	*Brucella abortus*, *Haemophilus influenzae* (B) *Blastocladia pringsheimii* (F) *Crithidia fasciculata* (P)
Riboflavin (B_2)	Precursor of FAD and FMN—carry electrons or hydrogen atoms	*Caulobacter vibrioides* (B) *Dictyostelium* spp. (P) *Tetrahymena pyriformis* (P)
Thiamine (B_1)	Aldehyde group transfer (pyruvate decarboxylation, α-keto acid oxidation)	*Bacillus subtilis* (B) *Physarum polycephalum* (P) *Ochromonas malhamensis* (P) *Colpidium campylum* (P)

* The representative microorganisms are members of the following groups: Bacteria (B), Fungi (F), and protozoa (P).

Some microorganisms are able to synthesize large quantities of vitamins needed by humans. These microbes can be used to manufacture these vitamins for human use. Several water-soluble and fat-soluble vitamins are produced partly or completely using industrial fermentations. Examples of such vitamins and the microorganisms that synthesize them are riboflavin (*Clostridium, Candida*), coenzyme A (*Brevibacterium*), vitamin B 12 (*Streptomyces, Propionibacterium, Pseudomonas*), vitamin C (*Glucono bacter, Erwinia, Corynebacterium*), β-carotene (*Dunaliella*), and vitamin D (*Saccharomyces*). Current research focuses on improving yields and finding microorganisms that can produce large quantities of other vitamins. Other growth factors include heme (for the synthesis of cytochromes), which is required by *Haemophilus influenzae,* and cholesterol, which is needed by some mycoplasmas.

Table 3.6: Sources of Essential nutrients

Carbon	extracellular environment
Nitrogen	Reservoir – atmospheric nitrogen, inorganic & organic nitrogenous compounds in environment
Oxygen	Atmosphere, organic compounds, inorganic salts
Hydrogen	Organic and inorganic compounds, water, naturally occurring gases-methane, hydrogen sulphide, hydrogen
Phosphorou	Phosphates and phosphoric acid from rocks and oceanic mineral

s	deposits
Sulfur	Environment: rocks, sediments, hydrogen sulphide, S

Nutritional Types of Microorganisms

Because the need for carbon, energy, and electrons is so important, biologists use specific terms to define how these requirements are fulfilled. Microorganisms can be classified as either heterotrophs or autotrophs with respect to their preferred source of carbon (**table 3.3**).

Only two sources of energy are available to organisms: (1) light energy, and (2) the energy derived from oxidizing organic or inorganic molecules.

Phototrophs use light as their energy source;

chemotrophs obtain energy from the oxidation of chemical compounds (either organic or inorganic).

Microorganisms also have only two sources for electrons.

Lithotrophs (i.e., "rock- eaters") use reduced inorganic substances as their electron source, whereas

organotrophs extract electrons from reduced organic compounds.

Despite the great metabolic diversity seen in microorganisms, most may be placed in one of five nutritional classes based on their primary sources of carbon, energy, and electrons (**table 3.6**). The majority of microorganisms thus far studied are either photolithoautotrophic or chemoorganoheterotrophic.

Table 3.6: Major nutritional types of Microorganisms

Nutritional Type	Carbon Source	Energy Source	Electron Source	Representative Microorganisms
Photolithoautotroph	CO_2	Light	Inorganic e^- donor	Purple and green sulfur bacteria, cyanobacteria
Photoorganoheterotroph	Organic carbon	Light	Organic e^- donor	Purple nonsulfur bacteria, green nonsulfur bacteria
Chemolithoautotroph	CO_2	Inorganic chemicals	Inorganic e^- donor	Sulfur-oxidizing bacteria, hydrogen-oxidizing bacteria, methanogens, nitrifying bacteria, iron-oxidizing bacteria
Chemolithoheterotroph	Organic carbon	Inorganic chemicals	Inorganic e^- donor	Some sulfur-oxidizing bacteria (e.g., *Beggiatoa*)
Chemoorganoheterotroph	Organic carbon	Organic chemicals often same as C source	Organic e^- donor, often same as C source	Most nonphotosynthetic microbes, including most pathogens, fungi, and many protists and archaea

Photolithoautotrophs (often called simply **photoautotrophs**) use light energy and have CO_2 as their carbon source. Photosynthetic protists and cyanobacteria employ water as the electron donor and release oxygen (**figure 3.2** ***a***). Other photolithoautotrophs, such as the purple and green sulfur bacteria (**figure 3.2** ***b***), cannot oxidize water but extract electrons from inorganic donors such as hydrogen, hydrogen sulfide, and elemental sulfur. **Chemoorganoheterotrophs** (sometimes called **chemoheterotrophs** or **chemoorganotrophs**) use organic compounds as sources of

SYBSc Semester 4 Unit 3
Biofertilizers

1. Biofertilizers
2. Different types of biofertilizers
3. Mass production of Biofertilizers
4. Application of Biofertilizers
5. Azolla as cattle feed
6. List of Biofertilizer production units in Tamil Nadu 7. Constraints in Biofertilizer Technology
8. Biofertilizer strains developed from TNAU
9. Economics
10. Cost and availability of Biofertilizers

1. Biofertilizers

Biofertilizers are defined as preparations containing living cells or latent cells of efficient strains of microorganisms that help crop plants' uptake of nutrients by their interactions in the rhizosphere when applied through seed or soil. They accelerate certain microbial processes in the soil which augment the extent of availability of nutrients in a form easily assimilated by plants.

Very often microorganisms are not as efficient in natural surroundings as one would expect them to be and therefore artificially multiplied cultures of efficient selected microorganisms play a vital role in accelerating the microbial processes in soil.

Use of biofertilizers is one of the important components of integrated nutrient management, as they are cost effective and renewable source of plant nutrients to supplement the chemical fertilizers for sustainable agriculture. Several microorganisms and their association with crop plants are being exploited in the production of biofertilizers. They can be grouped in different ways based on their nature and function.

S. No.	Groups	Examples
N2 fixing Biofertilizers		
1.	Free-living	*Azotobacter, Beijerinkia, Clostridium, Klebsiella, Anabaena, Nostoc,*
2.	Symbiotic	*Rhizobium, Frankia, Anabaena azollae*
3.	Associative Symbiotic	*Azospirillum*

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P Solubilizing Biofertilizers		
1.	Bacteria	*Bacillus megaterium* var. *phosphaticum*, *Bacillus subtilis*
		Bacillus circulans, *Pseudomonas striata*
2.	Fungi	*Penicillium sp*, *Aspergillus awamori*
P Mobilizing Biofertilizers		
1.	Arbuscular mycorrhiza	*Glomus sp.*,*Gigaspora sp.*,*Acaulospora sp.*, *Scutellospora sp.* & *Sclerocystis sp.*
2.	Ectomycorrhiza	*Laccaria sp.*, *Pisolithus sp.*, *Boletus sp.*, *Amanita sp.*
3.	Ericoid mycorrhizae	*Pezizella ericae*
4.	Orchid mycorrhiza	*Rhizoctonia solani*
Biofertilizers for Micro nutrients		
1.	Silicate and Zinc solubilizers	*Bacillus* sp.
Plant Growth Promoting Rhizobacteria		
1.	Pseudomonas	*Pseudomonas fluorescens*

2. Different types of biofertilizers

Rhizobium

Rhizobium is a soil habitat bacterium, which can able to colonize the legume roots and fixes the atmospheric nitrogen symbiotically. The morphology and physiology of Rhizobium will vary from free-living condition to the bacteroid of nodules. They are the most efficient biofertilizer as per the quantity of nitrogen fixed concerned. They have seven genera and highly

specific to form nodule in legumes, referred as cross inoculation group. *Rhizobium* inoculant was first made in USA and commercialized by private enterprise in 1930s and the strange situation at that time has been chronicled by Fred (1932). Initially, due to absence of efficient bradyrhizobial strains in soil, soybean inoculation at that time resulted in bumper crops but incessant inoculation during the last four decades by US farmers has resulted in the build up of a plethora of inefficient strains in soil whose replacement by efficient strains of bradyrhizobia has become an insurmountable problem.

Azotobacter

Of the several species of *Azotobacter*, *A. chroococcum* happens to be the dominant inhabitant in arable soils capable of fixing N2 (2-15 mg N2 fixed /g of carbon source) in culture media. The bacterium produces abundant slime which helps in soil aggregation. The numbers of *A. chroococcum* in Indian soils rarely exceeds 105/g soil due to lack of organic matter and the presence of antagonistic microorganisms in soil.

Azospirillum

Azospirillum lipoferum and *A. brasilense* (*Spirillum lipoferum* in earlier literature) are primary inhabitants of soil, the rhizosphere and intercellular spaces of root cortex of graminaceous plants. They perform the associative symbiotic relation with the graminaceous plants. The bacteria of Genus *Azospirillum* are N2 fixing organisms isolated from the root and above ground parts of a variety of crop plants. They are Gram negative, *Vibrio* or *Spirillum* having abundant accumulation of polybetahydroxybutyrate (70 %) in cytoplasm. Five species of *Azospirillum* have been described to date *A. brasilense*, *A.lipoferum*, *A.amazonense*, *A.halopraeferens* and *A.irakense*. The organism proliferates under both anaerobic and aerobic conditions but it is preferentially micro-aerophilic in the presence or absence of combined nitrogen in the medium. Apart from nitrogen fixation, growth promoting substance production (IAA), disease resistance and drought tolerance are some of the additional benefits due to *Azospirillum* inoculation.

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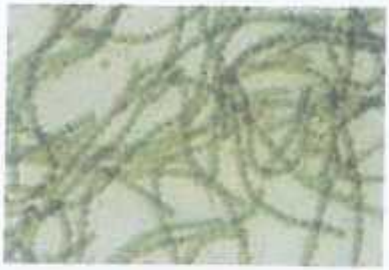
Cyanobacteria



Both free-living as well as symbiotic cyanobacteria (blue green algae) have been harnessed in rice cultivation in India. A composite culture of BGA having heterocystous *Nostoc, Anabaena, Aulosira etc.* is given as primary inoculum in trays, polythene lined pots and later mass multiplied in the field for application as soil based flakes to the rice growing field at the rate of 10 kg/ha. The final product is not free from extraneous contaminants and not very often monitored for checking the presence of desired algal flora. Once so much publicized as a biofertilizer for

the rice crop, it has not presently attracted the attention of rice growers all over India except pockets in the Southern States, notably Tamil Nadu. The benefits due to algalization could be to the extent of 20-30 kg N/ha under ideal conditions but the labour oriented methodology for the preparation of BGA biofertilizer is in itself a limitation. Quality control measures are not usually followed except perhaps for random checking for the presence of desired species qualitatively.

Azolla

Azolla is a free-floating water fern that floats in water and fixes atmospheric nitrogen in association with nitrogen fixing blue green alga *Anabaena azollae*. *Azolla* fronds consist of sporophyte with a floating rhizome and small overlapping bi-lobed leaves and roots. Rice growing areas in South East Asia and other third World countries have recently been evincing increased interest in the use of the symbiotic N2 fixing water fern *Azolla* either as an alternate nitrogen sources or as a supplement to commercial nitrogen fertilizers. *Azolla* is used as biofertilizer for wetland rice and it is known to contribute 40-60 kg N/ha per rice crop.

Phosphate solubilizing microorganisms(PSM)

Several soil bacteria and fungi, notably species of *Pseudomonas, Bacillus, Penicillium, Aspergillus etc.* secrete organic acids and lower the pH in their vicinity to bring about dissolution of bound phosphates in soil. Increased yields of wheat and

potato were demonstrated due to inoculation of peat based cultures of *Bacillus polymyxa* and *Pseudomonas striata*. Currently, phosphate solubilizers are manufactured by agricultural universities and some private enterprises and sold to farmers through governmental agencies. These appear to be no check on either the quality of the inoculants marketed in India or the establishment of the desired organisms in the rhizosphere.

AM fungi

The transfer of nutrients mainly phosphorus and also zinc and sulphur from the soil *milleu* to the cells of the root cortex is mediated by intracellular obligate fungal endosymbionts of the genera *Glomus, Gigaspora, Acaulospora, Sclerocysts* and *Endogone* which possess vesicles for storage of nutrients and arbuscles for funneling these nutrients into the root system. By far, the commonest genus appears to be *Glomus*, which has several species distributed in soil.

4

Availability for pure cultures of AM (Arbuscular Mycorrhiza) fungi is an impediment in large scale production despite the fact that beneficial effects of AM fungal inoculation to plants have been repeatedly shown under experimental conditions in the laboratory especially in conjunction with other nitrogen fixers.

Silicate solubilizing bacteria (SSB)

Microorganisms are capable of degrading silicates and aluminum silicates. During the metabolism of microbes several organic acids are produced and these have a dual role in silicate weathering. They supply H+ ions to the medium and promote hydrolysis and the organic acids like citric, oxalic acid, Keto acids and hydroxy carbolic acids which from complexes with cations, promote their removal and retention in the medium in a dissolved state.

The studies conducted with a Bacillus sp. isolated from the soil of granite crusher yard showed that the bacterium is capable of dissolving several silicate minerals under *in vitro* condition. The examination of anthrpogenic materials like cement, agro inputs like super phosphate and rock phosphate exhibited silicate solubilizing bacteria to a varying degree. The bacterial isolates made from different locations had varying degree of silicate solubilizing potential. Soil inoculation studies with selected isolate with red soil, clay soil, sand and hilly soil showed that the organisms multiplied in all types of soil and released more of silica and the available silica increased in soil and water. Rice responded well to application of organic sliceous residue like rice straw, rice husk and black ash @ 5 t/ha. Combining SSB with these residues further resulted in increased plant growth and grain

T.Y.B.Sc. Semester VI Unit 1: Recombinant DNA Technology

References : 1) Russel 3rd edition

2) Pierce Benjamin 2nd edition

3) Brock 11th edition

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Unit 1.1: Branches of genetics / Subdisciplines of genetics

Geneticists often divide genetics into four major subdisciplines:

1. **Transmission genetics** (sometimes called **classical genetics**) is the subdiscipline dealing with how genes and genetic traits are transmitted from generation to generation and how genes recombine (exchange between chromosomes). This area addresses the relation between chromosomes and heredity, the arrangement of genes on chromosomes, and gene mapping. Here the focus is on the individual organism—how an individual organism inherits its genetic makeup and how it passes its genes to the next generation. Analyzing the pattern of trait transmission in a human pedigree or in crosses of experimental organisms is an example of a transmission genetics study.
2. **Molecular genetics** is the subdiscipline dealing with the molecular structure and function of genes. It concerns the chemical nature of the gene itself: how genetic information is encoded, replicated, and expressed. It includes the cellular processes of replication, transcription, and translation—by which genetic information is transferred from one molecule to another— and gene regulation—the processes that control the expression of genetic information. The focus in molecular genetics is the gene—its structure, organization, and function. Analyzing the molecular events involved in the gene control of cell division, or the regulation of expression of all the genes in a genome, are examples of molecular genetics studies. Genomic analysis is part of molecular genetics.
3. **Population genetics** is the subdiscipline that studies heredity in groups of individuals for traits that are determined by one or only a few genes. It explores the genetic composition of groups of individual members of the same species (populations) and how that composition changes over time and geographic space. Because evolution is genetic change, population genetics is fundamentally the study of evolution. The focus of population genetics is the group of genes found in a population. Analyzing the frequency of a disease-causing gene in the human population is an example of a population genetics study.

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4. **Quantitative genetics** also considers the heredity of traits in groups of individuals, but the traits of concern are determined by many genes simultaneously. Analyzing the fruit weight and crop yield in agricultural plants are examples of quantitative genetics studies. Although these subdisciplines help us think about genes from different perspectives, there are no sharp boundaries between them. Increasingly, for example, population and quantitative geneticists analyze molecular data to determine gene frequencies in large groups. Historically, transmission genetics developed first, followed by population genetics and quantitative genetics, and then molecular genetics.

Genes influence all aspects of an organism's life. Understanding transmission genetics, population genetics, and quantitative genetics will help you understand population biology, ecology, evolution, and animal behavior. Similarly, understanding molecular genetics is useful when you study such topics as neurobiology, cell biology, developmental biology, animal physiology, plant physiology, immunology, and, of course, the structure and function of genomes.

Unit1.2: Model Organisms

Through the years, genetic studies have been conducted on thousands of different species, including almost all major groups of bacteria, fungi, protists, plants, and animals. Nevertheless, a few species have emerged as **model genetic organisms**—organisms with characteristics that make them particularly useful for genetic analysis and about which a tremendous amount of genetic information has accumulated.

Six model organisms that have been the subject of intensive genetic study are: *Escherichia coli,* a bacterium present in the gut of humans and other mammals; *Saccharomyces cerevisiae,* baker's yeast; *Arabidopsis thaliana,* a mustard plant; *Caenorhabditis elegans,* a nematode worm; *Drosophila melanogaster,* the fruit fly; and *Mus musculus*, the house mouse **(FIGURE 1.7)**. These species are the organisms of choice for many genetic researchers, and their genomes were sequenced as a part of the Human Genome Project.

Figure 1.1: Model genetic organisms

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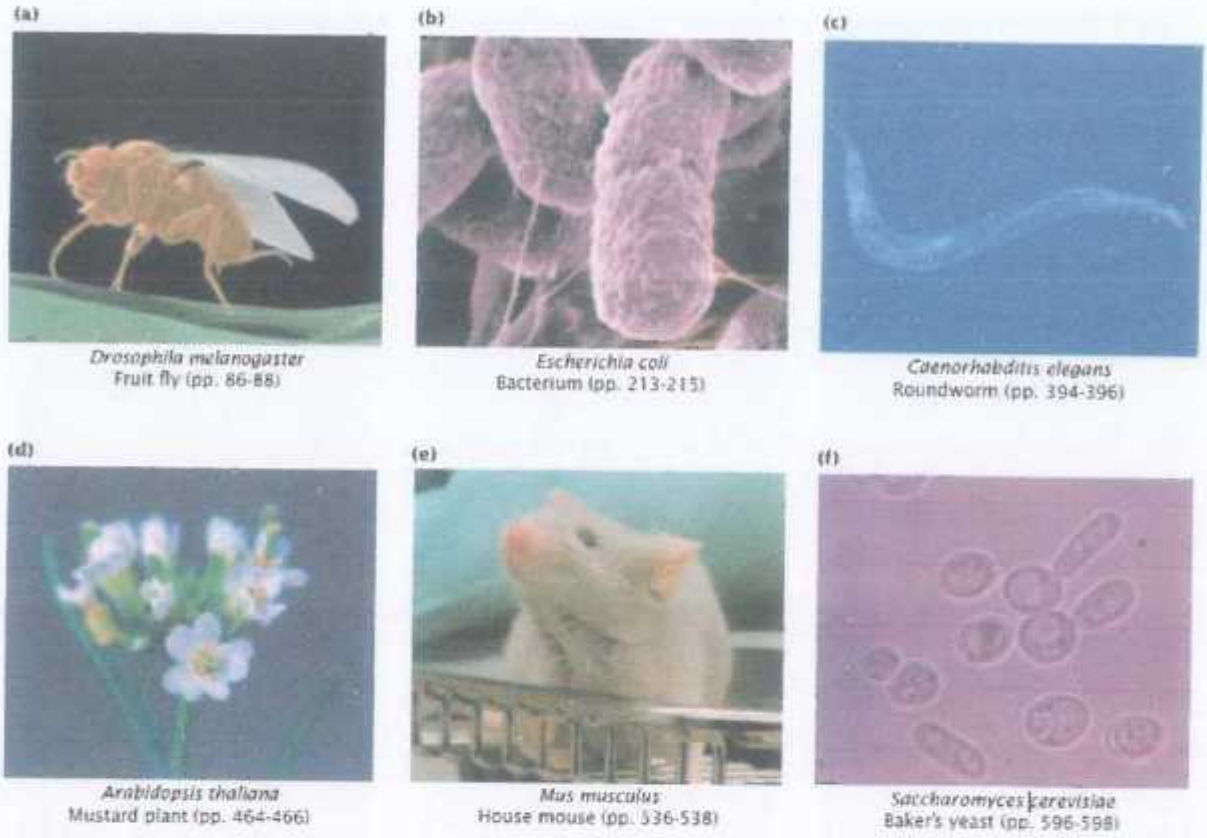


At first glance, this group of lowly and sometimes despised creatures might seem unlikely candidates for model organisms. However, all possess life cycles and traits that make them particularly suitable for genetic study, including a short generation time, manageable numbers of progeny, adaptability to a laboratory environment, and the ability to be housed and propagated inexpensively. The life cycles, genomic characteristics, and features that make these model organisms useful for genetic studies are included in special model organism illustrations that appear throughout this
book. Other species that are frequently the subject of genetic research include bread mold *(Neurospora crassa),* corn *(Zea mays),* zebra fish *(Danio rerio),* and clawed frog *(Xenopus laevis).* Although not generally considered a genetic model, humans also have been subjected to intensive genetic scrutiny.

The fruit fly *Drosophila melanogaster*

Drosophila melanogaster, the fruit fly **(FIGURE 1.2)**, was among the first organisms used for genetic analysis andtoday, it is one of the most widely used and best known genetically of all eukaryotic organisms.

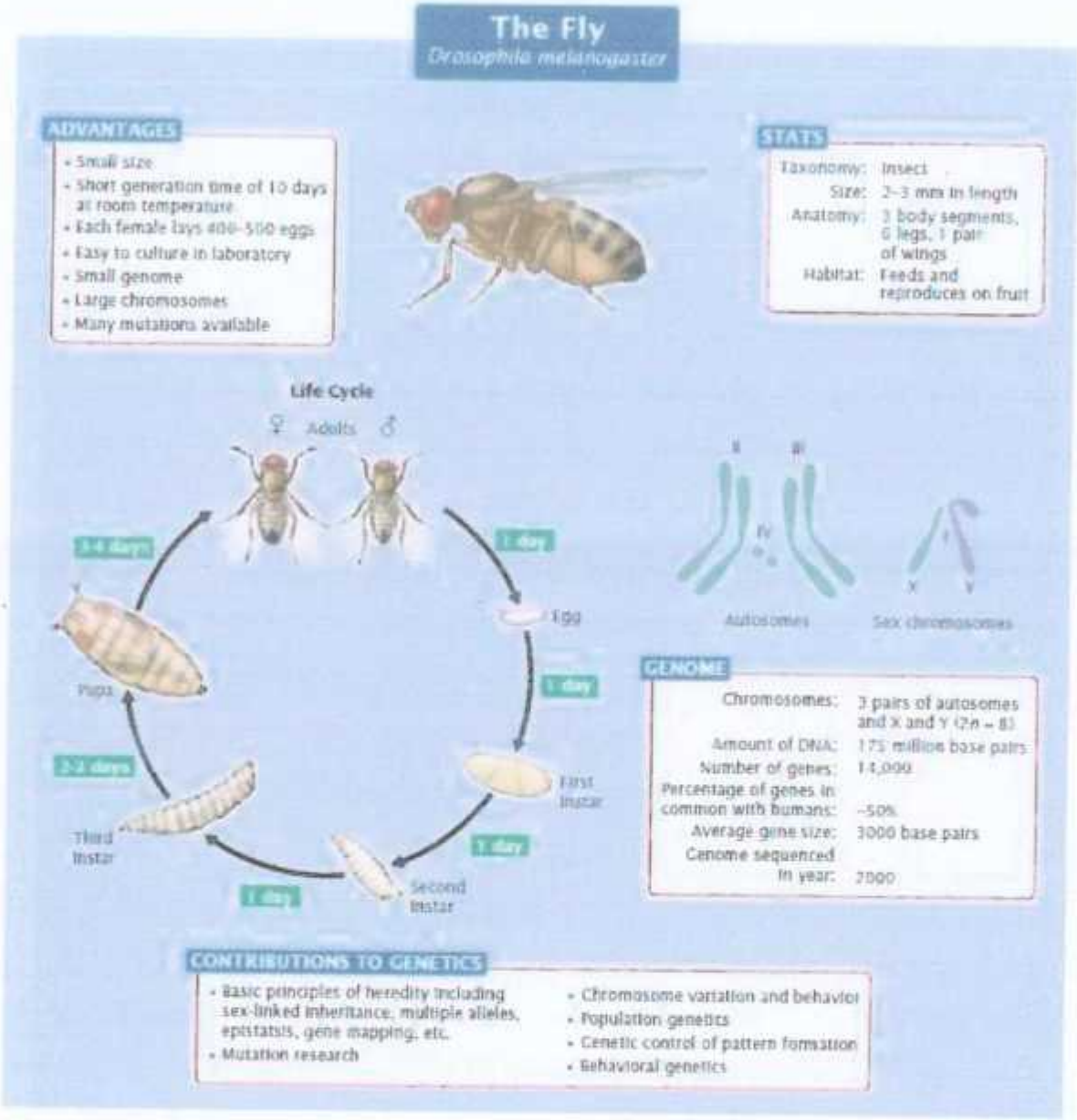
Figure 1.2: Model organism *Drosophila melanogaster*

D. melanogaster first began to appear in biological laboratories about 1900. After first taking up breeding experiments with mice and rats, Thomas Hunt Morgan began using fruit flies in experimental studies of heredity at Columbia University. Morgan's laboratory, located on the top floor of Schermerhorn Hall, became known as the Fly Room (Figure 1.3).

Figure 1.3: The Fly Room

To say that the Fly Room was unimpressive is an understatement. The cramped room, only about 16 by 23 feet, was filled with eight desks, each occupied by a student and his experiments. The primitive laboratory equipment consisted of little more than milk bottles for rearing the flies and hand-held lenses for observing their traits. Later, microscopes replaced the hand-held lenses, and crude incubators were added to maintain the fly cultures, but even these additions did little to increase the physical sophistication of the laboratory. Morgan and his students were not tidy: cockroaches were abundant (living off spilled *Drosophila* food), dirty milk bottles filled the sink, ripe bananas—food for the flies—hung from the ceiling, and escaped fruit flies hovered everywhere.

In spite of its physical limitations, the Fly Room was the source of some of the most important research in the history of biology. There was daily excitement among the students, some of whom initially came to the laboratory as undergraduates. The close quarters facilitated informality and the free flow of ideas. Morgan and the Fly Room illustrate the tremendous importance of "atmosphere" in producing good science. Morgan and his students eventually used *Drosophila* to elucidate many basic principles of heredity, including sex-linked inheritance, epistasis, multiple alleles, and gene mapping.



It has played an important role in studies of linkage, epistasis, chromosome genetics, development, behavior, and evolution. Because all, organisms use a common genetic system, understanding a process such as replication or transcription in fruit flies helps us to understand these same processes in humans and other eukaryotes. *Drosophila* is a genus of more than 1000 described species of small flies (about 1 to 2 mm in length) that frequently feed and reproduce on fruit, although they rarely cause damage and are not considered economic pests. The best known and most widely studied of the fruit flies is *D. melanogaster,* but genetic studies have also been extended to many other species of the genus.

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Advantages of *Drosophila melanogaster* as a model genetic organism: *Drosophila*'s widespread use in genetic studies is no accident. The fruit fly has a number of characteristics that make it an ideal subject for genetic investigations. It has a relatively short generation time; fruit flies will complete an entire generation in about 10 days at room temperature, and so several generations can be studied within a few weeks. Although *D. melanogaster* has a short generation time, it possesses a complex life cycle, passing through several different developmental stages, including egg, larva, pupa, and adult. A female fruit fly is capable of mating within 8 hours of emergence and typically begins to lay eggs after about 2 days. Fruit flies also produce a large number of offspring, laying as many as 400 to 500 eggs over a 10-day period. Thus, large numbers of progeny can be obtained from a single genetic cross.

Another advantage is that fruit flies are easy to culture in the laboratory. They are usually raised in small glass vials or bottles (as mentioned earlier, milk bottles were originally used) with easily prepared, paste-like food consisting of bananas or corn meal and molasses. Males and females are readily distinguished and virgin females are easily isolated, facilitating genetic crosses. The flies are small, requiring little space—several hundred can be raised in a small half-pint bottle—but they are large enough for many mutations to be observed easily with a hand lens or a dissecting microscope. Finally, *D. melanogaster* is an organism of choice for many geneticists because it has a relatively small genome consisting of 175 million base pairs of DNA, which is only about 5% of the human genome. It has four pairs of chromosomes: three pairs of autosomes and one pair of sex chromosomes. The X chromosome (designated chromosome 1) is large and acrocentric, whereas the Y chromosome is large and submetacentric, although it contains very little genetic information. Chromosomes 2 and 3 are large and metacentric; chromosome 4 is a very small acrocentric chromosome. In the salivary glands, the chromosomes are very large, making *Drosophila* an excellent subject for chromosome studies. In 2000, the complete genome of *D. melanogaster* was sequenced. *Drosophila* continues today to be one of the most versatile and powerful of all genetic model organisms.

The Bacterium *Escherichia coli*

The most widely studied prokaryotic organism and one of the best genetically characterized of all species is the bacterium *Escherichia coli* **(FIGURE 1.4).**

Figure 1.4: Model organism *Escherichia coli*

Competition Act, 2002

A] Object of the Competition Act, 2002

The essence of Liberalization, privatization and globalization have opened the doors of Indian economy by removing governmental controls and allowed the natural competition from within the borders of our country as well as from the global economy. The Competition Act, 2002 replaced the outdated MRTP Act 1969 with the following objectives:

a) **To prevent and eliminate** the forces, factors and practices, that cause adverse and negative impact on competition.

b) **To promote and sustain** the forces of competition in the Indian economy.

c) **To protect and promote** the interests of consumers.

d) **To ensure freedom** of trade carried on by all other participants in Indian markets.

B] Prohibition of Anti-Competitive Agreements

Firms may enter into agreements, which may have the potential of or has adverse effect on competition within India. Such agreement can be horizontal and vertical agreements between the firms.

Horizontal agreements refer to agreements between two or more enterprise that are at the same stage of production chain. The cartel is the example of Horizontal agreement

Vertical agreements are agreements between enterprises that are at different stages or levels of production chain. Vertical agreements are pernicious (harmful), if they are between firms in a position of dominance.

Sec.3 (1) provides that any enterprise or association of enterprises or person or association of persons shall not enter into any agreement in respect of:

a) Production,
b) Supply,
c) Distribution,
d) Storage,
e) Acquisition, or
f) Control of goods or provision of services

Which causes or is likely to cause an appreciable adverse effect on competition within India. Any agreement in violation of the above rule is void.

Following are the agreements are considered to be in contravention of Sec. 3 (1)

a) Tie in Agreement: Eg. To Compulsorily buy gas burner from agency supplying gas cylinder as a condition for purchase of gas connection.

b) Exclusive Supply Agreement: To restrict HUL products dealer from stocking any other brand goods other than HUL brand products.

c) Exclusive Distribution Agreement: To give *Maruti* car dealer exclusive rights to sell particular area say *Andheri*.

d) Refusal to Deal: An agreement with particular company ABC Ltd. to sell all the goods to particular person only say XYZ.

Exception: An agreement shall not be considered as anti-competitive if such agreement is entered into by way of joint ventures which increases efficiency in production, supply, distribution, storage, acquisition or control of goods or provision of services e.g. an arrangement between two or more banks for sharing their ATM networks.

C] Abuse of Dominant Position.

Sec. 4(1) defines Dominant position as a position of strength enjoyed by an enterprise or group, in the relevant market in India, which enables it to:

a) Operate independently of competitive forces prevailing in the relevant market: or

b) Affect its competitors or consumers or the relevant market in its favour.

Abuse of dominant position includes imposing unfair conditions or price, predatory pricing, limiting production/market, creating barriers to entry and applying dissimilar conditions to similar transactions.

Case Law: Microsoft V/s Sun Microsystems.

According to European Union's (EU) press release, the case had arisen out of complaint filed in December 1998 by Sun Microsystem, U.S. Company and a competitor to Microsoft. The allegation was that Microsoft had refused to provide interface information, which is necessary for Sun to develop products that could "talk" properly with the ubiquitous Windows PCs. As the result they are not able to compete on an equal footing in the market for Work Group Server Operating Systems.

The Competition Commission found that the Microsoft's refusal to provide interface information enabled the Window Media player get advantage over other media players to

operate efficiently on the Windows Operating Systems ant limited the other media players to compete with WMP.

III] Regulation of Combinations (Sec.6)

Combinations are not desirable if, they have appreciable adverse effect on the competition. The provisions relating to the regulation of combination are as follows:

1) A person or enterprise shall not enter into a combination, which causes or is likely to cause an appreciable adverse effect on competition within the relevant market in India. Such a combination is void.
2) Any person or enterprise, who proposes to enter into a combination, shall give notice to the Competition Commission within thirty days of approval by board of directors of the proposal relating to merger or amalgamation or execution of any agreement or other document for acquisition or acquisition of control.
3) The commission shall, deal with such notice in accordance with the prescribed provisions of the Competition Act.
4) The public financial institution, foreign institutional investors, bank or venture capital fund shall within seven days from the date of the acquisition file with the Competition Commission in the specified form about the details of acquisition or acquisition of control.

B} Competition Commission of India (CCI)

Following are the features of CCI

a) The CCI is a body corporate having common seal and perpetual succession and thereby can enter into a contract, hold, acquire and dispose off the property.

b) The commission shall consist of a Chairperson and minimum tow and maximum six other members to be appointed by the Central Government.

c) The chairperson and very other member shall be a person of ability, integrity and standing and who has special knowledge and professional experience of not less than fifteen years in international trade, economics, business, commerce, law, finance, accountancy, management, industry, public affairs or competition matters, competition law.

d) The chairperson and other members of the Commission shall be appointed by the Central Government from a panel of names recommended by a Selection committee consisting of

i) the Chief Justice of India or his nominee…Chairperson,
ii) the secretary in the Ministry of Corporate Affairs …..Member,
iii) the secretary in the Ministry of Law & Justice ……Member
iv) two experts of repute who have special knowledge and professional experience of not less than fifteen years in international trade, economics, business, commerce, law, finance, accountancy, management, industry, public affairs or competition matters, competition law….Member

e) The maximum term of office of chairman and member is 5 years and maximum age limit for chairman is 65 years.

Powers of the CCI

1. Power to inquire into certain agreements and dominant position of enterprise.
2. Power to inquire into combinations.
3. Power to give opinion on in case of reference by statutory aughority.
4. Power to inquire into acts taking place outside India, but having an effect on competition in India.
5. Power to grant interim relief.
6. Power to award compensation

C} Statutory Authority – Sec. (w):

Statutory authority means any
i) authority,
ii) board,
iii) corporation
iv) council
v) institute
vi) university or
vii) any other body corporate,

established by or under any Central, State or Provincial Act for the purpose of regulating production or supply of goods or provision of any services or markets or any matter connected therewith or incidental thereto.

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Physics Assignment Topics

Revision test 1

1. The phase difference between current and voltage for a pure resistor is _____.
   (a) $\pi/2$ (b) zero (c) $\pi/6$ (d) $\pi/3$
2. In _____ circuit, impedance becomes minimum at resonance.
   (a) LR series (b) LCR parallel (c) CR series (d) LCR series
3. The only bridge making use of only resistors is _____.
   (a) De-Sauty's bridge (b) Maxwell's bridge
   (c) Wheatstone bridge (d) Wien bridge
4. The reactance of a coil of L = 100mH connected to frequency of 1000HZ will be_____.
   (a) 314Ω (b) 628Ω (c) 100Ω (d) 25Ω
5. A Wien bridge circuit makes use of _____.
   (a) two resistors and two capacitors (b) two resistors and four capacitors
   (c) four resistors and two capacitors (d) four resistors and four capacitors
6. In Maxwell's inductance bridge, if $R1$ =500 Ω, $R2$ =800 Ω and $L2$=4 H, then $L1$ = _____.
   a) 2.5H b) 4H c) 6.4H d) 1H
7. The phase difference between alternating current and emf in a series LR circuit is _____
   a) $\sin^{-1}(wL/R)$ b) $\cos^{-1}(wL/R)$ c) $\tan^{-1}(wL/R)$ d) $\cot^{-1}(wL/R)$
8. A balanced Maxwell's inductance bridge, R1 = 500Ω, R2,= 800Ω, L2 = 4H, then L1 = _____
   a) 4H b) 8H c) 3.125H d) 2.5H
9. The phase difference between alternating current and emf in a series CR circuit is given by---------
   a) $sin^{-1}(R/wC)$ B) $tan^{-1}(\omega C/R)$ c) $tan^{-1}(1/wCR)$ d) $sin^{-1}(1/wCR)$
10. If $\theta1,\theta2,\theta3$ and $\theta4$ are the phase angles corresponding to the four arms of an ac bridge then for balanced bridge,-----
    a) $\theta1.\theta2=\theta3.\theta4$ b) $\theta1.\theta4=\theta2.\theta3$ c)$1+\theta2=\theta3+\theta4$
    d) $\theta1+\theta4=\theta2+\theta3$
11. Reactance of a capacitor of 0.1 μF at frequency of alternating emf 50 Hz is _____
    a) 3.18 Ω b) 31.8 Ω c) 318 Ω
12. In a pure _____ circuit, the current lags behind the applied e.m.f. by 90^0.
    (a) Inductive (b) Resistive (c) Capacitive (d) None of these
13. In a De Sauty's bridge, when R_1=1100 ohm, R_2=1650 ohm and C_1=0.33 μF. The balance condition would be obtained when C_2= _____ μF.
    (a) 0.47 (b) 0.33 (c) 0.22 (d) None of these
14. The reactance of a capacitor will be _____ as the frequency of the AC source increases.
    (a) decresing (b) constant (c) increasing
15. The SI unit of inductance is _____.
    (a) ohm (b) farad (c) Henry (d) coulomb
16. In case of LCR _____ circuit, current becomes maximum at resonance.
    (a) series (b) parallel
17. The phase difference is zero for a pure _____.
    (a) inductor (b) capacitor (c) resistor
18. NOR gate is combination of _____ gates.
    (a) AND and OR (b) OR and NOT (c) NOT and NAND
    (d) AND and NOT

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19. The internal resistance of an ideal current source is _____.
(a) infinity (b) minimum (c) maximum (d) zero

20. To construct an OR gate using only NOR gates, we need minimum _____ NOR gates.
(a) 1 (b) 2 (c) 3 (d) 4

21. The 1's complement of binary number 101101 will be_____.
(a) 101101 (b) 100001 (c) 111111 (d) 010010

22. Maximum power is delivered to the load only if load resistance is _____ equivalent resistance of the circuit.
(a) equal to (b) less than (c) half of (d) more than

23. _____ is used for converting alternating current into direct current.
(a) junction diode (b) transistor (c) NOT gate (d) capacitor

24. The NAND gate is a combination of _____ gates.
(a) AND & OR (b) NOT &OR
(c) OR & EX-OR (d) AND & NOT

25. _____ is used as voltage regulator.
(a) junction diode (b) transistor (c) zener diode (d) capacitor

26. The statement of De-Morgan's theorem is _____.
(a) $A \cdot B = A + B$ (b) $\overline{A \cdot B} = A + B$
(c) $A \cdot \overline{B} = \overline{A} + B$ (d) $\overline{A} \cdot \overline{B} = \overline{A + B}$

27. The logic gate that gives output 1 only when all its inputs are 1 is _____.
(a) AND (b) OR (c) NAND (d) Ex-OR

28. Half adder is used to add _____ binary bits at a time.
(a) 1 (b) 2 (c) 3 (d) 4

29. The rectifier efficiency of an ideal bridge rectifier is _____.
(a) 40.6% (b) 90.2% (c) 81.2% (d) 100%

30. If $Y = A(\overline{B}C + B\overline{C})$, and A=1, B = 1 and C = 0, value of Y will be _____.
(a) 1 (b) 2 (c) 0 (d) 1 or 0

31. If $V_{TH} = 2.5V$ and $R_{TH} = 400\Omega$ and $R_L = 1600\Omega$, current flowing through load resistor will be _____.
(a) 12.5mA (b) 125mA (c) 0.125mA (d)1.25mA

32. For an ideal constant current source, internal resistance is----------.
(a)finite (b) Zero (c) infinite (d) none of these

33. When the load resistance equals the source resistance,------- will be delivered by the source to the load.
a) minimum power b) zero power c) maximum power d) none of these

34. The ratio of rms value to mean value over one half cycle of an alternating sinusoidal emf is -------
a) 1.11 b) 1.32 c) 1.41 d) 3.142

35. The _____ is known as basic gate.
a) EX-OR b)NOR c) NOT d) NAND

36. Zener diode can be used as _____.
a) An oscillator b) An amplifier c) A voltage regulator d) A filter

37. The _____ gate is known as universal gate.
a) EX-OR b) AND c) NOT d) NOR

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38. A junction diode can be used as _____.
a) An oscillator b) An amplifier c) Voltage regulator
d) A rectifier

39. The _____ gate is known as basic building block in digital gates.
(a) NOT (b) AND (c) NOR (d) OR

40. The output of Ex-OR gate will be _____ if input A= 1 and B = 0.
(a) 1 (b) 2 (c) 0 (d) 3

41. A resistance of junction diode under forward biased condition is _____.
(a) zero (b) very small (c) infinity

42. Half adder is constructed using _____ gate and _____ gate.
(a) AND & NOR (b) OR & Ex-OR (c) AND & Ex-OR

43. As per the Biot-Savart's law, the _____ at a point due to a current carrying wire is directly proportional to the strength of the current element.
(a) magnetic induction (b) induced emf
(c) electric potential (d) electrostatic energy

44. Two charges of 1 coulomb each separated by a distance of 1m in vaccum will experience a force of _____.
(a) 9×10^9N (b) 0.9×10^9N (c) 90×10^9N (d) zero N

45. The magnetic field outside a long solenoid is _____.
(a) less than magnetic field inside (b) zero
(c)) more than magnetic field inside (d) infinite

46. The SI unit of electric filed intensity is _____.
(a) N/m (b) V/m (c) N-m (d) N-C

47. Magnetic field produced by Helmholtz coil is _____
a) Non uniform axial magnetic field
b) Uniform magnetic field at the center of coil
c) Intense at the centre.
d) None of these

48. Two charges +2μC and +5μC are separate by a distance d = 10 cm apart. The ratio of the force acting on the respective charges is _____.
a) 1:1 b) 5:2 c) 2:5 d) 4:25

49. Two charges of 1 coulomb each separated by a distance 1 m in vacuum exert mutually a force of
(a) $9 \times 10_9$ N (b) $18 \times 10_9$ N (c) $0.9 \times 10_9$ N (d) none of these

50. The unit of magnetic induction is _____.
(a) weber (b) tesla (c) Newton (d) A-m

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Revision test 2

1. The reactance of a coil of inductance 10mH at frequency 500Hz will be _____.
2. The S.I. unit for reactance is_____.
3. The relation between voltage drop across a capacitor (Vc) and charge stored on capacitor(q) is _____.
4. The effective resistance of a capacitor and a resistor connected across an ac source is called as _____.
5. The reactance of a coil is _____ proportional to the frequency of ac source.
6. The reactance of a capacitor is _____ proportional to the frequency of ac source.
7. The reactance of a coil will _____ as the frequency of ac source is reduced.
8. The reactance of a capacitor will _____ as the frequency of ac source is reduced.
9. The resistance of a resistor will _____ as the frequency of ac source is increased.
10. The impedance of a resistor of 1KΩ connected in series with a capacitor of 10μF and ac source of frequency 500Hz will be _____.
11. The circuit where impedance has a maximum value at a certain source frequency is _____ circuit.
12. The circuit where impedance has a minimum value at a certain source frequency is _____ circuit.
13. The circuit where current has a maximum value at a certain source frequency is _____ circuit.
14. The circuit where current has a mimimum value at a certain source frequency is _____ circuit.
15. The LCR _____ circuit is called as acceptor circuit.
16. The LCR _____ circuit is called as rejector circuit.
17. In case of LCR series circuit, the peak value of current at resonance depends only on _____ and _____.
18. In case of LCR series circuit, the value of resonant frequency depends only on _____ and _____.
19. The bridge circuit with only resistors is _____.
20. The De-Sauty's bridge can be used to find unknown _____.
21. The Wheatstone bridge circuit is used to find unknown _____.
22. The Maxwell's bridge can be used to find unknown _____.
23. The Wien bridge can be used to find unknown _____.
24. The power dissipated in an ideal inductor by an ac source is _____.
25. The power dissipated in an ideal capacitor by an ac source is _____.
26. The internal resistance of an ideal voltage source is _____.
27. The internal resistance of an ideal current source is _____.
28. The symbol for ideal current source is _____.
29. The symbol for ideal voltage source is_____.
30. If two resistors of 10KΩ and 5KΩ are connected parallel to each other, the effective resistance will be_____.
31. The reverse voltage beyond which zener diode starts conducting is called as _____.
32. For an ideal rectifier, the ripple factor should be _____.
33. The ripple factor of bridge rectifier is _____.
34. For an ideal rectifier, the rectifier efficiency should be _____.

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35. The rectifier efficiency of bridge rectifier is _____.
36. The relation between thevenin's resistance and norton's resistance for any given circuit is _____.
37. Complete the table.

Gate	logic symbol	Boolean expression
AND		
OR		
NAND		
NOT		
NOR		
Ex-OR		

38. The statement of De-Morgan's theorem is _____.
39. The filter circuits are used to reduce _____.
40. After connecting capacitior filter to the output of bridge rectifier, the ripple factor _____.

Answer in one sentence.

1. Define ideal current source.
2. Define ideal voltage source.
3. What is a rectifier circuit?
4. Which circuit is called as acceptor circuit?
5. Which circuit is called as rejecter circuit?
6. Which circuit is called as wattless circuit?
7. Define reactance and impedance.
8. Name different devices used to detect null point.
9. What is a filter circuit?
10. State Fleming's left hand rule.
11. Define ripple factor.
12. Define rectifier efficiency.
13. Define power factor.
14. Name the bridge circuit used to identify unknown capacitance.
15. Define resonant frequency.
16. Define electric intensity.
17. Define linear charge distribution.
18. Define volume charge distribution.
19. Define surface charge distribution.
20. Define reactance.
21. Define electric potential.
22. What is Lorentz force?
23. Define full adder.
24. Define half adder.
25. What is 1's complement of a binary number?
26. What is resistance of a diode under forward and reverse biased condition?

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F.Y.B.Sc. PHYSICS PAPER I UNIT II
ASSIGNMENT I

Answer the following. (8 marks each)

1. Derive the lens maker's equation to calculate focal length of a convex lens. Draw the necessary diagram.
2. Two convex lenses are placed coaxially at a distance d from each other. Draw the necessary diagram and derive the expression for equivalent focal length of the lens combination.
3. Derive the newton's lens equation for a convex lens.
4. Explain the construction of a Ramsden's eyepiece. Draw the necessary diagram. Derive the expression for equivalent focal length and positions of principle points for Ramsden eyepiece.
5. Explain the construction of a Huygen's eyepiece. Draw the necessary diagram. Derive the expression for equivalent focal length and positions of principle points for Huygen eyepiece.
6. Define Spherical aberration. Explain it with the help of a diagram. State any four methods used to reduce spherical aberration.
7. Define Chromatic aberration. Explain it with the help of a diagram. Define longitudinal chromatic aberration. Mention any two methods to reduce chromatic aberration.
8. Derive expression for longitudinal chromatic aberration when object is placed at an infinite distance from lens.

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F.Y.B.Sc. PHYSICS PAPER I UNIT II
ASSIGNMENT Ii

1. Derive expression for longitudinal chromatic aberration when object is placed at a finite distance from lens.
2. Two convex lenses of focal lengths f1 and f2 and dispersive powers ω1 and ω2 are placed touching each other. Derive the relation between their focal lengths and dispersive powers so that the lens system does not produce any chromatic aberration.
3. Two convex lenses of focal lengths f1 and f2 and having same dispersive power ω are placed at a distance D from each other. Derive the expression for distance D so that the lens system does not produce any chromatic aberration.
4. Explain the interference produced by a thin film due to reflected rays. Draw necessary diagram. state the conditions for constructive and destructive interference.
5. Explain the interference produced by a thin film due to transmitted rays. Draw necessary diagram. state the conditions for constructive and destructive interference.
6. What are Newton's rings? Explain the experimental set up used to produce Newton's rings. Draw the necessary diagram.
7. What are Newton's rings? Derive the expression for radius of Newton's rings. Draw the necessary diagram.

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F.Y.B.Sc. PHYSICS PAPER I UNIT II
ASSIGNMENT II

Answer the following. (4 marks each)

1. Explain the sign convention for a lens.
2. Name the cardinal points of a lens system and explain each point in brief.
3. Define thick lens. Write the expression for its focal length.
4. State any four differences between Ramsden eyepiece and Huygen eyepiece.
5. Define power of a lens. state the expression for power of a lens combination.
6. Derive the expression for distance between two lenses such that there is no spherical aberration.
7. What is dispersion of light. Define dispersive power. Write the expression for dispersive power of a lens.
8. What is aberration? What are different types of aberrations. Define each type.
9. What is interference? Define constructive and destructive interference. what is path difference.
10. What is a thin film? Explain different types of thin films.
11. Explain how Newton's ring apparatus can be used to determine unknown wavelength.
12. Explain how Newton's ring apparatus can be used to determine unknown radius of curvature.
13. Explain how Newton's ring apparatus can be used to determine unknown refractive index.
14. Derive expression for fringe width for fringes produced by a thin film.

Define following terms (1 mark each):

1. focal length
2. focal point
3. principle point
4. longitudinal magnification
5. lateral magnification
6. angular magnification
7. power of lens
8. refractive index
9. monochromatic aberration
10. achromatism

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F.Y.B.Sc. PHYSICS PAPER I UNIT II

Assignment IV : Lens system (Numericals)

1. In a Ramsden's eyepiece, two thin Plano convex lenses of the same material are at a distance 4 cm apart and have equal focal lengths of 2.8cm each. Calculate the equivalent focal length.
2. Two thin convex lenses of focal length 10 cm and 20 cm are placed at 5 cm apart in air. Find the equivalent focal length.
3. Calculate the focal length of a double convex lens for which radius of curvature of each surface is 30cm and refractive index of glass is 1.5
4. Two thin convex lenses are of focal lengths 45 cm and 30cm are separated by a distance of 8cm. Calculate the focal length of equivalent lens and positions of principal points.
5. Two thin convex lenses have power 6D and 3D. They are placed in air 15cm apart. Find the equivalent power.
6. Two thin convex lenses of focal lengths 20 cm and 5 cm. are kept coaxially separated by a distance of 10 cm plot the positions of cardinal points for the system.
7. Find the focal length of a thick lens having thickness 4cm and radii of curvature of two sides is 30 cm and 50cm. the refractive index of the material of lens is 1.65
8. An object is placed at a distance of 25 cm from a convex lens having focal length 10 cm. calculate image distance. Also calculate lateral magnification produced by lens.

Solution :

1. f1 =f2 =2.8cm
   d=4cm
   F = 2.1cm
2. f1=10cm , f2=20cm , d=5cm F =8cm
3. R1=R2=30cm , μ=1.5 F=30.03cm
4. F1=45cm , f2=30cm, d=8cm F =20.16cm α = 5.376cm β = - 3.584cm
5. 6.3D
6. F=6.66cm α = 13.32cm β = - 3.33cm

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T.Y.B.Sc. SEM VI
ELECTRONIC INSTRUMENTATION
UNIT I : LOGIC CIRCUITS

Tristate devices:

1. What are tristate devices ? State their uses. Explain with functional block diagram working of bidirectional buffer (74LS245)
2. What are tristate devices ? State their uses. Explain with functional block diagram working of unidirectional buffer (74LS244)
3. What is Buffer ? Explain with the help of logic diagram bidirectional buffer (74LS245). State its use in microprocessor based system.

   Ans : Buffer is a logic circuit that amplifies current or power. It has one input line and one output line. The buffer is used to increase the driving capability of a logic circuit.

   In microprocessor system peripherals are connected in parallel between the address bus and data bus. But due to the tristate interfacing devices , peripherals do not load the system buses. The microprocessor can communicate with on device at a time by enabling tristate line of the interfacing device.
4. Explain the working of 3:8 decoder IC 74LS138. State its uses.
5. What is an encoder ? Draw logic symbol of 8 to 3 priority encoder 74LS148 and give its function table. Also state its uses.
6. What is a D flip-flop ? Explain 74LS373 D latch with its logic diagram and function table.
7. What are tristate devices ? State their uses. Explain tristate inverters with active high and active low enable lines with their logic symbols and truth tables.

Multiplexers and De-multiplexers:

1. What is a multiplexer? Draw the block diagram of a 8 to 1 multiplexer and explain its working.
2. What is a multiplexer? Draw block diagram of 8 to 1 multiplexer IC 74151 . eirte its truth table and explain its working.
3. What is a demultiplexer? Draw the block diagram of a 1 to n demultiplexer and explain its working.
4. What is a demultiplexer? Explain how a demultiplexer can be converted into a decoder.

Memory:

1. What is memory ? State different types of semiconductor memory. Explain in brief static and dynamic RAM.
2. Describe general categories of memory. State their uses. Distinguish between EPROM and EEPROM.
3. What is ROM ? State uses of ROM . Explain in brief different types of ROM.
4. What is memory? Describe classification of memory. State their uses.

UNIT II : MICROPROCESSOR 8085 (HARDWARE AND SIMPLE INSTRUCTIONS)

Hardware:

1. Give the detailed description and use of address bus, data bus and control bus with reference to 8085 microprocessor.

2. What is bus ? explain the function of address bus , data bus and control bus in 8085 microprocessor.
3. State the function and uses of general purpose registers, program counter and arithmetic-logic unit.
4. Write a short note on memory mapping for interfacing memory chip to 8085 microprocessor.
5. What is memory mapping? Interface 4K x 8 RAM to 8085 microprocessor. Give the memory map with starting address C000H.
6. Draw a neat labeled block diagram of 16 X 4 memory chip and explain in brief its write operation.
7. Interface a 4k x 8 RAM to 8085 micrprocessor with starting address C000H. indicate clearly the address range for the chip.
8. Give the general format of the flag register of 8085 microprocessor and explain the function of each flag.
9. List five functional categories of 8085 instruction set. Describe any two instructions from arithmetic group with suitable example.
10. What are different functions of accumulator ?
11. Why are program counter and stack pointer 16 bit registers?
12. The memory address of first location of 4K byte memory is 4000H. find the address of the last location.
13. Give the general format of flag register of 8085 microprocessor and explain the function of each flag.
14. How many memory locations can be addressed by a microprocessor with 16 address lines? How many address lines are necessary on the chip of 2K bytes of memory? If this chip is mapped with the starting address 2000H , specify the address of the last location on the chip.
15.

Instructions:

1. List different instructions that clear the accumulator.
2. What are different addressing modes used in 8085 microprocessor ? explain each mode with example.
3. How do you classify instructions in 8085 microprocessor ? Explain with suitable example any two instructions from data transfer group.
4.

Problems:

1. Find the error in each case and rewrite correct instruction.
   MVI B ,C
   INX L
   JNC 8 BIT DATA
2. Write the no. of bytes required for each of the following
   ADD C SUI 20H STA C500H
3. The initial contents of various registers are A =72H , B = C3H H= 00H and L=00H Memory location C300H contains 92H. Specify the contents of these registers and memory location immediately after execution of each instruction.
   LXI H C300H
   MOV B ,M

CMA
MOV M, A
RST 1

4. State the instructions that perform following operation.
   i. Load HL pair with DE50H
   ii. Clear the accumulator.
   iii. Increment the contents of memory by 1.
   iv. Logically Or the contents of register B with accumulator.
   v. Complement the Accumulator.
   vi. No operation.
5. State the type of addressing mode for the following.

MOV B , A	ADI 8 BIT DATA	LDA F000H
STAX H	RAL	CMP M

6. The accumulator contains the data A2H , register B contains 51H and register C contains 68H. What will be the contents of these registers immediately after the execution of each instruction independently.

SUB B	MOV B , C	INX B
RAR	XRI FOH	CMA

7. Write instruction to load accumulator with data B2H and transfer this data to memory location C250H.
8. Assume that accumulator contains 52H and carry flag is SET. Give the accumulator contents and status of carry flag after executing RAL instruction twice.
9. State the function performed by each of the following instructions.

STA C085H	RRC	LXI H E500H	JC D008H

10. State the function performed by each of the following instructions.

MOV B , C	ADI 52H	RAL	JZ C100H
OUT 01H	PCHL		

11. The data in the accumulator , register C and register D of 8085 microprocessor is 00H , 0FH and 49H resp. What will be the contents of these registers after executing each instruction in the following program.
    MVI A , 68H
    SUB C
    MOV D , C
    ORA D
    RST 1
12. State how many times the following loop will be executed?

```
        LXI B , 0005H
AGAIN:  DCX B
        JNZ : AGAIN
```

13. Give the contents of accumulator after executing each of the following instruction in the program.
    MVI A , 95H
    ANI 0FH
    CMA

14. Initially the accumulator contains 82H and carry flag is RESET. After executing following instructions in sequence , give the contents of accumulator and carry flag.
ORI 07H
RAL
MVI A, 00H

15. State the functions performed by each of the following instructions.

STA D300H	DCR M	RRC
JNC C130H	IN 03H	HLT

16. Write the 8085 instructions to
    1. Initialize memory pointer to C250H.
    2. Load F0H in accumulator.
    3. Increment contents of register B.
    4. Logically AND the contents of register C with contents of accumulator.
    5. Add the contents of register C to contents of accumulator.
    6. Find 2's complement of accumulator contents.
17. The accumulator contains the data B4H , register C contains 52H and register D contains 0FH. What will be the contents of these registers after execution of each of the following instruction independently.
    1. ADD C
    2. MOV C, D
    3. INR D
    4. XRA C
    5. RAL
    6. SUB D
18. State the functions performed by each of the following instructions.

MVI A, OOH	STA 3200H	JNZ C050H
NOP	LXI H , C200H	ADD B

19. The data in the accumulator , register D and register E is 34H , A2H and F0H resp. What will be the contents of these registers after execution of each of the following instruction in the given program.
ADD D
MOV E , A
RAR
CMA
SUB A
RST 1

20. Specify the content of accumulator and carry flag when the following instructions are executed in sequence.
MVI A, 80h
ORA A
RAL
21. Explain with suitable example, following instructions.

ADD M	RAL	LDA ADDRESS

22. What will be the contents of the accumulator , register B and register C after executing each instruction in the following program? Initially the contents of these registers ar 00H.
MVI A , 52H
MOV B,A
MVI C, 7AH
ADD C
NOP
INX B

23. Assume that the content of the accumulator is 55H and the carry flag (CY) is SET. Give the contents of both after executing RAR instruction twice.
24. Specify the contents of accumulator , CY and AC flags after executing following instructions in sequence.
MVI A, 9CH
ADI 64H
RST 1

25.

UNIT III : MICROPROCESSOR 8085 (MEMORY RELATED INSTRUCTIONS AND PROGRAMMING , INTERFACING DEVICES)

Instructions:

8255 peripheral interface :

1. State the different modes of operation of PPI 8255 and explain in brief simple input-output mode.
2. Draw the functional block diagram of 8255 and state its features.
3. Draw block diagram of 8255 PPI and explain its working in brief.
4. Write the control word to program 8255A as follows
Port A : output port mode 0
Port B : input port mode 0
Port C upper : output port mode 0
Port C lower : input port mode 0
Write a program to input 8 bit data from port B and display the complement of it at port A. Port addresses are port A : 80H port B : 81H port C : 82H control register : 83H
5. The control word of 8255 PPI in I /O mode is 83H. Identify the mode of operation and I/O status of all ports. Write a program to input 8 bit data from port B. Mask the upper 4 bits of data (accumulator contents) and then display it at port A.
6. Write the control word to program 8255A as follows
Port A output port (mode 0)
Port B input port (mode 0)
Port C output port (mode 0)
Write a program to input 8 bit data , rotate accumulator contents to right four times and then display it at any output port.
Given : port A : E000H
port B : E001H

port C : E002H
CWR : E003H

7. Write the three essential steps to communicate with peripherals through 8255PPI. Draw the block diagram of 8255A chip select logic and tabulate its I/P port addresses.
8.

PROGRAMS : (Draw flow chart)

1. Write an assembly language program to subtract 70H from C8H and store the result in memory location C900H.
2. Write an assembly language program to find the largest number in a given array of 5 elements. The array is stored in the memory from C300H onwards. Store the result at the end of the array.
3. Write an assembly language program to multiply to 8 bit hexadecimal numbers. Use register C to store any carry generated. Store the result at two consecutive memory locations CE00H and CE01H.
4. Write an assembly language program to add 52H to 4AH and store the result in memory location C500H.
5. Write an assembly language program to transfer the contents of memory block of size 10 with the starting address C200H to the memory block starting with D200H.
6. Write an assembly language program to complement the data stored in memory location C800H and place result in C400H.
7. Write an assembly language program to add two hexadecimal numbers. Take care of carry if generated and store the result at memory locations C200H and C201H.
8. The block of data is stored in the memory locations from C200H to C20FH. Transfer the data to the memory with starting address C550H.
9. Write an assembly language program to subtract two 8 bit hexadecimal numbers. Take care of borrow if generated. Show the result at memory locations C400H and C401H.
10. Write an assembly language program to add B218H to 4369H using DAD instruction. Store the result in memory locations C500H and C501H. Specify the answer you would expect after execution of program.
11. Write an assembly language program to find largest number from an array of TEN numbers stored in the memory with the starting address C800H.
12. Write an assembly language program to add a series of numbers. The numbers are stored in memory locations from C300H to C309H. the result is to be stored in locations C30AH and C30BH.
13. Write an assembly language program to find 2's complement of 17H and store the result at memory location C100H.
14. Write an assembly language program to add 32G0H and 7B09H using DAD instruction.

UNIT IV : C++ PROGRAMMING

1. List five major hardware components of computer system. Explain any two of them in brief.
2. Distinguish between procedural and object oriented programming.
3. Describe different parts of a complete C++ program.
4. Explain the general format of a switch statement with illustrative examples.

5. Explain the general format of a switch statement and explain the sequence in which switch statement is executed. Distinguish between if_else_if and switch statements.
6. Give the general format of if-else-if control statement. Write a program to explain the use of same.
7. Give the general format of if statement. Explain with suitable examples.
8. Give the general format of if_else statement. Explain with suitable examples.
9. Give the general format of for loop. Explain in brief execution of the for statement.
10. What is an identifier ? how is a user defined identifier different from standard identifier ?
11. State the functions of following in C++ program:
    Cin object #include directive setw( ) '\t' self(ios::showpoint)
    //
12. What are different loop statements in C++? Give their syntax.
13. Explain with suitable example, use of break and continue statements in a loop structure.
14. Distinguish between while and do-while loop structures with suitable examples.
15. What are different statements in C++ to break the loop structure. Explain any one with suitable example.
16. Write a short note on function prototype.
17. Explain with suitable example continue statement.
18. Explain in brief the function of preprocessor, compiler and linker. Illustrate the process of translating source code into executable code.
19. Explain the function of following in C++ program.
    Cin sqrt //
20. Explain the terms function header , function definition and function call.
21. Explain with suitable examples exit statement.
22. Give the difference between if statement and if_else statement. Explain with suitable example.
23. What is the use of #define statement in C++ ?

Programs:

1. Write a C++ program to display the name of the day in a week , depending on the number entered by the user. Use if-else-if.
2. Write a C++ program to display the name of the day in a week , depending on the number entered by the user. Use if-else.
3. Write a C++ program to display the name of the day in a week , depending on the number entered by the user. Use switch statement.
4. Write a C++ program to find area and perimeter of rectangle and display the result on screen.
5. Write a C++ program to add integer numbers from 1 to 10 using any one loop structure.
6. Write a C++ program which uses function prototype named area( ) in addition to its main function. The main function declares variable radius within its body and calls the function area ( ) to calculate area of a circle and displays the result in the following format with two digit precision. Area od circle = _____ sq. meter
7. Write a C++ program using function prototype named energy ( ) in addition to main function. The main function declares the variables mass height and velocity within its

body. Call the function energy ( ) and display the result in the following format.
Energy = _____ cgs units. [given : energy = mgh + ½ mv^2 where g = 980 cgs units]

8. Write a C++ program to perform the following tasks:-
   1. declare two variables X and Y as floats.
   2. Assign a value 5.20 to X and 3.25 to Y.
   3. Assign the sum of X and Y to Z.
   4. Display the value of Z with proper prompt.
9. Write a function named ConvMiles. The function should have a float parameter named distance and should convert given distance in miles to meters, when ConvMiles is called.it should also display the output in the format _____miles = _____meters. (given 1 mile = 1609 meters)
10. Write a program in C++ to find the largest value of any three numbers using if_else structure.
11. Write a program in C++ to find sum of given three numbers using function named sum ( ). When the function is called in the main function , it should return the sum of three numbers.
12. Write a C++ program to display the name of the day in a week depending upon the number entered through keyboard. (use switch statement)
13. Write a C++ program to display the name of the day in a week depending upon the number entered through keyboard. (use if statement)
14. Write a C++ program to display the name of the day in a week depending upon the number entered through keyboard. (use if_else statement)
15. Write C++ program to enter two positive integers and display the larger of the two.
16. Write C++ program to display the perimeter of a square and a rectangle depending on the integer 1 or 2 entered during program execution.
17. Write C++ program to display "Do you wish ti do community service ?" at least once. The display should be seen as many times as the user wants.
18. Write C++ program to list 100 to 50 in descending order , one below the other. Write using 1) while loop 2) for loop
19. Write C++ program to convert a temperature in ^{0}K to a temperature in ^{0}C . K value is input through keyboard. The program should display C upto 2 decimal places.
20. Write C++ program to print the sum of integers from 5 to 50.
21.

Problems:

1. Predict the output of the following program.

```
# include < iostream.h>
Void main ( )
{
long x , y , z ;
x = y = z = 6 ;
x +=3 ;
y %=3 ;
z *=3 ;
```


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```
cout<< x <, " " << y <<"  " << z <<endl ;
}
```

2. Find the eoor if any in the following statements and rewrite corrected statement.

```
cout<<"age="age;
cin>>X;>>Y;
if(X>9||y<5)cout<<"invalid inputs\n";
else
cout<<"valid inputs\n";
```

3. Indicate which of the following is a function header , function prototype and function call.

```
float volume ( int , int , float)
float area ( int x , int  y= 12)
area ( 32 )
```

4. Convert the following program segment from while to do-while format.

```
a.  int  i=1, sum;
b.  while( i < 50)
c.  {
d.  Sum+=I;
e.  I++;
f.  }
g.  Cout<<"sum="<<sum<<endl;
```

5. Predict the output of the following program

```
# include < iostream.h>
# define  WHO " Alexander"
# define  DID " invented"
# define  WHAT " telephone"
Void  main ( )
{
const int when = 1876;
cout<<"In";
cout<<when;
cout<<"  "<<WHO << DID <<WHAT<<endl ;
}
```

6. Predict the output of the following program if user enters i=100

```
int  n ;
cin >> n ;
for( i=1;  i*i<=n;  i++ )
cout<<i-1<<endl;
```

7. Predict the output of the following program

```
# include < iostream.h>
Int  main ( );
```


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```
{
int i , j , total=0 ;
cout<<"total = " ;
for ( i=5 , j =1 ; j<=5 ;  i-- , j++ )
{
total + = i *j ;
cout<<"["<<i<<"*"<<j<<"]+" ;
}
cout<<"=" <<total<<endl ;
return 0;
}
```

8. State the value of a , b ,c after executing following C++ statements

```
int  a =5 ;
int  b =60 ;
int  c =0 ;
a  *=5 ;
b  %=6 ;
c  = 3* pow ( 2 , 3 ) ;
```

9. Convert the following program into while loop.

```
long  f =1 ;
int  n  , i = 2 ;
cin>> n ;
do
{
f *= i ;
i ++ ;
}
while < ( i <= n ) ;
cout<< f << endl;
```

10. Define a function named min ( ) that returns the minimum of three integers.
11. Write the output of the following code.

```
for ( int  m = 50 ;    ;  m - =5 )
{
cout << m<<"    ";
if ( m < = 25)
break;
}
```

12. Write the combined assignment statement for
    1. Multiply the variable **product** by 12 and then store in **product** .
    2. Divide the variable **week** by 7 and then store in remainder .
    3. Store thesum of the variable **arcadet** and 40 .

13. Write the output after executing following code sement.

```
int x , y ;
x = 2 ;
y = x ++ ;
cout<< x << y ;
```

14. Write the following statements in C++.
    1. An if_else statement that assigns 5 to x when y is equal to 100 otherwise it should assign 20 to x.
    2. An if_else statement that displays "Albert Einstein " if A is positive otherwise displays " Fermi Dirac".

15. Write the output of the following code in C++

```
int m=1;
while ( m<5 )
{
m++;
cout<<m<<endl;
}
```

16. Write the output of the following code in C++

```
for( int num =5; num <=10 ; num+=5)
{
cout<<"room number ="<<num<<endl;
cout<<"laboratory –senior"<<endl;
}
```

17. Write the output of the following program assuming the user enters a = 5 and b =3 .

```
int a , b , alpha , beta ;
if ( a>b)
alpha = ++a *b;
else
alpha = a*b ;
beta = pow ( alpha , 2) ;
cout << " alpha = " <<alpha <<endl;
cout<< "beta =" <<beta;
```

18.

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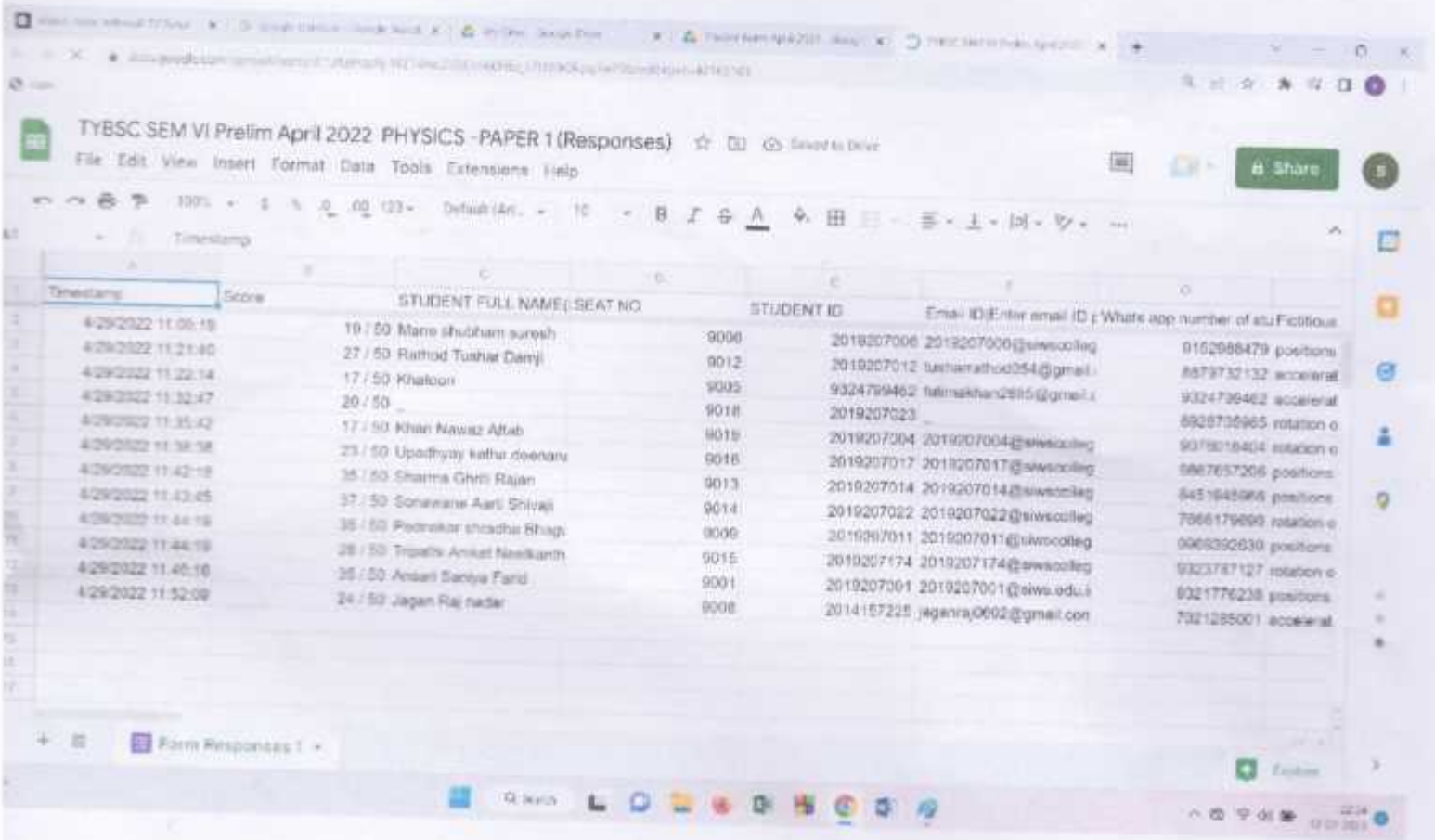

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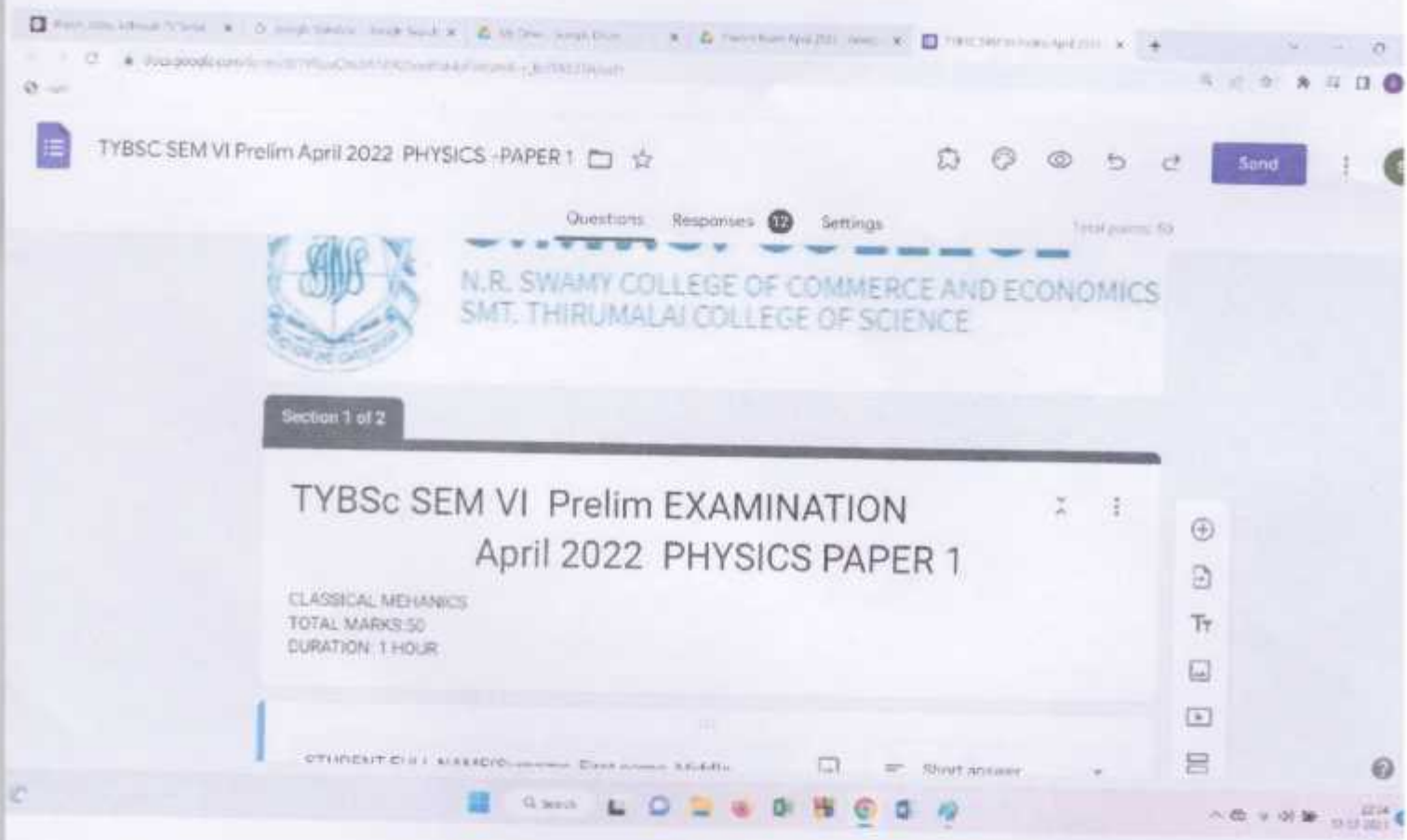

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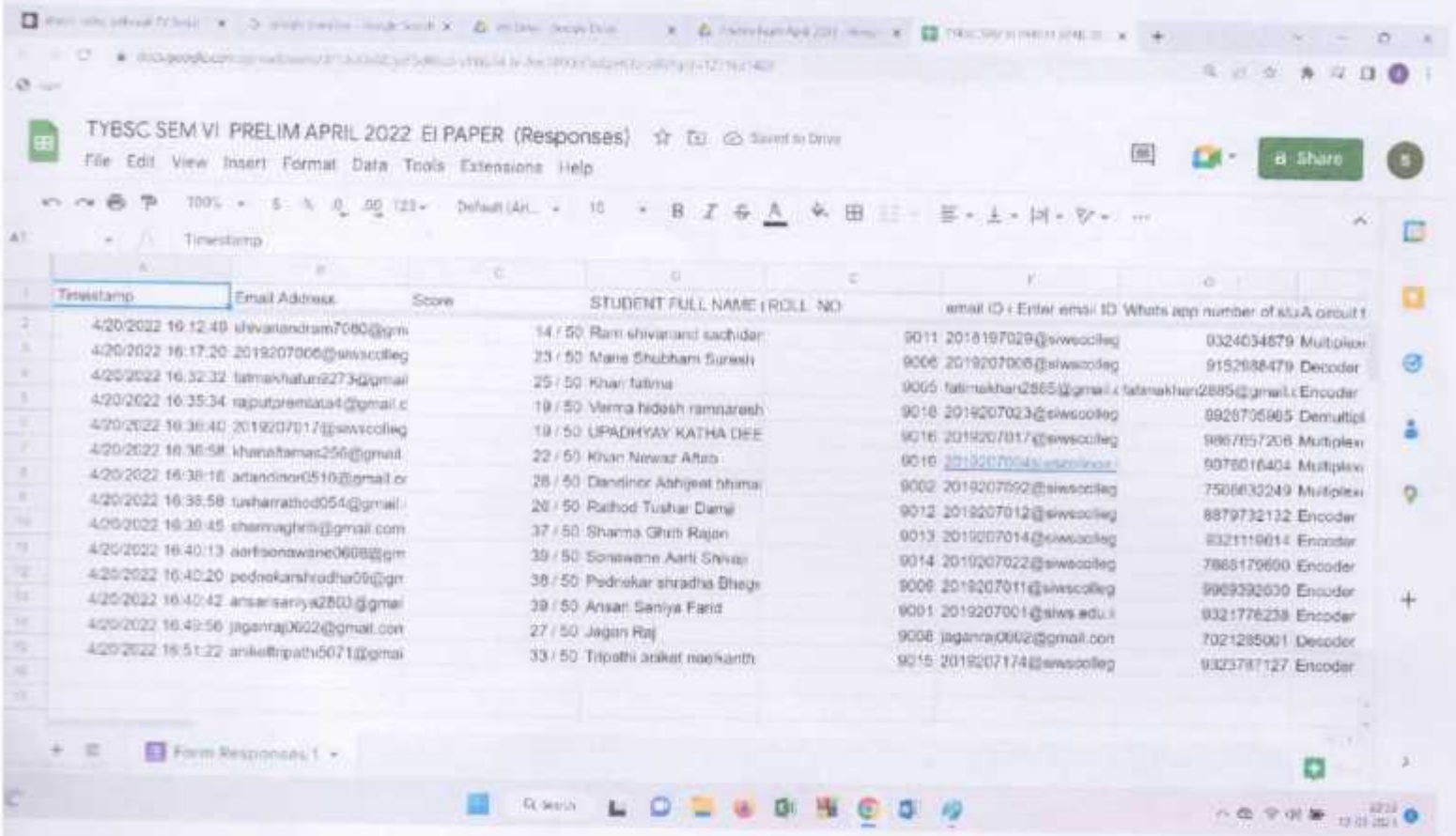

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4/20/2022 16:39:45	sharmaghrs@gmail.com	37 / 50	Sharma Ghrit Rajan	9013	2019207014@siwscolleg		8321119814	Encoder
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4/20/2022 16:40:20	pednekarshradha09@gm	38 / 50	Pednekar shradha Bhagv	9009	2019207011@siwscolleg		9969392630	Encoder
4/20/2022 16:40:42	ansarisaniya2803@gmai	39 / 50	Ansari Saniya Farid	9001	2019207001@siws.edu.i		9321776238	Encoder
4/20/2022 16:49:56	jagannaj0602@gmail.con	27 / 50	Jagan Raj	9008	jagannaj0602@gmail.con		7021285001	Decoder
4/20/2022 16:51:22	anikettripathi5071@gmai	33 / 50	Tripathi aniket nagkanth	9015	2019207174@siwscolleg		9323787127	Encoder

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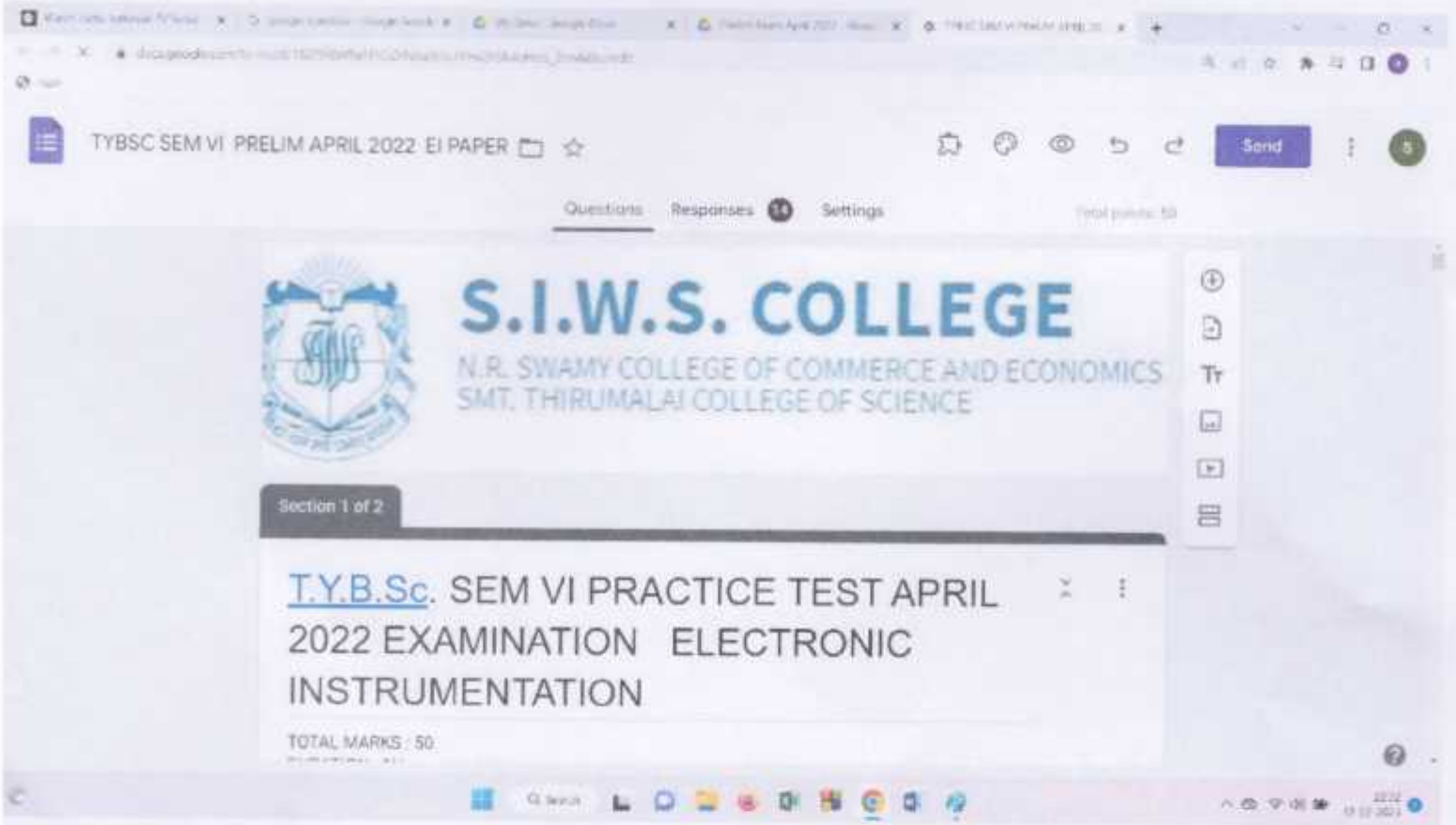

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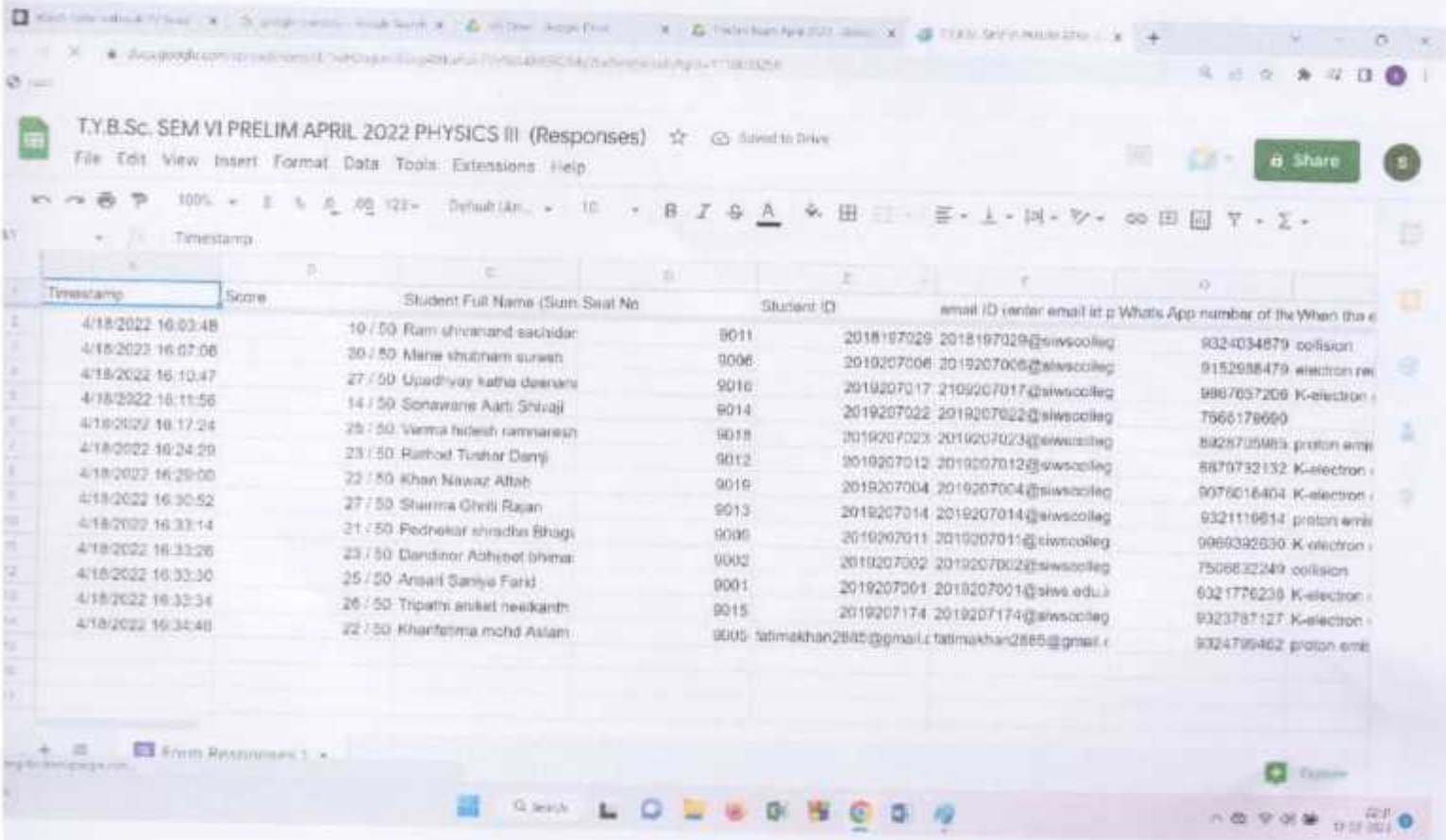

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4/18/2022 16:33:34	26 / 50	Tripathi aniket neelkanth	9015	2019207174	2019207174@siwscolleg	9323787127	K-electron
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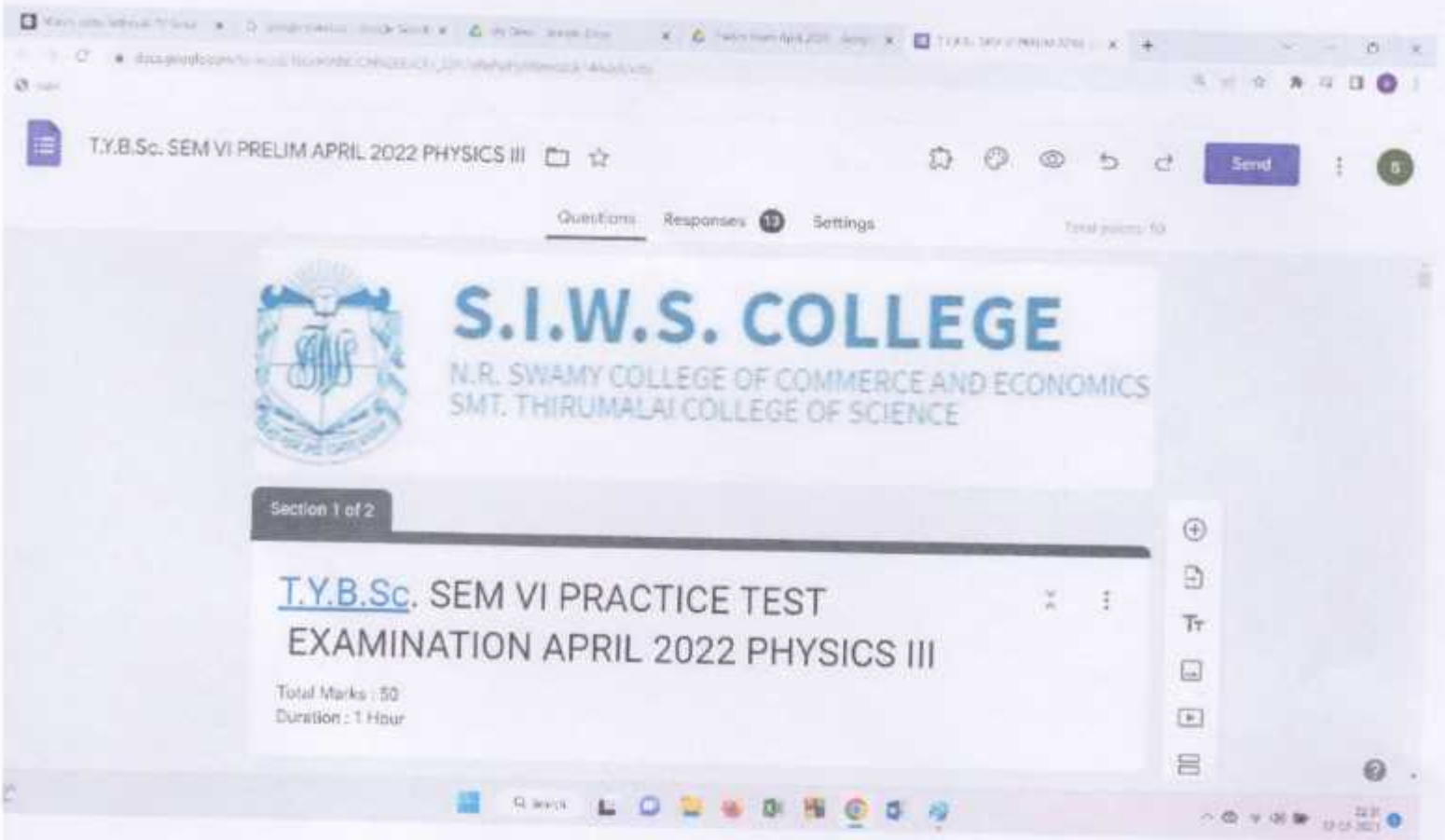

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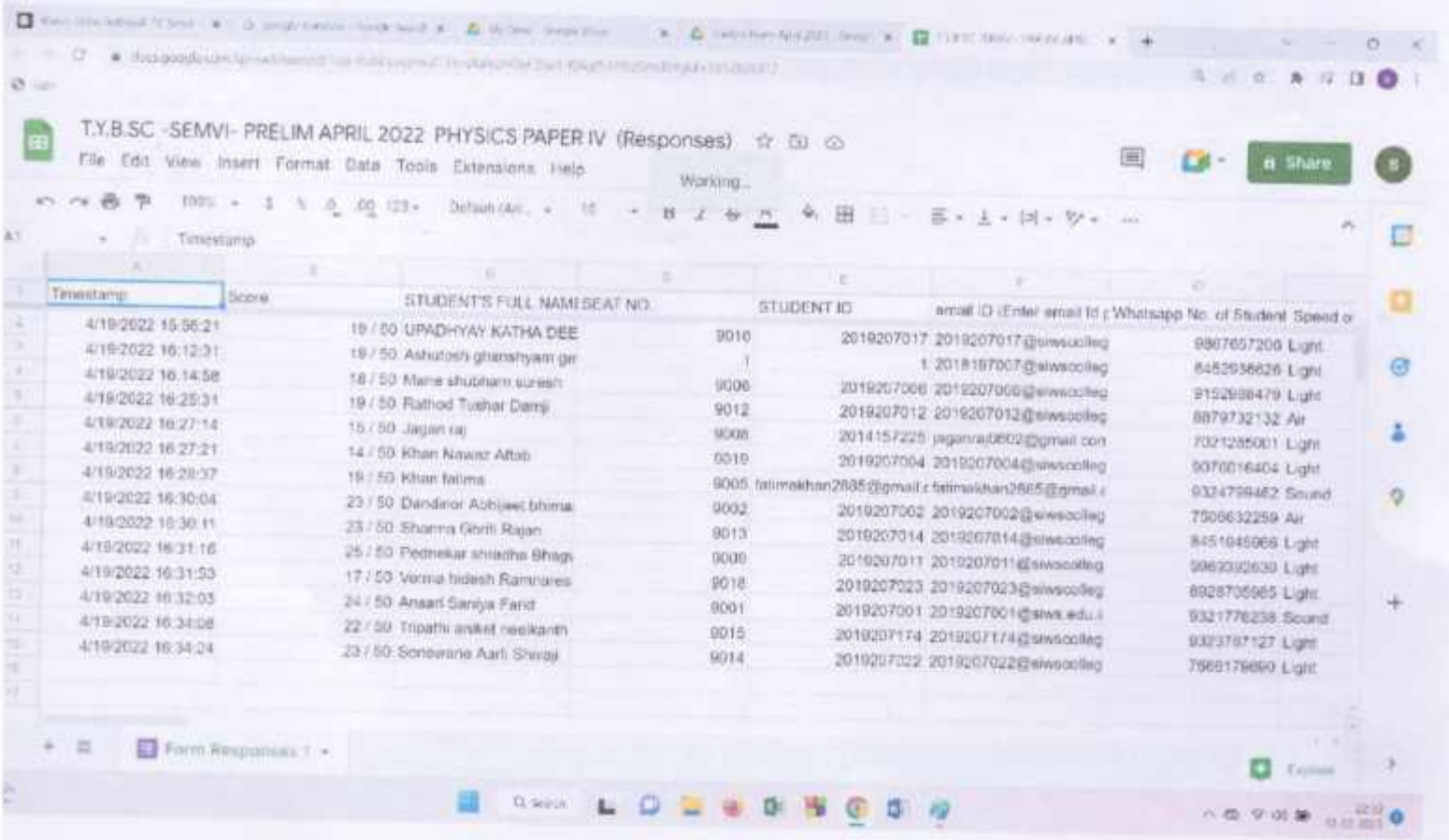

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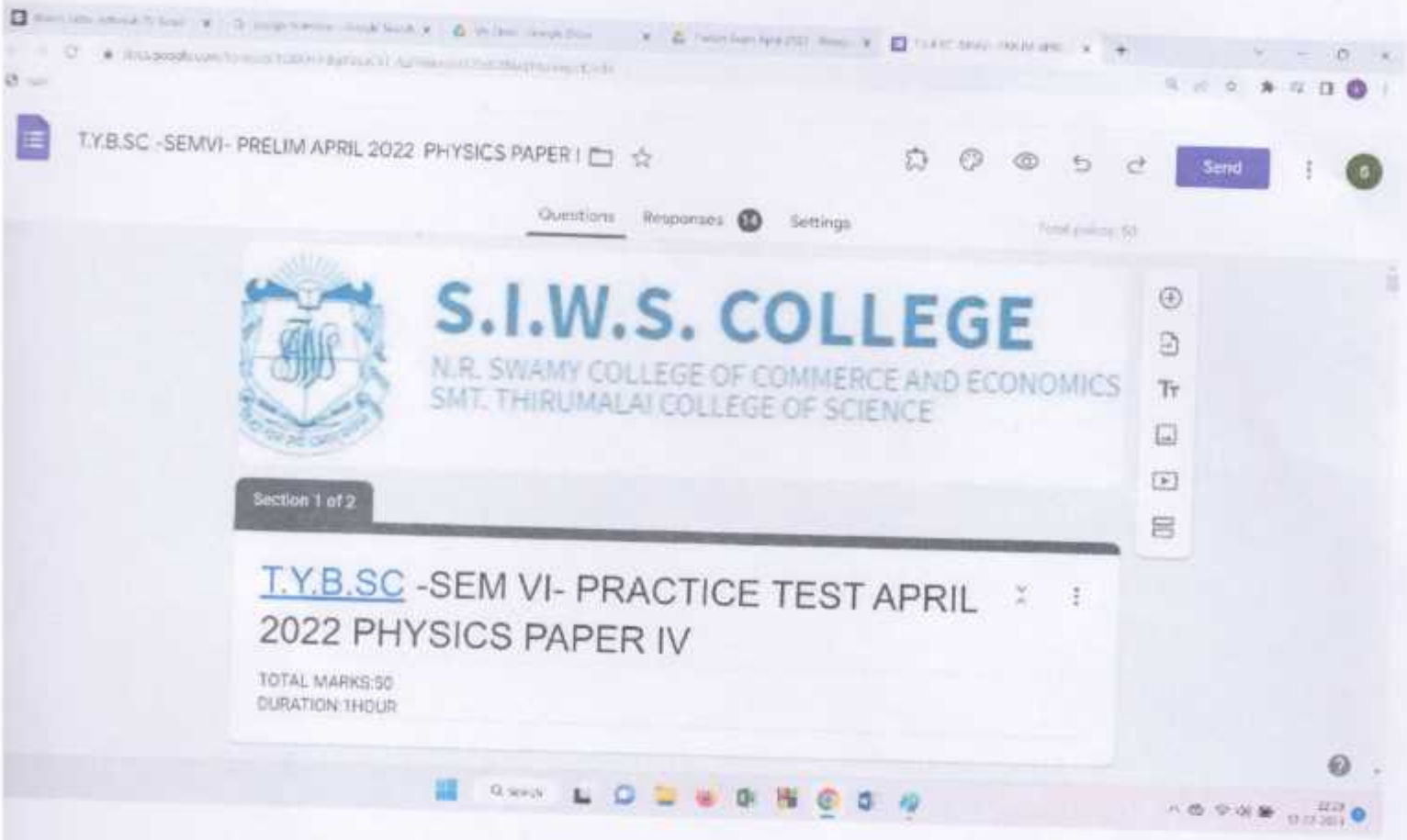

SIWS NR Swamy College Wadala, Mumbai-31

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
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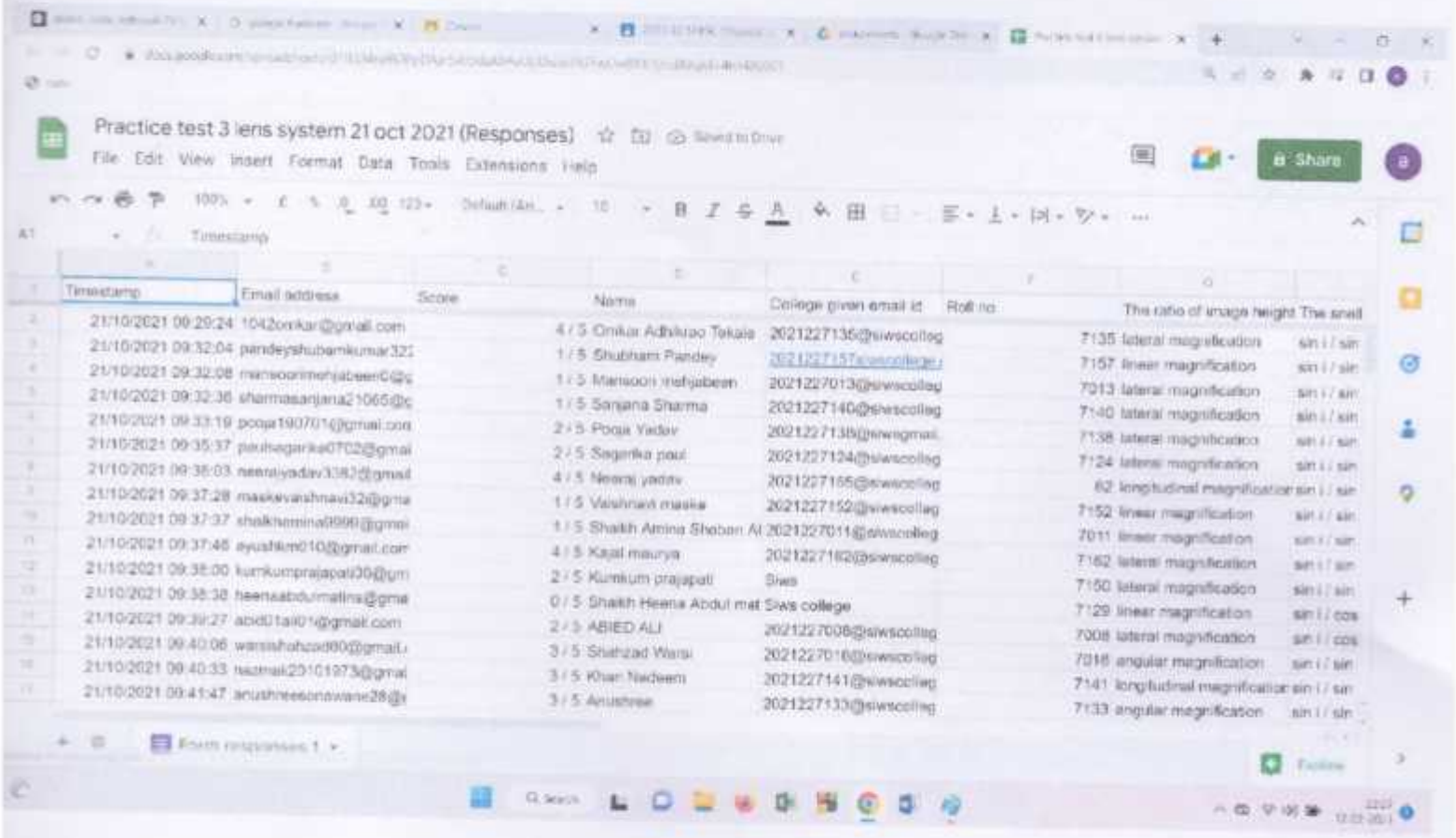
Wadala, Mumbai - 400 031



Practice test 3 lens system 21 oct 2021 (Responses)

File Edit View Insert Format Data Tools Extensions Help

Share

Timestamp	Email address	Score	Name	College given email id	Roll no	The ratio of image height	The small
21/10/2021 09:29:24	1042onkar@gmail.com	4 / 5	Onkar Adhikrao Tekale	2021227135@siwscolleg	7135	lateral magnification	sin i / sin
21/10/2021 09:32:04	pandeyshubamkumar321	1 / 5	Shubham Pandey	2021227157@siwscollege.i	7157	linear magnification	sin i / sin
21/10/2021 09:32:08	mansoormehjabeen6@g	1 / 5	Mansoori mehjabeen	2021227013@siwscolleg	7013	lateral magnification	sin i / sin
21/10/2021 09:32:36	sharmasanjana21065@g	1 / 5	Sanjana Sharma	2021227140@siwscolleg	7140	lateral magnification	sin i / sin
21/10/2021 09:33:19	pooja190701@gmail.com	2 / 5	Pooja Yadav	2021227135@siwsgmail.	7138	lateral magnification	sin i / sin
21/10/2021 09:35:37	paulsagarika0702@gmai	2 / 5	Sagarika paul	2021227124@siwscolleg	7124	lateral magnification	sin i / sin
21/10/2021 09:36:03	neerajyadav3382@gmail	4 / 5	Neeraj yadav	2021227165@siwscolleg	82	longitudinal magnification	sin i / sin
21/10/2021 09:37:28	maskevaishnavi32@gma	1 / 5	Vaishnavi maske	2021227152@siwscolleg	7152	linear magnification	sin i / sin
21/10/2021 09:37:37	shaikhamina0999@gmail	1 / 5	Shaikh Amina Shaban Al	2021227011@siwscolleg	7011	linear magnification	sin i / sin
21/10/2021 09:37:46	ayushkm010@gmail.com	4 / 5	Kajal maurya	2021227162@siwscolleg	7162	lateral magnification	sin i / sin
21/10/2021 09:38:00	kumkumprajapati30@gm	2 / 5	Kumkum prajapati	Siws	7150	lateral magnification	sin i / sin
21/10/2021 09:38:38	heenaabdulmatin@gma	0 / 5	Shaikh Heena Abdul mat	Siws college	7129	linear magnification	sin i / cos
21/10/2021 09:39:27	abid01ali01@gmail.com	2 / 5	ABIED ALI	2021227008@siwscolleg	7008	lateral magnification	sin i / cos
21/10/2021 09:40:06	warsishahzad60@gmail.c	3 / 5	Shahzad Warsi	2021227016@siwscolleg	7016	angular magnification	sin i / sin
21/10/2021 09:40:33	nazmak23101973@gmail	3 / 5	Khan Nadeem	2021227141@siwscolleg	7141	longitudinal magnification	sin i / sin
21/10/2021 09:41:47	anushreesonawane28@g	3 / 5	Anushree	2021227133@siwscolleg	7133	angular magnification	sin i / sin

Form responses 1

SIWS NR Swamy College * Wadala, Mumbai-31 *

PRINCIPAL
S.I.W.S. N.R. Swamy College of
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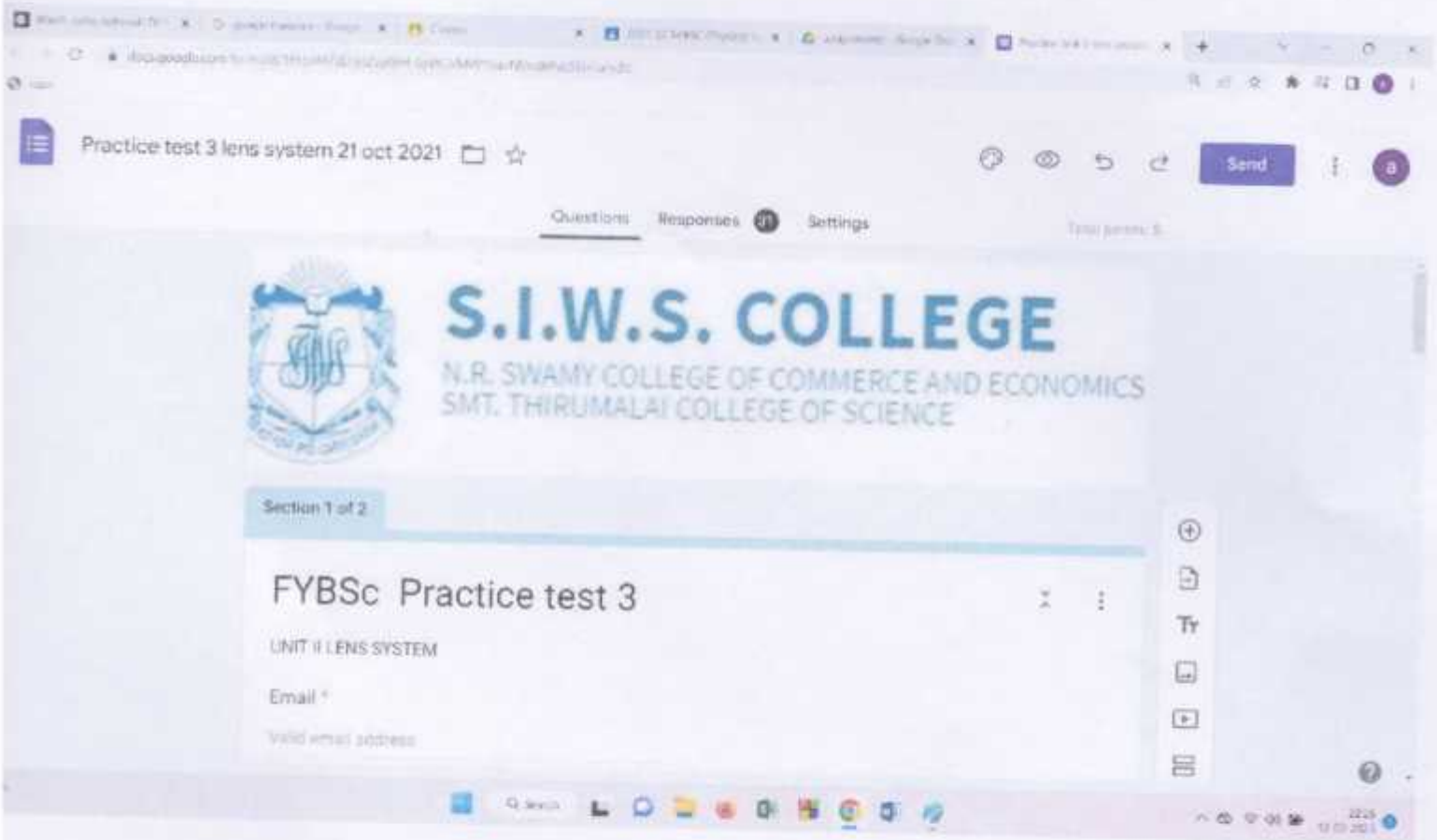
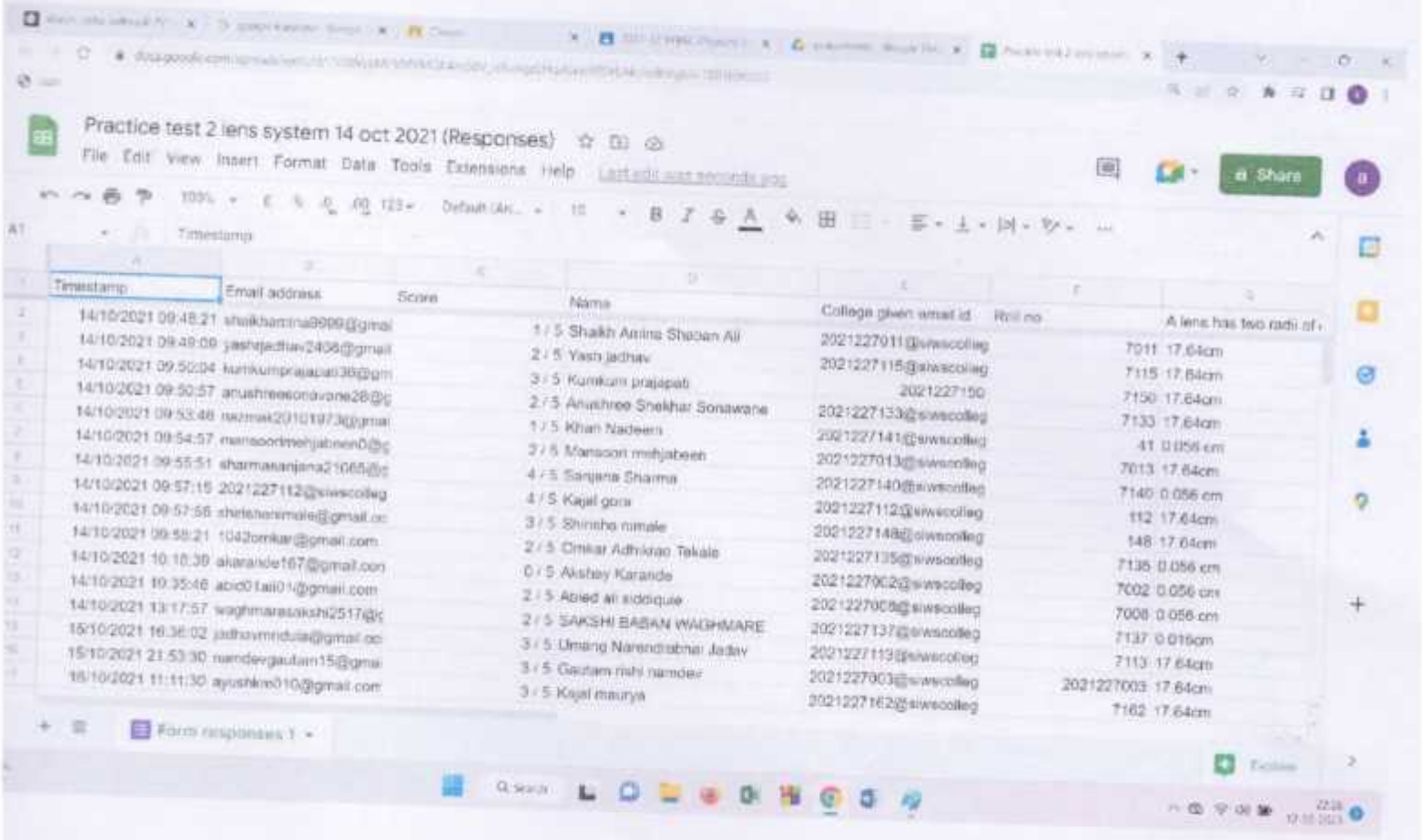
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



SIWS NR Swamy College * Wadala, Mumbai-31 *

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



Practice test 2 lens system 14 oct 2021 (Responses)

File Edit View Insert Format Data Tools Extensions Help

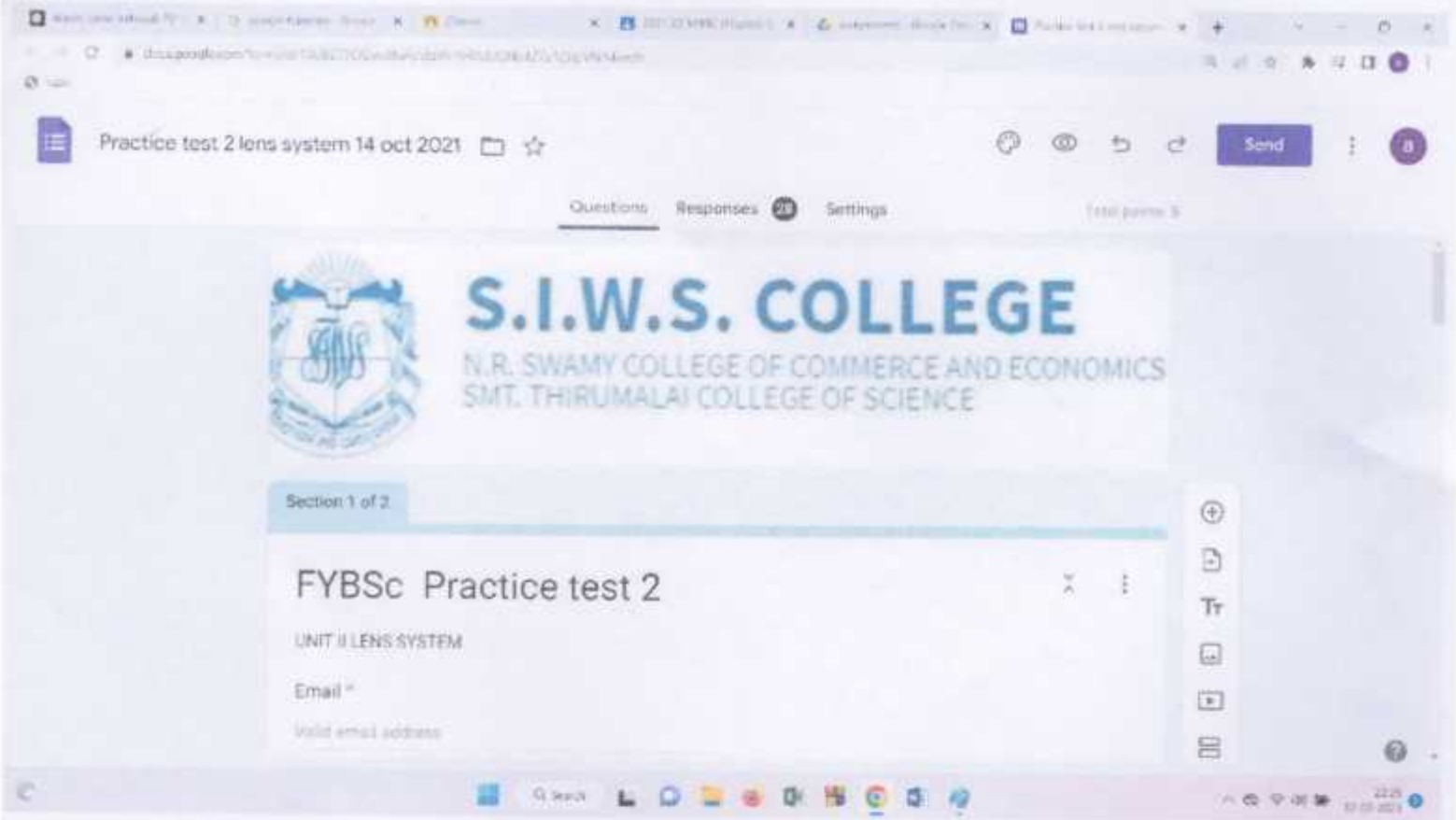
Share

Timestamp	Email address	Score	Name	College given email id	Roll no	A lens has two radii of
14/10/2021 09:48:21	shaikhamina9999@gmai	1 / 5	Shaikh Amina Shaban Ali	2021227011@siwscolleg	7011	17.64cm
14/10/2021 09:49:09	yashjadhav2406@gmail	2 / 5	Yash jadhav	2021227115@siwscolleg	7115	17.64cm
14/10/2021 09:50:04	kumkumprajapati36@gm	3 / 5	Kumkum prajapati	2021227150	7150	17.64cm
14/10/2021 09:50:57	anushreesonavane28@g	2 / 5	Anushree Shekhar Sonawane	2021227133@siwscolleg	7133	17.64cm
14/10/2021 09:53:48	nazmak2010197 3@gmai	1 / 5	Khan Nadeem	2021227141@siwscolleg	41	0.056 cm
14/10/2021 09:54:57	mansoorimehjabeen0@g	3 / 5	Mansoori mishjabeen	2021227013@siwscolleg	7013	17.64cm
14/10/2021 09:55:51	sharmasanjana21065@g	4 / 5	Sanjana Sharma	2021227140@siwscolleg	7140	0.056 cm
14/10/2021 09:57:15	2021227112@siwscolleg	4 / 5	Kajal gora	2021227112@siwscolleg	112	17.64cm
14/10/2021 09:57:56	shirishanimale@gmail.co	3 / 5	Shirisha nimale	2021227148@siwscolleg	148	17.64cm
14/10/2021 09:58:21	1042omkar@gmail.com	2 / 5	Omkar Adhikrao Tekale	2021227135@siwscolleg	7135	0.056 cm
14/10/2021 10:10:39	akaralde167@gmail.com	0 / 5	Akshay Karande	2021227002@siwscolleg	7002	0.056 cm
14/10/2021 10:35:46	abid01ali01@gmail.com	2 / 5	Abied ali siddique	2021227008@siwscolleg	7008	0.056 cm
14/10/2021 13:17:57	waghmarasakshi2517@g	2 / 5	SAKSHI BABAN WAGHMARE	2021227137@siwscolleg	7137	0.056cm
15/10/2021 16:36:02	jadhavmridula@gmail.co	3 / 5	Umang Narendrabhai Jadav	2021227113@siwscolleg	7113	17.64cm
15/10/2021 21:53:30	namdevgautam15@gmai	3 / 5	Gautam rishi namdev	2021227003@siwscolleg	2021227003	17.64cm
16/10/2021 11:11:30	ayushkm010@gmail.com	3 / 5	Kajal maurya	2021227162@siwscolleg	7162	17.64cm

Form responses 1

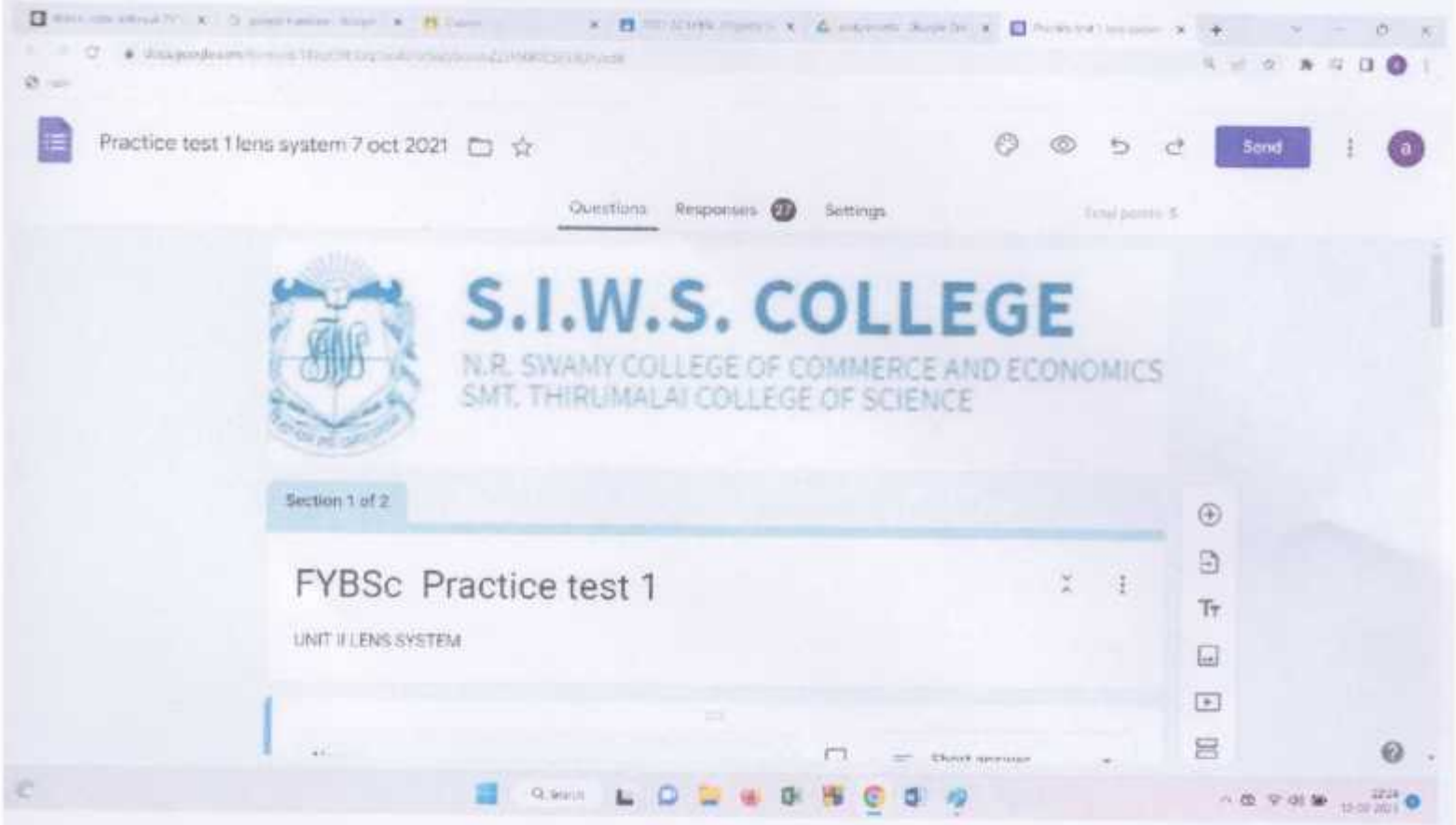
SIWS NR Swamy College Wadala, Mumbai-31

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



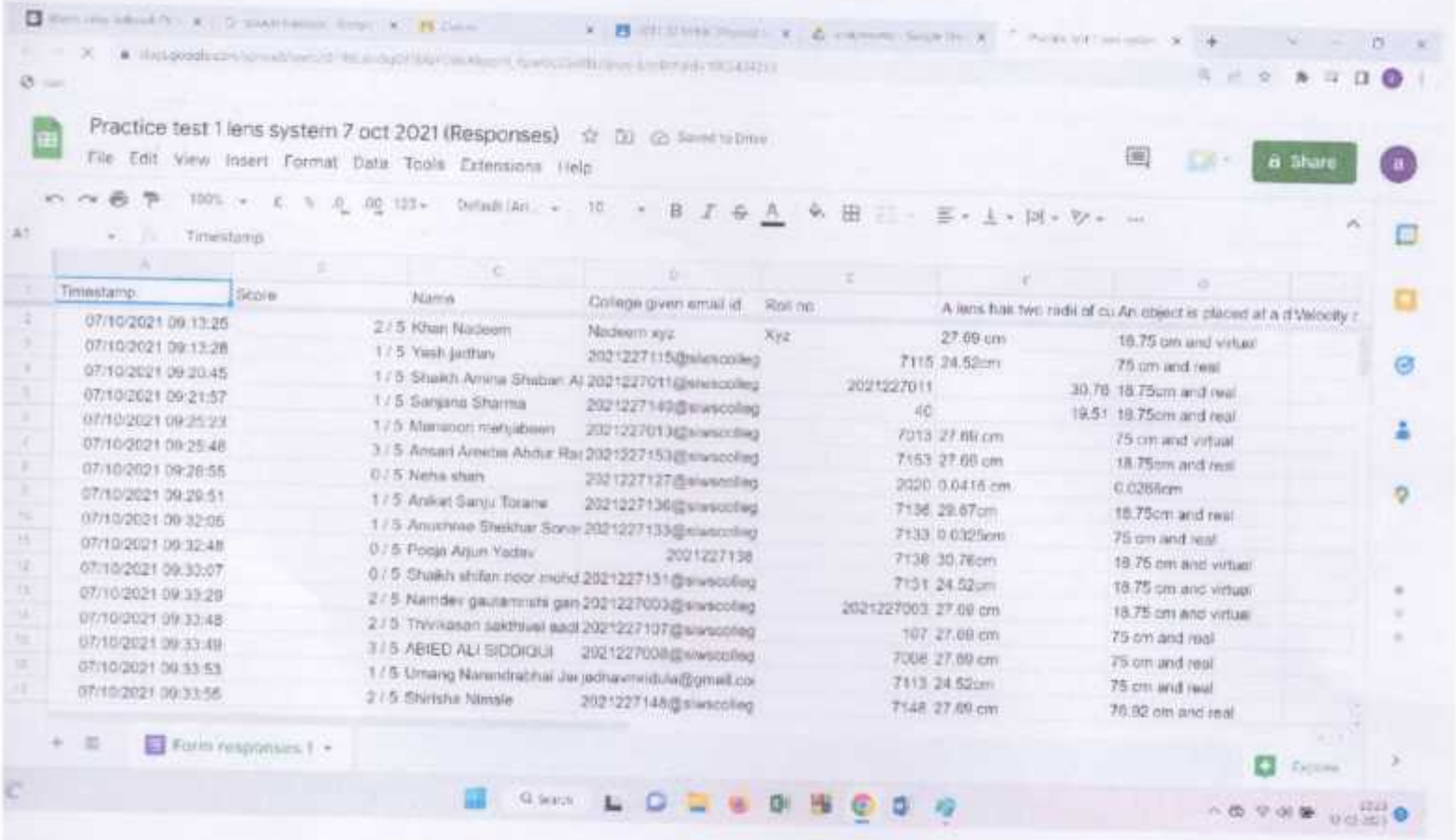
SIWS NR Swamy College ★ Wadala, Mumbai-31 ★

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



SIWS NR Swamy College * Wadala, Mumbai-31 *

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



Practice test 1 lens system 7 oct 2021 (Responses)

File Edit View Insert Format Data Tools Extensions Help

Share

Timestamp	Score	Name	College given email id	Roll no	A lens has two radii of cu	An object is placed at a d	Velocity c
07/10/2021 09:13:26	2 / 5	Khan Nadeem	Nadeem xyz	Xyz	27.69 cm	18.75 cm and virtual	
07/10/2021 09:13:28	1 / 5	Yash jadhav	2021227115@siwscolleg	7115	24.52cm	75 cm and real	
07/10/2021 09:20:45	1 / 5	Shaikh Amina Shaban Al	2021227011@siwscolleg	2021227011	30.76	18.75cm and real	
07/10/2021 09:21:57	1 / 5	Sanjana Sharma	2021227140@siwscolleg	40	19.51	18.75cm and real	
07/10/2021 09:25:23	1 / 5	Mansoori mehjabeen	2021227013@siwscolleg	7013	27.69 cm	75 cm and virtual	
07/10/2021 09:25:48	3 / 5	Ansari Areeba Abdur Rai	2021227153@siwscolleg	7153	27.69 cm	18.75cm and real	
07/10/2021 09:26:55	0 / 5	Neha shah	2021227127@siwscolleg	2020	0.0416 cm	0.0266cm	
07/10/2021 09:29:51	1 / 5	Aniket Sanju Tosane	2021227136@siwscolleg	7136	29.67cm	18.75cm and real	
07/10/2021 09:32:06	1 / 5	Anushree Shekhar Sonv	2021227133@siwscolleg	7133	0.0325cm	75 cm and real	
07/10/2021 09:32:48	0 / 5	Pooja Arjun Yadav	2021227138	7138	30.76cm	18.75 cm and virtual	
07/10/2021 09:33:07	0 / 5	Shaikh shifan noor mohd	2021227131@siwscolleg	7131	24.52cm	18.75 cm and virtual	
07/10/2021 09:33:29	2 / 5	Namdev gautamnath gan	2021227003@siwscolleg	2021227003	27.69 cm	18.75 cm and virtual	
07/10/2021 09:33:48	2 / 5	Thirukasan sakthivel aadi	2021227107@siwscolleg	107	27.69 cm	75 cm and real	
07/10/2021 09:33:49	3 / 5	ABIED ALI SIDDIQUI	2021227008@siwscolleg	7008	27.69 cm	75 cm and real	
07/10/2021 09:33:53	1 / 5	Umang Narendrabhai Jad	jadnarmridula@gmail.co	7113	24.52cm	75 cm and real	
07/10/2021 09:33:56	2 / 5	Shirisha Nimsle	2021227148@siwscolleg	7148	27.69 cm	76.92 cm and real	

Form responses 1

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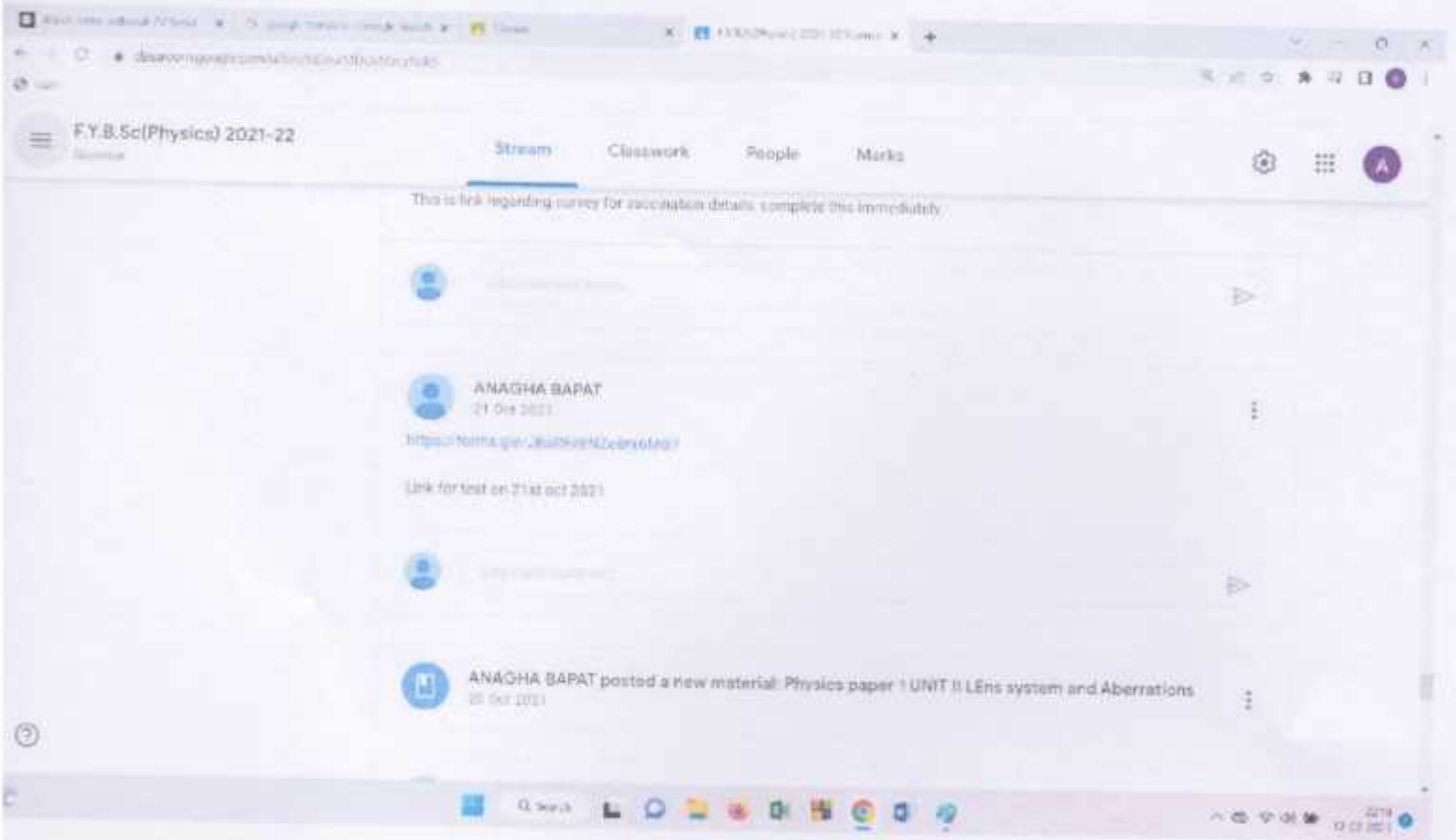
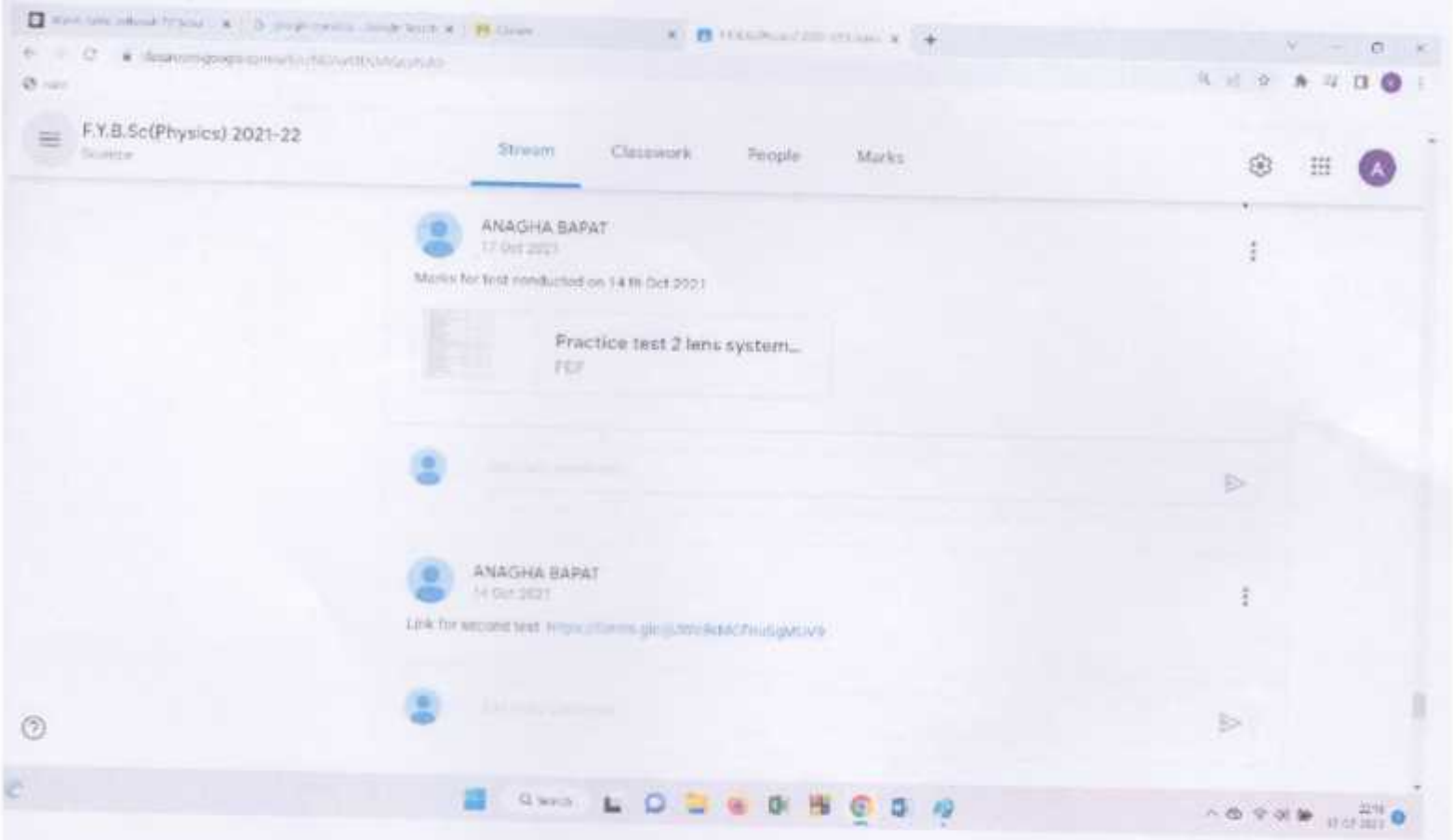


SIWS NR Swamy College * Wadala, Mumbai-31. *

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031



SIWS NR Swamy College * Wadala, Mumbai-31 *

PRINCIPAL
S.I.W.S. N.R. Swamy College of
Commerce & Economics and
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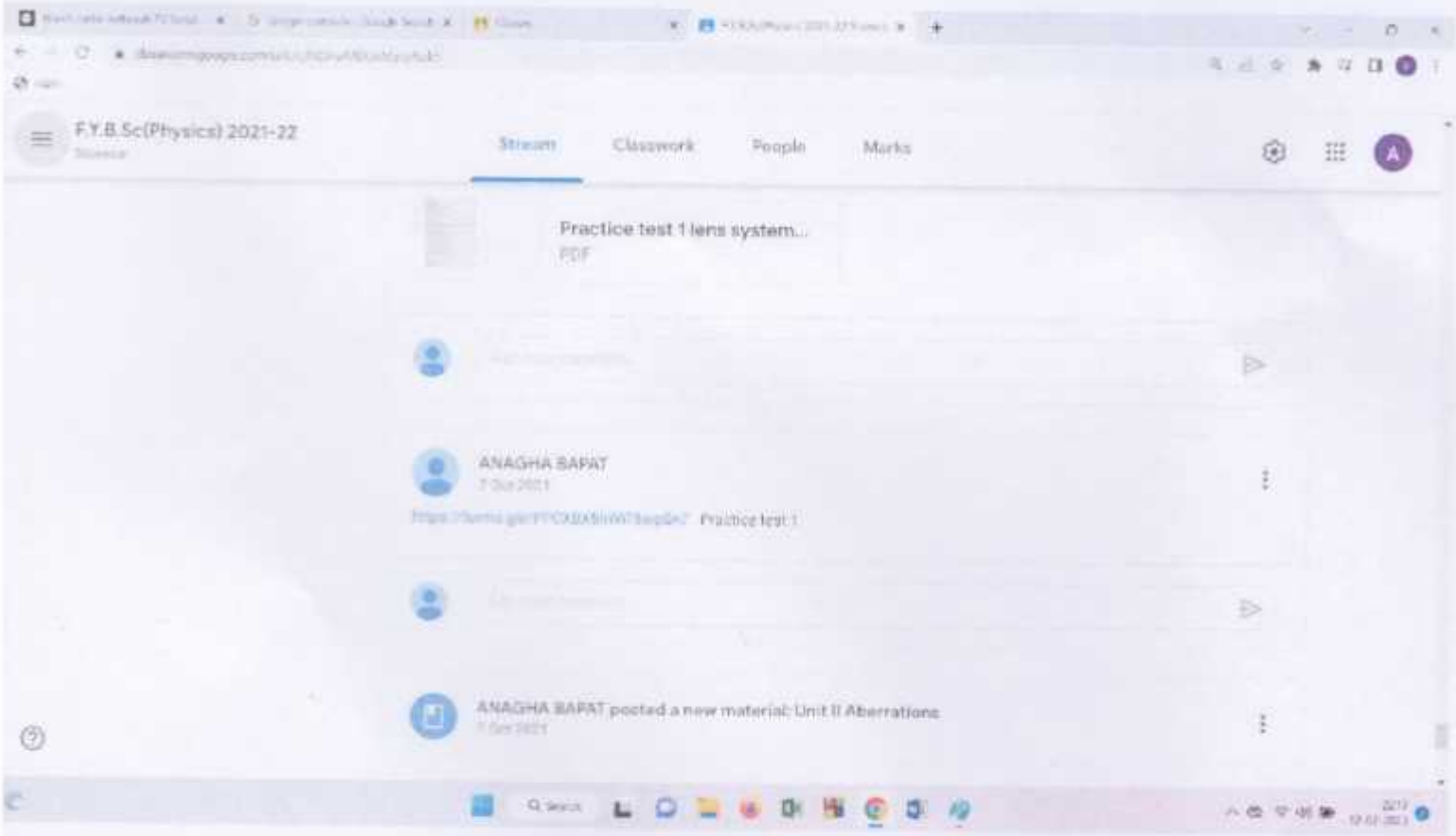
Wadala, Mumbai - 400 031



SIWS NR Swamy College Wadala, Mumbai-31.

PRINCIPAL
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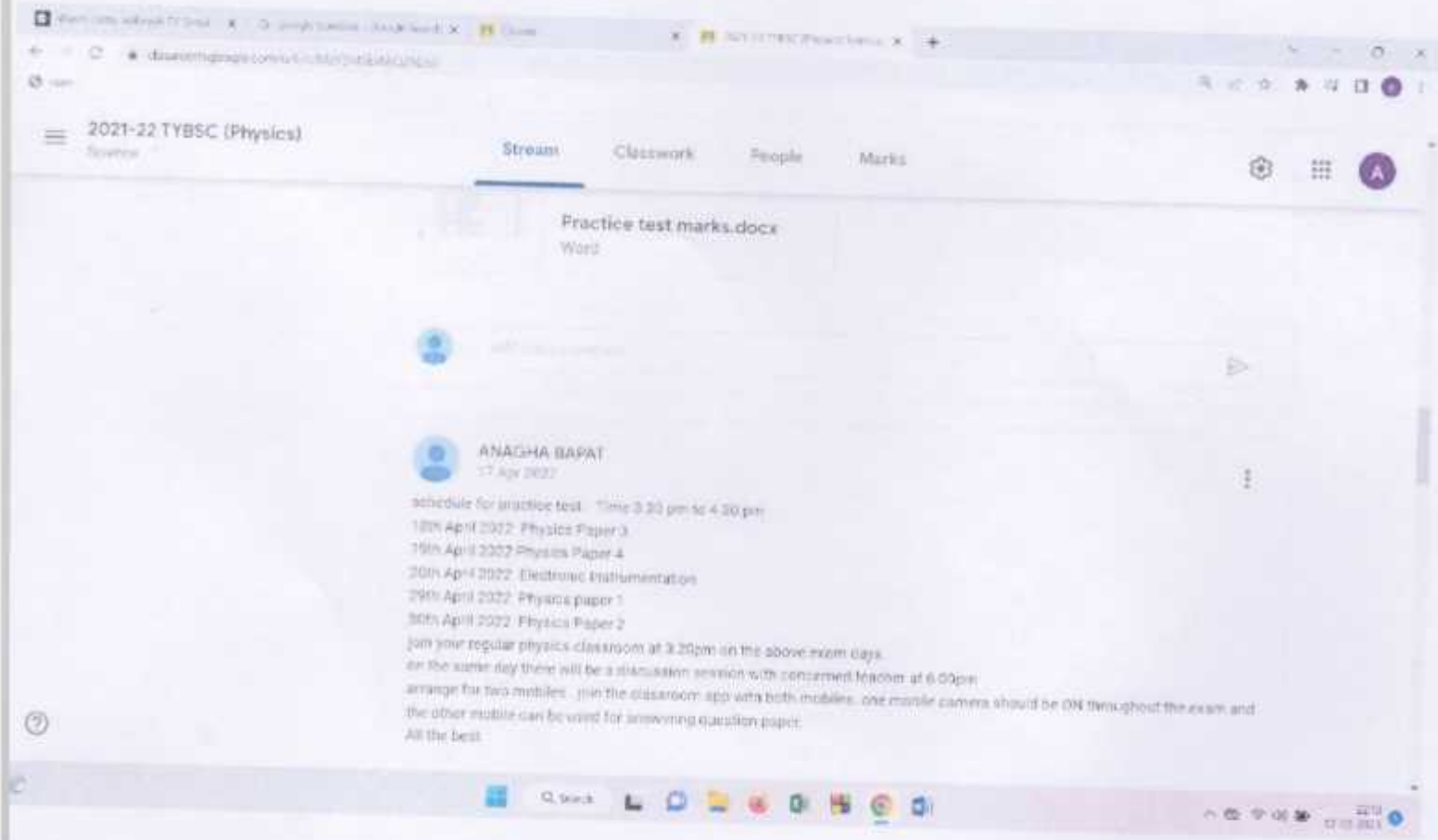

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S.I.W.S.

N.R. SWAMY COLLEGE OF COMMERCE AND ECONOMICS

&

SMT. THIRUMALAI COLLEGE OF SCIENCE

WADALA MUMBAI-400031

Department of Microbiology
Remedial lectures
Class – F.Y.B.Sc.
Year- 2021-22

SEMESTER I

THEORY
Paper I
Date- **20.11.2021 and 20.12.2021**
Syllabus- Unit I, II, III

- Structure of chloroplasts, Cell wall of bacteria
- Biosafety Cabinets
- Properties and functions Nucleic acids

Duration – two hours
Attendance – enclosed

SEMESTER II

Date- **19.03.2022 and 04.04.2022**

Syllabus- Unit I, II, III

- Identification, general properties, structure and reproduction of Chlamydia and Archaea
- Study of Slime Molds
- Effect of environmental factors on bacterial growth.

Duration – two hours

Attendance – enclosed

Rekha Bhatia
Prof. Rekha Bhatia
Teacher In-charge

N Khanolkar
Prof. Neeta Khanolkar
HOD

I/C Principal
S.I.W.S. N.R. Swamy College of Commerce & Economics &
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031.

1/31

Attendance for: **REMEDIAL LECTURE** SEM 1 MICROBIOLOGY PAPER 1

Date: **"2021-11-20"** "Time:" "13:20" "Meet ID:" "rrt-pepb-ubn"

Names	"2021-11-20"	"Email"	"Comment	"Arrival time"	"Last Seen	"# of Chec	"Joined"	"Details"
Thivikasan Aadhidravidar	"✓"	""	""	"13:31"	"14:35"	"64"	"1"	
Gulnaz Ali	"✓"	""	""	"13:34"	"14:35"	"14"	"2"	"13:34 (6n 13:57 (8mi
Mehwish Ansari	"✓"	""	""	"13:32"	"13:33"	"2"	"1"	
Saniya Bagwan	"✓"	""	""	"14:30"	"14:35"	"6"	"1"	
Tanmayee Bane	"✓"	""	""	"13:32"	"14:35"	"7"	"1"	
Komal Bhojayya	"✓"	""	""	"13:30"	"14:35"	"44"	"1"	
Jyoti Chikane	"✓"	""	""	"14:08"	"14:35"	"28"	"1"	
Rajeshwari Harijan	"✓"	""	""	"13:31"	"14:35"	"52"	"2"	"13:31 (46 14:30 (6mi
Anushree Sonawane Have	"✓"	""	""	"13:56"	"14:35"	"29"	"1"	
Umang Jadav	"✓"	""	""	"13:28"	"14:35"	"68"	"1"	
Manira Khan	"✓"	""	""	"13:26"	"14:35"	"12"	"2"	"14:30 (6n 13:26 (6mi
Nadeem Khan	"✓"	""	""	"13:32"	"14:35"	"58"	"1"	
Saif Khan	"✓"	""	""	"13:30"	"14:35"	"8"	"1"	
Kajal Maurya	"✓"	""	""	"13:29"	"13:31"	"3"	"1"	
Mohdshamshad Nadaf	"✓"	""	""	"13:33"	"14:35"	"13"	"1"	
Shirisha Nimale	"✓"	""	""	"13:30"	"14:35"	"63"	"1"	
Sunita Nishad	"✓"	""	""	"13:39"	"14:35"	"17"	"2"	"14:30 (6n 13:39 (11m
4 Others	"✓"	""	""	"13:31"	"14:34"	"61"	"1"	
Sagarikapaul Paul	"✓"	""	""	"13:30"	"14:35"	"66"	"1"	
Sachin Rathod	"✓"	""	""	"13:39"	"14:35"	"47"	"1"	
Bhagyashree Reddy	"✓"	""	""	"13:34"	"14:35"	"7"	"1"	
Aqsa Sayyed	"✓"	""	""	"13:31"	"14:35"	"57"	"1"	
Neha Shah	"✓"	""	""	"13:31"	"13:33"	"3"	"1"	
Sanjana Sharma	"✓"	""	""	"13:31"	"14:35"	"17"	"1"	
Roshani Singh	"✓"	""	""	"13:30"	"14:35"	"8"	"1"	
Anushree Sonawane	""	""	""					
Aishwaryavalarmathi Student	"✓"	""	""	"13:33"	"14:35"	"9"	"3"	"13:33 (1n 14:30 (3mi
Omkar Tekale	"✓"	""	""	"13:32"	"14:35"	"10"	"1"	
Aniket Torane	"✓"	""	""	"13:40"	"14:35"	"56"	"1"	
Sakshi Waghmare	"✓"	""	""	"13:30"	"14:35"	"8"	"1"	

I/C Principal
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Attendance for: REMEDIAL LECTURE SEM 1 MICROBIOLOGY 1

Date: "2021-12-20" "Time:" "12:01" "Meet ID:" "rrt-pepb-ubn"

Names	"2021-12-20"	"Email"	"Commen	"Arrival time"	"Last Seen	"# of Chec	"Joined"	"Details"
Mehwish Ansari	"✓"	""	""	"12:01"	"12:05"	"5"	"1"	
Saniya Bagwan	"✓"	""	""	"12:11"	"12:11"	"1"	"1"	
Komal Bhojayya	"✓"	""	""	"12:07"	"12:07"	"1"	"1"	
Jyoti Chikane	"✓"	""	""	"12:15"	"12:54"	"40"	"1"	
Kajal Gore	"✓"	""	""	"12:01"	"12:54"	"49"	"1"	
Umang Jadav	"✓"	""	""	"12:03"	"12:54"	"46"	"1"	
Nikhil Jadhav	"✓"	""	""	"12:14"	"12:14"	"1"	"1"	
Manira Khan	"✓"	""	""	"12:01"	"12:05"	"5"	"1"	
Nadeem Khan	"✓"	""	""	"12:06"	"12:06"	"1"	"1"	
Rahenuma Khan	"✓"	""	""	"12:02"	"12:40"	"6"	"2"	"12:40 (1n 12:02 (5min) [12:27]
Sneha Mohite	"✓"	""	""	"12:14"	"12:14"	"1"	"1"	
Mohdshamshad Nadaf	"✓"	""	""	"12:04"	"12:12"	"6"	"2"	"12:04 (5n 12:12 (1min) [12:12]
Shirisha Nimale	"✓"	""	""	"12:01"	"12:54"	"54"	"1"	
Sunita Nishad	"✓"	""	""	"12:08"	"12:08"	"1"	"1"	
10 Others	"✓"	""	""	"12:05"	"12:54"	"50"	"1"	
Sachin Rathod	"✓"	""	""	"12:04"	"12:54"	"36"	"2"	"12:04 (2n 12:21 (34min) [12:54]
Aqsa Sayyed	"✓"	""	""	"12:01"	"12:15"	"15"	"1"	
Heena Shaikh	"✓"	""	""	"12:05"	"12:54"	"4"	"2"	"12:39 (3n 12:05 (1min) [12:05]
Sanjana Sharma	"✓"	""	""	"12:01"	"12:53"	"49"	"1"	
Roshani Singh	"✓"	""	""	"12:01"	"12:30"	"9"	"2"	"12:30 (1n 12:01 (8min) [12:11]
Anushree Sonawane	"✓"	""	""	"12:01"	"12:47"	"31"	"4"	"12:47 (1n 12:26 (6mi 12:01 (23r 12:47 (1mi
Aishwaryavalarmathi Stuc	"✓"	""	""	"12:01"	"12:13"	"6"	"2"	"12:13 (1n 12:01 (5min) [12:05]
Monisha Student	"✓"	""	""	"12:23"	"12:23"	"1"	"1"	
Purva Sudam	"✓"	""	""	"12:01"	"12:15"	"15"	"1"	
Omkar Tekale	"✓"	""	""	"12:03"	"12:05"	"3"	"1"	
Aniket Torane	"✓"	""	""	"12:01"	"12:18"	"13"	"2"	"12:01 (12 12:18 (1min) [12:18]
Sakshi Waghmare	"✓"	""	""	"12:11"	"12:11"	"1"	"1"	
Pooja Yadav	"✓"	""		"12:01"	"12:54"	"45"	"1"	

3/3 |

I/C Principal
S.I.W.S. N.R. Swamy College of
Commerce & Economics &
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031.

Attendance for: **REMEDIAL LECTURE** SEM 2 MICROBIOLOGY 1

Date: **"2022-03-19"** "Time:" "13:30" "Meet ID:" "rrt-pepb-ubn"

Names	"2022-03-19"	"Email"	"Comment	"Arrival time"	"Last Seen	"# of Chec	"Joined"	"Details"
Shifa Ansari	""	""	""					
Tanmayee Bane	"✓"	""	""	"13:45"	"14:22"	"7"	"1"	
Komal Bhojayya	"✓"	""	""	"13:32"	"14:01"	"30"	"1"	
Jyoti Chikane	"✓"	""	""	"13:31"	"14:22"	"91"	"5"	"13:37 (46 14:21 (1mi 13:31 (42r
Kajal Gore	"✓"	""	""	"13:32"	"14:22"	"51"	"1"	
Umang Jadav	"✓"	""	""	"13:31"	"14:22"	"26"	"2"	"13:31 (17 13:49 (9min) [14:22]
Saif Khan	"✓"	""	""	"13:44"	"14:22"	"39"	"1"	
Shirisha Nimale	"✓"	""	""	"13:31"	"14:22"	"52"	"1"	
Sagarikapaul Paul	"✓"	""	""	"13:31"	"14:22"	"96"	"2"	"13:38 (45 13:31 (51min) [14:22]
Neha Shah	""	""	""					
Wahidali Shaikh	"✓"	""	""	"13:32"	"13:43"	"12"	"3"	"13:32 (3r 13:36 (8mi 13:35 (1mi
Anushree Sonawane	"✓"	""	""	"13:31"	"14:22"	"33"	"2"	"13:31 (10 13:40 (23min) [14:22]
Aishwaryavalarmath	"✓"	""	""	"13:40"	"13:40"	"1"	"1"	
Omkar Tekale	"✓"	""	""	"13:32"	"14:22"	"51"	"1"	
Aniket Torane	"✓"	""	""	"13:33"	"14:22"	"98"	"3"	"13:33 (50 13:34 (2mi 13:33 (46m
Shivani Yadav	"✓"	""	""	"13:31"	"14:22"	"11"	"1"	

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Attendance for: REMEDIAL LECTURE SEM2 MICROBIOLOGY 1

Date: "2022-04-04" "Time:" "12:04" "Meet ID:" "rrt-pepb-ubn"

Names	"2022-04-04"	"Email"	"Comment	"Arrival time"	"Last Seen	"# of Chec	"Joined"	"Details"
Mehwish Ansari	"✓"	""	""	"12:04"	"13:04"	"5"	"1"	
Shifa Ansari	"✓"	""	""	"12:25"	"12:58"	"26"	"1"	
Tanmayee Bane	"✓"	""	""	"12:04"	"13:04"	"68"	"2"	"12:47 (17 12:04 (51min) [13:04]
Jyoti Chikane	"✓"	""	""	"12:04"	"13:04"	"54"	"1"	
Sonali Dewade	"✓"	""	""	"12:04"	"13:04"	"64"	"2"	"12:07 (58 12:04 (6min) [12:35]
Kajal Gore	"✓"	""	""	"12:34"	"13:04"	"4"	"1"	
Rajeshwari Harijan	"✓"	""	""	"12:23"	"13:04"	"5"	"1"	
Umang Jadav	"✓"	""	""	"12:04"	"13:04"	"55"	"1"	
Muskan Khan	"✓"	""	""	"12:24"	"12:39"	"5"	"1"	
Nadeem Khan	"✓"	""	""	"12:28"	"12:28"	"1"	"1"	
Saif Khan	"✓"	""	""	"12:04"	"13:04"	"5"	"1"	
Pranav Mane	"✓"	""	""	"12:27"	"12:35"	"3"	"1"	
Shirisha Nimale	"✓"	""	""	"12:04"	"13:04"	"61"	"1"	
Sunita Nishad	"✓"	""	""	"12:12"	"13:04"	"5"	"1"	
4 Others	"✓"	""	""	"12:04"	"13:02"	"58"	"1"	
Sagarikapaul Paul	"✓"	""	""	"12:04"	"13:04"	"29"	"1"	
Heena Shaikh	"✓"	""	""	"12:20"	"13:04"	"10"	"1"	
Ummehabiba Shaikh	"✓"	""	""	"12:23"	"12:35"	"3"	"1"	
Sanjana Sharma	"✓"	""	""	"12:04"	"13:04"	"34"	"1"	
Aishwaryavalarmathi S	"✓"	""	""	"12:04"	"12:10"	"7"	"1"	
Monisha Student	"✓"	""	""	"12:13"	"13:04"	"4"	"2"	"12:13 (1n 12:45 (3min) [13:04]
Omkar Tekale	"✓"	""	""	"12:04"	"13:04"	"42"	"1"	
Pooja Yadav	"✓"	""	""	"12:29"	"13:04"	"5"	"1"	
Shivani Yadav	"✓"	""	""	"12:56"	"13:04"	"3"	"1"	
Tangam Yadav	"✓"	""	""	"12:08"	"13:04"	"5"	"1"	

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Class – S.Y.B.Sc.

Year- 2021-22

SEMESTER III

THEORY
Paper I
Date-04.09.2021
Syllabus- Unit I, II, III

- Estimation of Nitrogen—Microkjeldahl method
- Advanced Molecular Biology methods used in Microbial taxonomy
- Unusual DNA structures

Duration – one hour

Attendance – enclosed

SEMESTER IV

Date- 22.02.2022

Syllabus- Unit I, II, III

- Mechanism of biochemical reactions
- Michaelis Menten equation
- Analytical centrifugation

Duration –one hour

Attendance – enclosed

Dr. Ajitha Nair
Teacher in charge

Prof. Neeta Khanolkar
HOD

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S.Y.B.Sc CMB Sem 3 - Remedial Lecture Microbiology Paper I

Date: "2021-09-04" "Time:" "7:52" "Meet ID:" "izn-fxdx-mmw"

Names	"2021-09-04"	"Email"	"Comment	"Arrival time"	"Last Seen"	"# of Checks"	"Joined"
ansarijishan ansari	"✓"	""	""	"8:03"	"8:59"	"11"	"1"
aaditya asware	"✓"	""	""	"8:00"	"8:59"	"14"	"1"
anil baraee	"✓"	""	""	"8:03"	"8:59"	"10"	"3"
girish gautam	"✓"	""	""	"7:57"	"8:59"	"33"	"2"
ujwalkumar jaiswar	"✓"	""	""	"8:11"	"8:45"	"35"	"1"
sneha kamble	"✓"	""	""	"8:04"	"8:04"	"1"	"1"
khanmohammadsadik	"✓"	""	""	"8:01"	"8:03"	"3"	"1"
mahek khan	"✓"	""	""	"8:04"	"8:07"	"4"	"1"
naseem khan	"✓"	""	""	"8:02"	"8:59"	"3"	"1"
bhumit mahadik	"✓"	""	""	"8:03"	"8:59"	"33"	"1"
michelraj nadar	"✓"	""	""	"7:59"	"8:59"	"20"	"1"
2 others	"✓"	""	""	"8:03"	"8:59"	"57"	"1"
rozmin panchi	"✓"	""	""	"8:04"	"8:59"	"5"	"1"
alfia qureshi	"✓"	""	""	"8:03"	"8:03"	"1"	"1"
saimasiddiqa shaikh	"✓"	""	""	"8:02"	"8:59"	"7"	"1"
shamirunnisha shaikh	"✓"	""	""	"8:03"	"8:59"	"21"	"1"
umerabano siddique	"✓"	""	""	"8:00"	"8:04"	"5"	"1"
rani singh	"✓"	""	""	"8:13"	"8:59"	"7"	"1"
gauri vanniyar	"✓"	""	""	"8:02"	"8:03"	"2"	"1"
sakshi vesvikar	"✓"	""	""	"7:58"	"8:59"	"24"	"1"
hemal waghela	"✓"	""	""	"8:01"	"8:59"	"13"	"1"

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Attendance for: SYBSc CMB 21-22 Sem 4 Remedial lecture Microbiology Paper I

Date: "2022-02-22" "Time:" "12:26" "Meet ID:" "edd-kuxd-bfw"

Names	"2022-02-22"	"Email"	"Comment	"Arrival tim	"Last Seen	"# of Checks"	"Joined"
ansarijishan ansari	"✓"	""	""	"12:27"	"12:27"	"1"	"1"
aaditya asware	"✓"	""	""	"12:32"	"12:45"	"5"	"1"
anil baraee	"✓"	""	""	"12:44"	"12:46"	"3"	"2"
akshada borhade	"✓"	""	""	"12:32"	"12:45"	"5"	"1"
bushra butt	""	""	""				
shrutika devkar	"✓"	""	""	"12:27"	"12:45"	"6"	"1"
girish gautam	"✓"	""	""	"12:27"	"12:45"	"17"	"1"
sneha kamble have	""	""	""				
ujwalkumar jaiswar	"✓"	""	""	"12:27"	"12:45"	"6"	"1"
alishabanu khan	"✓"	""	""	"12:27"	"12:31"	"5"	"1"
arshiya khan	""	""	""				
mahek khan	""	""	""				
naseem khan	"✓"	""	""	"12:27"	"12:45"	"3"	"2"
sabina khan	""	""	""				
bhumit mahadik	"✓"	""	""	"12:27"	"12:27"	"1"	"1"
michelraj nadar	"✓"	""	""	"12:32"	"12:38"	"7"	"1"
rozmin panchi	"✓"	""	""	"12:32"	"12:45"	"5"	"1"
neha potphode	""	""	""				
alfia qureshi	""	""	""				
pratiksha rane	""	""	""				
nadimahmed shaik	""	""	""				
saimasiddiqa shaikl	"✓"	""	""	"12:29"	"12:45"	"6"	"1"
shamirunnisha shai	""	""	""				
umerabano siddiqu	""	""	""				
rani singh	""	""	""				
gauri vanniyar	"✓"	""	""	"12:30"	"12:30"	"1"	"1"
sakshi vesvikar	"✓"	""	""	"12:27"	"12:46"	"12"	"1"
hemal waghela	"✓"	""	""	"12:27"	"12:27"	"1"	"1"
pooja yadav	"✓"	""	""	"12:45"	"12:45"	"1"	"1"

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10/31

Class – S.Y.B.Sc.

Year- 2021 - 22

SEMESTER III

THEORY
Paper III
Date- 28-08-2021
Syllabus- Unit I, II, III

- Pure Culture techniques
- Infections of Digestive system
- Eradication

Duration – one hour

Attendance – enclosed

SEMESTER IV

Date- 03-02-2022

Syllabus- Unit I, II, III

- Biosensors
- Biostatistics Problems
- Bioremediation

Duration – one hours

Attendance – enclosed

Prof. Deepali Kheddekar
Teacher In charge

Prof. Neeta Khanolkar
HOD

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Attendance for: class-list Remedial Lecture Sem 3 Paper 3

Date:	"2021-08-28"	"Time:"	"11:02"	"Meet ID:"	"ugi-veym-vnp"					
Names	"2021-08-28"	"Email"	"Comment	"Arrival tir	"Last Seen	"# of Chec	"Joined"	"Details"		
Ansarijishan Ansari	""	""	""							
Aaditya Asware	""	""	""							
Anil Baraee	""	""	""							
Akshada Borhade	""	""	""							
Shrutika Devkar	""	""	""							
Sakshi Gaikwad	"✓"	""	""	"11:02"	"11:56"	"55"	"1"			
Girish Gautam	""	""	""							
Ansarijishan Ansari Have	""	""	""							
Rani Singh Have	""	""	""							
Ujwalkumar Jaiswar	""	""	""							
Alishabanu Khan	""	""	""							
Arshiya Khan	""	""	""							
Khanmohammadsadik Kha	""	""	""							
Mahek Khan	""	""	""							
Naseem Khan	""	""	""							
Sabina Khan	""	""	""							
Saniya Khan	""	""	""							
Vaishali Kori	"✓"	""	""	"11:02"	"11:56"	"55"	"1"			
Siddhi Londhe	"✓"	""	""	"11:02"	"11:56"	"55"	"1"			
Bhumit Mahadik	""	""	""							
Shubham More	"✓"	""	""	"11:02"	"11:56"	"57"	"2"	"11:02 (55	11:50 (2min) [11:56]	
Michelraj Nadar	""	""	""							
Hemlata Nayak	"✓"	""	""	"11:17"	"11:56"	"31"	"1"			
Deepali Nijapkar	"✓"	""	""	"11:03"	"11:56"	"107"	"2"	"11:03 (54	11:04 (53min) [11:56]	
Rozmin Panchi	""	""	""							
Neha Potphode	""	""	""							
Aditya Prajapati	"✓"	""	""	"11:02"	"11:56"	"55"	"1"			
Alfia Qureshi	""	""	""							
Saimasiddiqa Shaikh	""	""	""							

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Shamirunnisha Shaikh	""	""	""							
Umerabano Siddique	""	""	""							
Rani Singh	""	""	""							
Gauri Vanniyar	""	""	""							
Sakshi Vesvikar	""	""	""							
Hemal Waghela	""	""	""							
Pooja Yadav	""	""	""							
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Attendance for:	Class List	Remedial Lecture		Sem 4	Paper 3							
Date:	"2022-02-03"	"Time:"	"10:00"	"Meet ID:"	"edd-kuxd-bfw"							
Names	"2022-02-03"	"Email"	"Comment	"Arrival tir	"Last Seen	"# of Chec	"Joined"					
Ansarijishan Ansari	"✓"	""	""	"10:14"	"10:55"	"42"	"1"					
Aaditya Asware	"✓"	""	""	"10:00"	"10:32"	"33"	"1"					
Bushra Butt	"✓"	""	""	"10:55"	"10:55"	"1"	"1"					
Shrutika Devkar	"✓"	""	""	"10:00"	"10:55"	"56"	"1"					
Alishabanu Khan	"✓"	""	""	"10:04"	"10:55"	"52"	"1"					
Khanmohammadsadil	"✓"	""	""	"10:00"	"10:55"	"44"	"2"					
Mahek Khan	"✓"	""	""	"10:00"	"10:55"	"57"	"4"					
Naseem Khan	"✓"	""	""	"10:02"	"10:55"	"56"	"2"					
Sabina Khan	"✓"	""	""	"10:05"	"10:55"	"52"	"2"					
Bhumit Mahadik	"✓"	""	""	"10:39"	"10:55"	"17"	"1"					
Michelraj Nadar	"✓"	""	""	"10:00"	"10:55"	"56"	"1"					
Deepali Nijapkar	"✓"	""	""	"10:02"	"10:55"	"103"	"2"					
5 Others	"✓"	""	""	"10:06"	"10:54"	"49"	"1"					
Rozmin Panchi	"✓"	""	""	"10:00"	"10:55"	"56"	"2"					
Pratiksha Rane	"✓"	""	""	"10:01"	"10:55"	"55"	"1"					
Nadimahmed Shaikh	"✓"	""	""	"10:00"	"10:55"	"56"	"1"					
Saimasiddiqa Shaikh	"✓"	""	""	"10:03"	"10:55"	"53"	"1"					
Shamirunnisha Shaikh	"✓"	""	""	"10:00"	"10:55"	"56"	"1"					
Rani Singh	"✓"	""	""	"10:13"	"10:55"	"43"	"1"					
Gauri Vanniyar	"✓"	""	""	"10:00"	"10:55"	"56"	"1"					
Sakshi Vesvikar	"✓"	""	""	"10:04"	"10:55"	"52"	"1"					
Hemal Waghela	"✓"	""	""	"10:07"	"10:55"	"49"	"1"					
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Class – S.Y.B.Sc.

Year- 2021-22

SEMESTER III

PRACTICAL
Paper I, II & III
Date-30.11.2021

Syllabus-

- Estimation of RNA by Orcinol method
- BOD & COD

Duration – one hour

Attendance – enclosed

SEMESTER IV

Date- 12.02.2022

Syllabus-

- Determination of Km and Vmax
- Bioenergetics Problems

Duration – one hour

Attendance – enclosed

Dr. Ajitha Nair
Teacher In charge

Prof. Neeta Khanolkar
HOD

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Attendance for: **SYBSc CMB Sem 3 Remedial Micro Practical 21-22**

Date: "2021-11-30" "Time:" "12:01" "Meet ID:" "edd-kuxd-bfw"

Names	"2021-11-30"	"Email"	"Commen	"Arrival time	"Last Seen	"# of Chec	"Joined"
ansarijishan ansari	"✓"	""	""	"12:02"	"12:58"	"11"	"1"
aaditya asware	"✓"	""	""	"12:02"	"12:58"	"12"	"1"
shrutika devkar	"✓"	""	""	"12:02"	"12:11"	"10"	"1"
girish gautam	"✓"	""	""	"12:05"	"12:58"	"22"	"1"
sneha kamble	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
alishabanu khan	"✓"	""	""	"12:03"	"12:58"	"10"	"2"
khanmohammadsadik kh	"✓"	""	""	"12:02"	"12:58"	"11"	"1"
saniya khan	"✓"	""	""	"12:04"	"12:05"	"2"	"1"
bhumit mahadik	"✓"	""	""	"12:02"	"12:58"	"40"	"1"
michelraj nadar	"✓"	""	""	"12:02"	"12:58"	"12"	"1"
rozmin panchi	"✓"	""	""	"12:02"	"12:57"	"3"	"2"
alfia qureshi	"✓"	""	""	"12:02"	"12:33"	"4"	"2"
shamirunnisha shaikh	"✓"	""	""	"12:02"	"12:58"	"20"	"1"
umerabano siddique	"✓"	""	""	"12:07"	"12:07"	"1"	"1"
rani singh	"✓"	""	""	"12:03"	"12:04"	"2"	"1"
gauri vanniyar	"✓"	""	""	"12:18"	"12:18"	"1"	"1"
sakshi vesvikar	"✓"	""	""	"12:04"	"12:58"	"46"	"2"
pooja yadav	"✓"	""	""	"12:03"	"12:04"	"2"	"1"

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Attendance for: **SYBSc CMB sem 4 Remedial session for Microbiology Practical 21-22**

Date: "2022-02-12" "Time:" "7:59" "Meet ID:' "edd-kuxd-bfw"

Names	"2022-02-12"	"Email"	"Comment	"Arrival tir	"Last Seen	"# of Chec	"Joined"
aaditya asware	"✓"	""	""	"8:00"	"8:09"	"10"	"1"
akshada borhade	"✓"	""	""	"8:21"	"8:21"	"1"	"1"
bushra butt	"✓"	""	""	"8:00"	"8:09"	"10"	"1"
shrutika devkar	"✓"	""	""	"8:02"	"8:58"	"55"	"2"
girish gautam	"✓"	""	""	"8:06"	"8:58"	"53"	"1"
pooja yadav have	""	""	""				
ujwalkumar jaiswar	"✓"	""	""	"8:03"	"8:58"	"56"	"1"
alishabanu khan	"✓"	""	""	"8:02"	"8:58"	"57"	"2"
arshiya khan	"✓"	""	""	"8:02"	"8:10"	"9"	"1"
khanmohammadsadik khan	"✓"	""	""	"8:08"	"8:57"	"50"	"1"
mahek khan	"✓"	""	""	"8:03"	"8:31"	"29"	"2"
naseem khan	"✓"	""	""	"8:00"	"8:31"	"32"	"1"
sabina khan	"✓"	""	""	"8:11"	"8:58"	"19"	"1"
bhumit mahadik	"✓"	""	""	"8:02"	"8:58"	"58"	"2"
michelraj nadar	"✓"	""	""	"8:02"	"8:58"	"54"	"1"
neha potphode	"✓"	""	""	"8:01"	"8:58"	"31"	"1"
saimasiddiqa shaikh	"✓"	""	""	"8:08"	"8:35"	"28"	"1"
shamirunnisha shaikh	"✓"	""	""	"8:01"	"8:58"	"42"	"1"
rani singh	"✓"	""	""	"8:03"	"8:31"	"29"	"1"
gauri vanniyar	"✓"	""	""	"8:00"	"8:09"	"10"	"1"
sakshi vesvikar	"✓"	""	""	"8:02"	"8:58"	"57"	"1"
hemal waghela	"✓"	""	""	"8:05"	"8:58"	"54"	"1"
pooja yadav	"✓"	""	""	"8:06"	"8:31"	"26"	"1"

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Class – T.Y.B.Sc.

Year- 2021-22

SEMESTER V

THEORY

Paper II

Date- **30.09.21**

Syllabus- Unit I, II, III &IV

- Exo-toxins
- Endotoxins
- Immunoglobulins- classes
- MHC, Cytokines

Duration – one hour

Attendance – enclosed

SEMESTER VI

Date- **02.03.2022**

Syllabus- Unit I, II, III & IV

- Meningococcal meningitis
- Mechanisms of drug resistance
- Primary and Secondary response
- Complement system - pathways

Duration – one hour

Attendance – enclosed

Prof. Rekha Bhatia
Teacher In charge

Prof. Neeta Khanolkar
HOD

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Attendance for:	REMEDIAL LECTURE		SEM 5	MICROBIOLOGY PAPER 2				
Date:	"2021-09-30"	"Time:"	"11:09"	"Meet ID:"	"ncc-gutg-ojx"			
Names	"2021-09-30"	"Email"	"Comment	"Arrival tin	"Last Seen	"# of Chec	"Joined"	"Details"
Trupti Deolekar	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Sakshi Gaikwad	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Misbah Khan	"✓"	""	""	"11:09"	"11:48"	"41"	"2"	"11:34 (15 11:09 (26min) [11:34]
Vaishali Kori	"✓"	""	""	"11:09"	"11:48"	"2"	"1"	
Siddhi Londhe	"✓"	""	""	"11:09"	"11:48"	"9"	"1"	
Shubham More	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Hemlata Nayak	"✓"	""	""	"11:09"	"11:40"	"32"	"1"	
7 Others	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Aarti Parab	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Ganesh Patil	"✓"	""	""	"11:09"	"11:09"	"1"	"1"	
Rutuja Patil	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Aditya Prajapati	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Vaishnavishantaramra	"✓"	""	""	"11:09"	"11:09"	"1"	"1"	
Raswathi Ramesh	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Sumitra Rane	"✓"	""	""	"11:09"	"11:48"	"40"	"1"	
Karishma Shete	"✓"	""	""	"11:09"	"11:09"	"1"	"1"	
Sumit Singh	"✓"	""	""	"11:09"	"11:09"	"1"	"1"	
Ankit Tiwari	"✓"	""	""	"11:09"	"11:49"	"3"	"1"	

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Attendance for:	**REMEDIAL LECTURE**		SEM 6	MICROBIOLOGY PAPER 2				
Date:	**"2022-03-02"**	"Time:"	"9:04"	"Meet ID:"	"tbg-rmmj-fjh"			
Names	"2022-03-02"	"Email"	"Comment	"Arrival tir	"Last Seen	"# of Chec	"Joined"	"Details"
Trupti Deolekar	"✓"	""	""	"9:04"	"9:54"	"23"	"2"	"9:38 (17n 9:04 (6min) [9:09]
Sakshi Gaikwad	"✓"	""	""	"9:04"	"10:01"	"58"	"1"	
Misbah Khan	"✓"	""	""	"9:04"	"9:48"	"33"	"2"	"9:04 (32n 9:48 (1min) [9:48]
Vaishali Kori	"✓"	""	""	"9:04"	"9:51"	"41"	"4"	"9:41 (11n 9:52 (10mi 9:04 (10mi 9:15 (10min) [9:40]
6 Others	"✓"	""	""	"9:04"	"9:47"	"55"		
7 Others	"✓"	""	""	"9:04"	"9:51"	"56"	"1"	
Aarti Parab	"✓"	""	""	"9:04"	"9:31"	"28"	"1"	
Ganesh Patil	"✓"	""	""	"9:04"	"9:47"	"16"	"3"	"9:17 (4mi 9:04 (4min 9:20 (1min) [9:20]
Rutuja Patil	"✓"	""	""	"9:04"	"10:01"	"58"	"3"	"9:04 (4mi 9:07 (6min 9:41 (9min) [10:01]
Aditya Prajapati	"✓"	""	""	"9:04"	"10:01"	"53"	"2"	"9:04 (41n 9:47 (14min) [10:00]
Vaishnavishantaramramane Rama	"✓"	""	""	"9:04"	"9:58"	"21"	"2"	"9:04 (48n 9:52 (8min) [10:01]
Raswathi Ramesh							"1"	
Sumitra Rane							"2"	"9:50 (10n 9:04 (6min) [9:47]
Nitesh Sharma	"https://tinyurl.com/y5peu3nk"						"1"	
Karishma Shete	https://tinyurl.com/y6k2yqts						"1"	
Sneha Singh							"3"	"9:58 (4mi 9:04 (7min 9:17 (10min) [9:58]

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Class – T.Y.B.Sc.

Year- 2021-22

SEMESTER V

THEORY
Paper III
Date- 17.12.2021

Syllabus- Unit I, II, III &IV

- Methods to study solute transport
- Bacterial ETC
- Anaplerotic reactions
- Acetone Butanol and Butanediol fermentation

Duration –one hour

Attendance – enclosed

SEMESTER VI

Date- 22.02.2022

Syllabus- Unit I, II, III & IV

- Anabolism of palmitic acid and Energetics of Beta oxidation of fatty acids
- Fermentation of single amino acids
- Repression and induction
- Assimilation of Ammonia

Duration – one hour

Attendance – enclosed

Dr. Ajitha Nair
Teacher in-charge

Prof. Neeta Khanolkar
HOD

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21/31

Attendance for: **Sem 5 TYBSc Remedial lecture sem 5 Microbiology Paper III**

Date: "2021-12-17" "Time:" "11:30" "Meet ID:" "tbg-rmmj-fjh"

Names	"2021-12-17"	"Email"	"Comments"	"Arrival time"	"Last Seen"	"# of Checks	"Joined"
trupti deolekar	"✓"	""	""	"11:31"	"12:20"	"4"	"2"
sakshi gaikwad	"✓"	""	""	"11:41"	"12:20"	"6"	"1"
misbah khan	"✓"	""	""	"12:18"	"12:20"	"3"	"1"
vaishali kori	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
siddhi londhe	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
ajitha nair	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
hemlata nayak	"✓"	""	""	"11:31"	"12:20"	"4"	"2"
8 others	"✓"	""	""	"11:31"	"12:20"	"50"	"1"
ganesh patil	"✓"	""	""	"11:31"	"11:45"	"3"	"1"
rutuja patil	"✓"	""	""	"11:31"	"12:20"	"3"	"2"
aditya prajapati	"✓"	""	""	"11:31"	"12:20"	"36"	"1"
vaishnavishantaran	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
raswathi ramesh	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
sumitra rane	"✓"	""	""	"11:31"	"12:20"	"3"	"1"
nitesh sharma	"✓"	""	""	"11:31"	"12:20"	"3"	"1"
karishma shete	"✓"	""	""	"11:53"	"12:20"	"5"	"1"
sneha singh	"✓"	""	""	"11:31"	"12:20"	"3"	"1"
sumit singh	"✓"	""	""	"12:19"	"12:20"	"2"	"1"
yash tarfe	"✓"	""	""	"11:31"	"12:20"	"29"	"1"

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Attendance for: **21-22 TYBSc sem 6 Remedial lecture Microbiology Paper III**

Date: "2022-02-22" "Time:" "7:53" "Meet ID:" "tbg-rmmj-fjh"

Names	"2022-02-22"	"Email"	"Comments"	"Arrival time"	"Last Seen"	"# of Checks"	"Joined"
trupti deolekar	"✓"	""	""	"8:08"	"8:08"	"1"	"1"
sakshi gaikwad	"✓"	""	""	"8:05"	"8:08"	"4"	"1"
vaishali kori	"✓"	""	""	"8:03"	"8:08"	"6"	"1"
siddhi londhe	"✓"	""	""	"8:04"	"8:08"	"5"	"1"
5 others	"✓"	""	""	"8:08"	"8:57"	"16"	"1"
6 others	""	""	""				
7 others	""	""	""				
ganesh patil	"✓"	""	""	"8:02"	"8:22"	"21"	"1"
aditya prajapati	"✓"	""	""	"7:58"	"8:08"	"11"	"1"
vaishnavishantara	"✓"	""	""	"8:00"	"8:57"	"10"	"1"
nitesh sharma	"✓"	""	""	"8:01"	"8:22"	"22"	"1"

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Class – T.Y.B.Sc.

Year- 2021 - 22

SEMESTER V

THEORY
Paper AC-
Date- 07-08 -2021
Syllabus- Unit I, II, III &IV

- Aquaculture
- Emerging preservation technology

Duration – one hours
Attendance – enclosed

SEMESTER VI

Date- 13-01-22

Syllabus- Unit I, II, III & IV

- Transgenic animals
- Food standard and laws
- Packaging

Duration – one hours

Attendance – enclosed

DSKhedekar

Prof. Deepali Kheddekar
Teacher In charge

NKhanolkar

Prof. Neeta Khanolkar
HOD

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Attendance class-list Remedial Lecture Sem 5 Applied Component Paper

Date:	"2021-08-07"	"Time:"	"11:04"	"Meet ID:"	"sfr-fkxr-rcb"						
Names	"2021-08-07"	"Email"	"Commen	"Arrival tir	"Last Seen	"# of Chec	"Joined"	"Details"			
Trupti Deo	"✓"	""	""	"11:06"	"11:56"	"51"	"1"				
Sakshi Gaik	"✓"	""	""	"11:04"	"11:56"	"52"	"1"				
Misbah Kha	"✓"	""	""	"11:04"	"11:56"	"87"	"2"	"11:04 (53	11:19 (34min) [11:56]		
Shubham N	"✓"	""	""	"11:06"	"11:56"	"51"	"1"				
Hemlata Na	"✓"	""	""	"11:04"	"11:56"	"55"	"2"	"11:04 (53	11:29 (2min) [11:56]		
Deepali Nij	"✓"	""	""	"11:06"	"11:56"	"101"	"2"	"11:07 (50	11:06 (51min) [11:56]		
Aarti Parab	"✓"	""	""	"11:05"	"11:56"	"52"	"1"				
Ganesh Pat	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Rutuja Pati	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Aditya Praj	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Vaishnavisl	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Raswathi R	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Sumitra Ra	"✓"	""	""	"11:04"	"11:56"	"55"	"2"	"11:52 (2n	11:04 (53min) [11:56]		
Nitesh Shai	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Sneha Sing	"✓"	""	""	"11:06"	"11:56"	"51"	"1"				
Sumit Singl	"✓"	""	""	"11:04"	"11:56"	"53"	"1"				
Yash Tarfe	"✓"	""	""	"11:04"	"11:56"	"60"	"2"	"11:21 (7n	11:04 (53min) [11:56]		
Ankit Tiwar	"✓"	""	""	"11:06"	"11:56"	"61"	"2"	"11:16 (10	11:06 (51min) [11:56]		
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Attendance for:	Class List	Remedial Lecture		Sem 6	Applied Component paper								
Date:	"2022-01-13"	"Time:"	"9:06"	"Meet ID:"	"tbg-rmmj-fjh"								
Names	"2022-01-13"	"Email"	"Comment	"Arrival tir	"Last Seen	"# of Chec	"Joined"	"Details"					
Trupti Deolekar	"✓"	""	""	"9:06"	"9:55"	"30"	"1"						
Sakshi Gaikwad	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
Misbah Khan	"✓"	""	""	"9:06"	"9:55"	"22"	"2"	"9:55 (1mi	9:06 (21min) [9:26]				
Vaishali Kori	"✓"	""	""	"9:06"	"9:55"	"50"	"2"	"9:06 (46n	9:52 (4min) [9:55]				
Siddhi Londhe	"✓"	""	""	"9:06"	"9:55"	"37"	"1"						
Shubham More	"✓"	""	""	"9:06"	"9:55"	"50"	"1"						
Hemlata Nayak	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
Deepali Nijapkar	"✓"	""	""	"9:07"	"9:26"	"39"	"2"	"9:07 (20n	9:08 (19min) [9:26]				
Aarti Parab	"✓"	""	""	"9:06"	"9:26"	"21"	"1"						
Ganesh Patil	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
Rutuja Patil	"✓"	""	""	"9:06"	"9:55"	"29"	"2"	"9:06 (20n	9:47 (9min) [9:55]				
Aditya Prajapati	"✓"	""	""	"9:06"	"9:55"	"42"	"2"	"9:06 (34n	9:39 (8min) [9:55]				
Vaishnavishantaram	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
Raswathi Ramesh	"✓"	""	""	"9:06"	"9:55"	"33"	"2"	"9:06 (30n	9:35 (3min) [9:55]				
Sumitra Rane	"✓"	""	""	"9:06"	"9:55"	"42"	"1"						
Nitesh Sharma	"✓"	""	""	"9:06"	"9:55"	"31"	"4"	"9:49 (7mi	9:06 (8min	9:31 (1min	9:10 (15min) [9:26]		
Karishma Shete	"✓"	""	""	"9:06"	"9:55"	"50"	"1"						
Sneha Singh	"✓"	""	""	"9:06"	"9:55"	"50"	"1"						
Sumit Singh	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
Yash Tarfe	"✓"	""	""	"9:06"	"9:55"	"50"	"1"						
Ankit Tiwari	"✓"	""	""	"9:06"	"9:55"	"23"	"1"						
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26/31

Class – T.Y.B.Sc.

Year- 2021-2022

SEMESTER V

PRACTICAL
Paper – I, II, III & IV
Date- **16.09.2021**
Syllabus- Unit I, II, III &IV

- Replica plate technique
- Identification of pathogens- *S.aureus, E.coli*

Duration – one hour
Attendance – enclosed

SEMESTER VI

Date- **16.03.2022 to 19.03.2022**

Syllabus- Unit I, II, III & IV

- Bioassay of penicillin & vitamin B12
- MBC, Phage Assay

Duration – three hours

Attendance – enclosed

Rekha Bhatia

Prof. Rekha Bhatia &
Prof. Sabina Thareja
Teacher In charge

N Khanolkar

Prof. Neeta Khanolkar

HOD

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Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031.

Attendance for:	**REMEDIAL**	SEM 5	PRACTICAL		MICROBIOLOGY P2			
Date:	**"2021-09-16"**	"Time:"	"12:17"	"Meet ID:"	"ssd-hitn-agm"			
Names	"2021-09-16"	"Email"	"Comment	"Arrival tin	"Last Seen	"# of Chec	"Joined"	"Details"
Trupti Deolekar	" ✓"	""	""	"12:02"	"12:57"	"5"	"2"	"12:07 (4n 12:02 (1min) [12:02]
Sakshi Gaikwad	" ✓"	""	""	"12:02"	"12:57"	"50"	"2"	"12:02 (9n 12:17 (41min) [12:57]
Misbah Khan	" ✓"	""	""	"12:02"	"12:57"	"12"	"1"	
Siddhi Londhe	" ✓"	""	""	"12:02"	"12:57"	"4"	"1"	
Hemlata Nayak	" ✓"	""	""	"12:02"	"12:57"	"14"	"1"	
Aarti Parab	" ✓"	""	""	"12:02"	"12:57"	"42"	"2"	"12:02 (1n 12:17 (41min) [12:57]
Ganesh Patil	" ✓"	""	""	"12:02"	"12:57"	"34"	"1"	
Rutuja Patil	" ✓"	""	""	"12:02"	"12:57"	"26"	"2"	"12:44 (3n 12:02 (23min) [12:43]
Aditya Prajapati	" ✓"	""	""	"12:02"	"12:57"	"50"	"1"	
Vaishnavishantaramr.	" ✓"	""	""	"12:02"	"12:57"	"31"	"1"	
Raswathi Ramesh	" ✓"	""	""	"12:02"	"12:57"	"12"	"2"	"12:02 (9n 12:20 (3min) [12:57]
Sumitra Rane	" ✓"	""	""	"12:02"	"12:57"	"5"	"3"	"12:02 (2n 12:56 (2mi 12:22 (1mi
Nitesh Sharma	" ✓"	""	""	"12:02"	"12:57"	"7"	"1"	
Sneha Singh	" ✓"	""	""	"12:02"	"12:57"	"5"	"3"	"12:02 (1n 12:38 (3mi 12:17 (1mi
Sumit Singh	" ✓"	""	""	"12:02"	"12:57"	"4"	"1"	
Yash Tarfe	" ✓"	""	""	"12:02"	"12:57"	"50"	"2"	"12:32 (26 12:02 (24min) [12:31]
Ankit Tiwari	" ✓"	""	""	"12:02"	"12:57"	"4"	"1"	

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S.I.W.S. NR Swamy College of Commerce Economics & Smt. Thirumalai College of Science

Wadala, Mumbai – 400037

Subject – Microbiology

Remedial :
Sem 6 (Practical)
Microbiology
(offline)

Class: T.Y.B.Sc Division: – Batch 1

Teacher in Charge Rekha Bhatia & Sabina Thareja

Roll No.	Students Name	18/3/22	12/3/22	14/3/22	15/3/22	16/3/22	17/3/22	19/3/22
9201	Deolekar Trupti Vilas	AB		A			A	A
9202	Gaikwad Saakshi Sanjay							
9203	Khan Misbah Wajahat							
9204	Kori Vaishali Vijaybhahadhur							
9205	Londhe Siddhi Santosh			A				
9206	More Shubham Ganesh							
9207	Nayak Hemlata Ramavtar							
9208	Parab Aarti Gopal							
9209	Patil Ganesh Mahesh							
9210	Patil Rutuja Jitendra							
9211	Prajapati Aditya Deviprasad							
9212	Ramane Vaishnavi Shantaram							
9213	Ramesh R. Aswathi Ramesh							
9214	Rane Sumitra Santosh	AB	A				A	
9215	Sharma Nitesh Rajkumar	AB				A	A	
9216	Shete Karishma Chandrakant		A	A				
9217	Sinhg Sneha Ambrej			A			AB	
9218	Singh Sumit Shivsagar							
9219	Tarfe Yahs Anil	AB					AB	
9220	Tiwari Ankit Shobnath	AB	A	AB		AB		

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Remedial Remedial Remedial

Class – T.Y.B.Sc.

Year- 2021 - 22

SEMESTER VI

PRACTICAL
Paper AC- Practical
Date- **23.03.22**

TOPICS

- Adulteration of food
- Lycopene extraction

Duration – one hour
Attendance – enclosed

Prof. Neeta Khanolkar
Teacher In charge

Prof. Neeta Khanolkar
HOD

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Commerce & Economics &
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031.

30/31

S.I.W.S. NR Swamy College of Commerce Economics & Smt. Thirumalai College of Science
Wadala, Mumbai – 400037
Subject – Microbiology

Class: T.Y. B.Sc. Division: _____ Batch T.Y. BSC Sem(6) Offline

Teacher in Charge A/C Practical Neeta Khanolkar

Roll No									
9201				A					
9202									
9203									
9204				A					
9205				A					
9206									
9207									
9208				A					
9209									
9210									
9211									
9212									
9213									
9214			A						
9215			A	A					
9216									
9217				A					
9218									
9219									
9220			A	A					

VPK 21/3/22 VPK 22/03/22 VPK 25/03/22

Revised

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Department of Physics

Youtube links: (for theory as well as practical)

1. Use of Vernier Callipers : https://www.youtube.com/watch?v=FG2jucZ5NVk
2. Use of Vernier Callipers : http://amrita.olabs.edu.in/?sub=1&brch=5&sim=16&cnt=4
3. Use of Screw Guage : https://www.youtube.com/watch?v=7g_JE9dxEuw
4. Use of Screw Guage : https://www.youtube.com/watch?v=11EM0nZUdqE
5. Use of spectrometer : https://vlab.amrita.edu/?sub=1&brch=281&sim=1508&cnt=4
6. HOW TO USE CRO : https://www.youtube.com/watch?v=Lanpw4Ry8xc
7. WORKING OF CRO : https://www.youtube.com/watch?v=U1amW7S1fcI
8. Use of Breadboard : https://www.youtube.com/watch?v=fCoqizjnLKI
9. Use of Breadboard : https://www.youtube.com/watch?v=W6mixXsn-Vc
10. WORKING OF IC 555 MULTIVIBRATORS: https://www.youtube.com/watch?v=8Z7kTCSZG5E
11. Laser Diffraction Grating Experiment : https://www.youtube.com/watch?v=pmmjgbwgon8
12. Working of astable multivibrator using op-amp : https://www.youtube.com/watch?v=jVQ9Jg46W74
13. Use of 8085 kit : https://www.youtube.com/watch?v=uvupli4nik8&t=23s
14. Use of 8085 kit : https://www.youtube.com/watch?v=xJSa_o3cosA
15. https://youtu.be/ukGLH_NrFH8
16. https://youtu.be/YEERJJQCoTw
17. https://youtu.be/Aoi4j8es4gQ
18. https://youtu.be/O6g-7rUgrdg

Anagha Bapat
Department of Physics
Date: 24th December 2021

Dr. Usha Iyer
Principal

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Wadala, Mumbai 400 031

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AND
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Major R. Parameshwaran Marg, Wadala, Mumbai - 400 031

CHEMISTRY DEPARTMENT
You tube Links

THEORY

1.MOLECULAR ORBITAL THEORY

https://youtu.be/H3QPImW9dpE

2. MOLECULAR SYMMETRY

https://youtu.be/jVrz8IYSa3E?t=7

https://www.youtube.com/watch?v=5iBsE2cfBJ8

https://youtu.be/wtD8JVRCxwE

3. MOT for Heteronuclear diatomic molecules

https://www.youtube.com/watch?v=IYvT3PNsO

4. Hybridization of Carbon

sp3 Hybridization

https://youtu.be/J9oNPj_GAws

sp2 Hybridization

https://youtu.be/dX6uNLCYhhQ

sp Hybridization

https://youtu.be/i9pFxmUViTs

Complete
https://youtu.be/8VBs_xf7yLs
https://youtu.be/K914ZDu5giU

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5.Hybridization of Nitrogen

sp3 Hybridization

https://youtu.be/dI9M_sw28HE

https://youtu.be/Wj6h2h--5E8

https://youtu.be/NpbHqSl6g-E

6. Hybridization of Oxygen

sp3 Hybridization

https://youtu.be/0c1hJs5cdT4

https://youtu.be/lMlibdPyNwI

sp2 Hybridization

https://youtu.be/LxDXnFy75I8

https://youtu.be/IdzypUy-_4E

7. Sigma & Pi Bonds

https://youtu.be/jPUb8AHWK-s

https://youtu.be/pT8nrBrTOm4

8. General Introduction to Drugs is as below:
https://youtu.be/LTT5CDuPTk4

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PRACTICAL

1. **Estimation of Chemical Oxygen Demand of Water: Reflux Condensor**
   https://youtu.be/_SzYqPdUkFQ
2. **Flame Photometry : How to use a Flame Photometer**
   https://youtu.be/tzloYQxLAkQ
3. **Calibration of a Turbidity meter**
   https://youtu.be/PCsWGxsZWoQ
4. **How to use a Spectrophotometer**
   https//youtu.be/EvDwmgSbnnk
5. **Nickel DMG**

   https://youtu.be/11rmnlepvMk?list=PLuu-p4jamfgiO7YXbrrOj1XHQK3rEnwA3
6. **Complexometric estimation of Barium**

   https://youtu.be/42WPj0REtNs?t=4
7. **Chemistry Apparatus**

   https://youtu.be/chODOKSPJS4

   https://youtu.be/3Fo09_v0Zz8
8. **Lab Safety**

   https://youtu.be/nTEw9UJ7_R8

   https://youtu.be/BRDApYgvDqQ

   https://youtu.be/gi3DeFY0cfw

   https://youtu.be/nsGp4ztkjtk
9. **Hazards Signs**

   https://youtu.be/KX9qzn8lkl4

   https://youtu.be/7nUdB3YcgSM

   https://youtu.be/IwAfLQdsbSk
10. **Titrations/Complexometric**

    https://youtu.be/wRAo-M8xBHM

    https://youtu.be/sFpFCPTDv2w

    https://youtu.be/IjNNZvxOw0g

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11. Preparations

1) Cyclohexanone Oxime

https://youtu.be/NeMOZlGRYt0

https://youtu.be/74KulYqfXTY

2) Glucosazone of Glucose

https://youtu.be/P7s675HVEWg

https://youtu.be/QWv4uYM00iE

3) Tribromoaniline from Aniline

https://youtu.be/iaOluWpua9w

https://youtu.be/hZiWD2nLanI

4) Phthalic anhydride

https://youtu.be/I9-TmMoO-yw

5) Acetanilide from Aniline

https://youtu.be/dQX77yEkZqk

6) Bromination of Acetanilide

https://youtu.be/1pgAFSB_E2I

7) Iodoform Preparation

https://youtu.be/RDfE1V7kb84

Dr. Sunita D. Shirvalkar
Head, Department of Chemistry
Date: 21/10/2021

Dr. Usha Iyer
Principal
PRINCIPAL
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Department of Microbiology

Microbiology Theory & Practical YouTube links

	F.Y.BSc Theory
cell organelle	https://www.youtube.com/watch?v=tO-W8mvBa78
nucleus	https://www.youtube.com/watch?v=8yLNC2BPnyM
chloroplast	https://www.youtube.com/watch?v=eOPEn2qYff4
	F.Y.BSc Practicals
Spore Staining	https://youtu.be/4tylE4f-kM0
Effect of UV rays	https://youtu.be/z4qrnMlhbpE
Metachromatic granule staining	https://youtu.be/YE9iGvG7UWo
	S.Y.BSc Theory
Gold nanoparticles	https://youtu.be/urmi99jQ5ZY
Simple galvanic replacement method	https://youtu.be/KdYWfaU54uA
Quorum sensing	https://youtu.be/mQ43fuJJW7M
	S.Y.BSc Practicals
COD -	https://www.youtube.com/watch?v=-oz7MPvzId4
Identification of bacteria	https://www.youtube.com/watch?v=yJY5vkcvwKM
Differential Blood staining --	https://www.youtube.com/watch?v=Y27TvaJMKRE
	T.Y.BSc Theory
Bioprocess Technology 1	https://www.youtube.com/watch?v=39LNa3KLrLw&list=PLXBkrgHl6u72Wpcyn7NVsHuNzw7sGyVoa
Bioprocess Technology 2	https://www.youtube.com/watch?v=hosgQawR9hU&list=PLXBkrgHl6u72Wpcyn7NVsHuNzw7sGyVoa&index=2
Bioreactor	https://www.youtube.com/watch?v=AXBK99GUNJg&list=PLXBkrgHl6u72Wpcyn7NVsHuNzw7sGyVoa&index=3
	T.Y.BSc Practicals
Fermentation of alcohol	https://youtu.be/yTnQrh36S58
Primary screening of antibiotic producers	https://youtu.be/Wf4BBYmQD_g
Isolation of genomic DNA	https://youtu.be/tcPgdR9_t64

Neeta Khanolkar
Department of Microbiology
Date: 24th December 2021

Dr. Usha Iyer
Principal

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AND
Smt. THIRUMALAI COLLEGE OF SCIENCE
PLOT NO. 337, SEWRI-WADALA ESTATE,
MAJOR R. PARMESHWARAN MARG, WADALA,
MUMBAI 400031

Department of Commerce

Youtube links

1. **Concept of Strategic Management :** https://www.youtube.com/watch?v=HQ6348u6o08
2. **Fundamentals of Financial Management :** https://www.youtube.com/watch?v=CCQwz_Gwo6o
3. **Export Marketing Documentation :** https://www.youtube.com/watch?v=Ib09slI9CMI
4. **Human Resource Management :** https://www.youtube.com/watch?v=A2HFusWQIeE
5. **E-Commerce :** https://www.youtube.com/watch?v=spbTx7mCJBU
6. **Kind of Markets :** https://www.youtube.com/watch?v=vz_smaQUkIo
7. **EOU :** https://www.youtube.com/watch?v=jDd8vkxHIFc
8. **Types of Organisation :** https://www.youtube.com/watch?v=R_p9wnBV9v0
9. **Management Accounting :** https://www.youtube.com/watch?v=9XTrTqOBtN0
10. **Mathematics and Statistics :** https://www.youtube.com/watch?v=d40UyLW8ook

CA Vaibhav Banjan
Vice Principal - Commerce
December 24, 2021

Dr. Usha Iyer
Principal
PRINCIPAL
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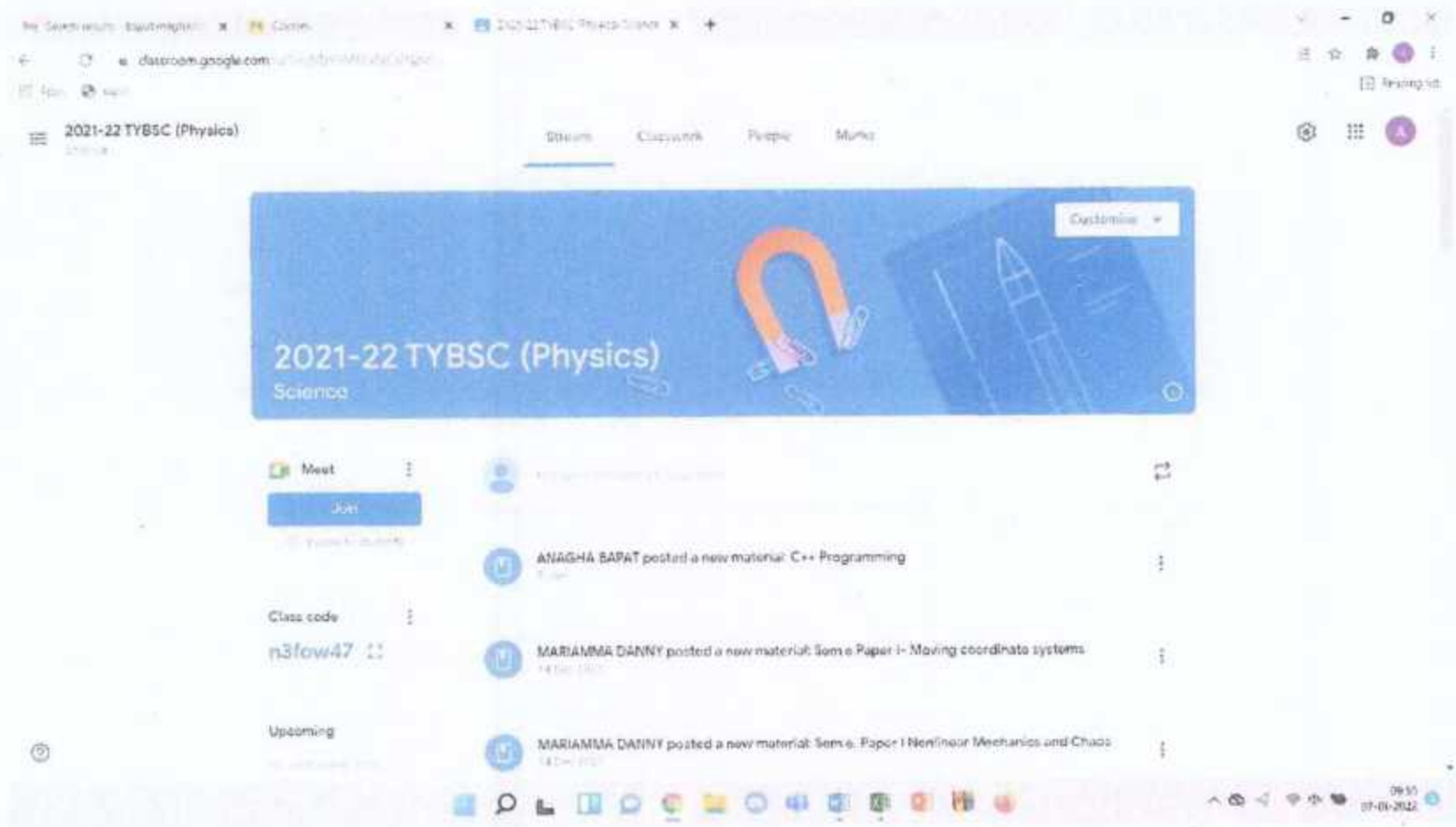
Smt. Thirumalai College of Science,
Wadala, Mumbai - 400 031

TYBSc Physics classroom



PRINCIPAL
B.I.W.S. N.R. Swamy College of
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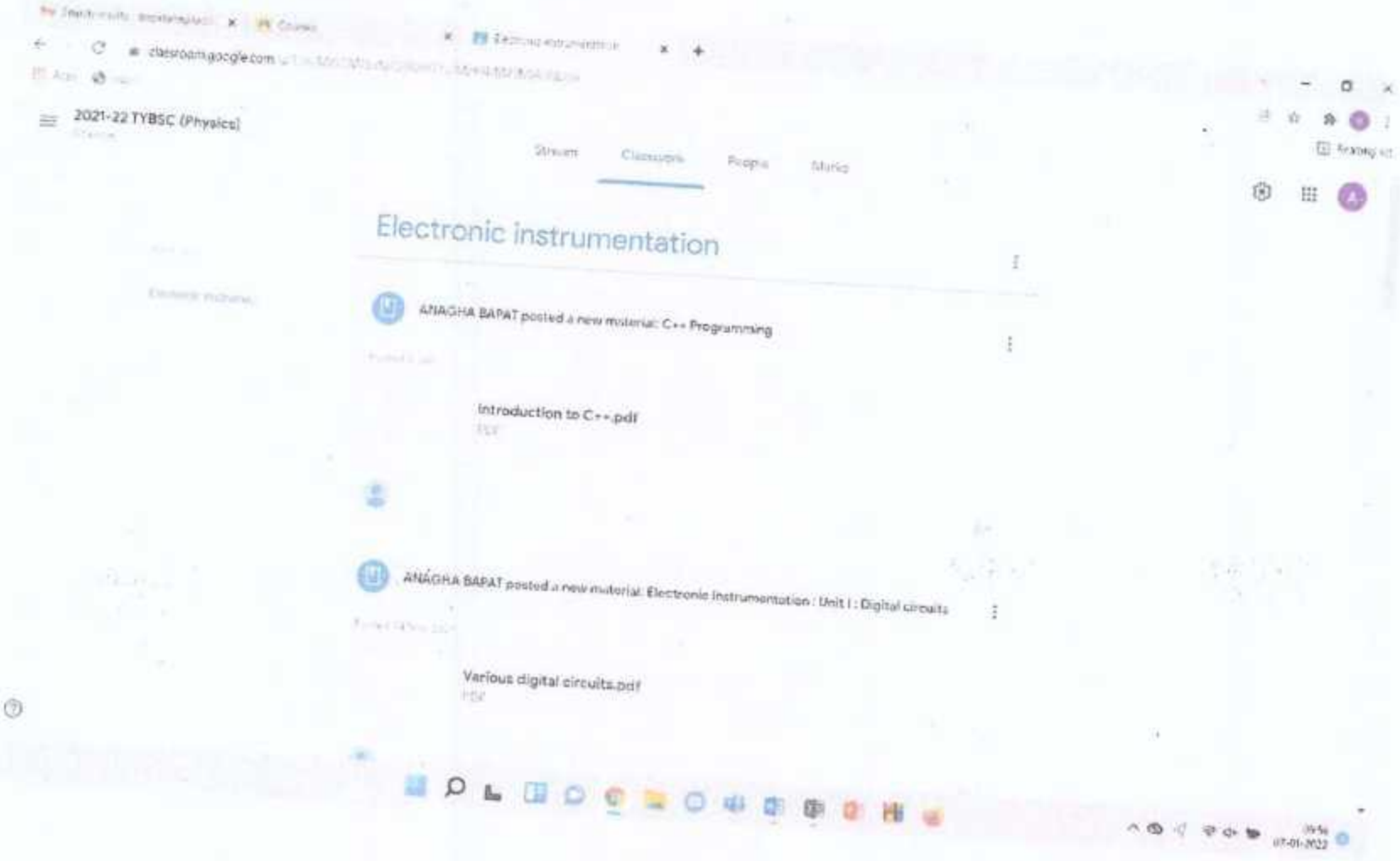
Thirumalai College of Science
Vadala, Mumbai-400 031.

Study Material shared in classwork



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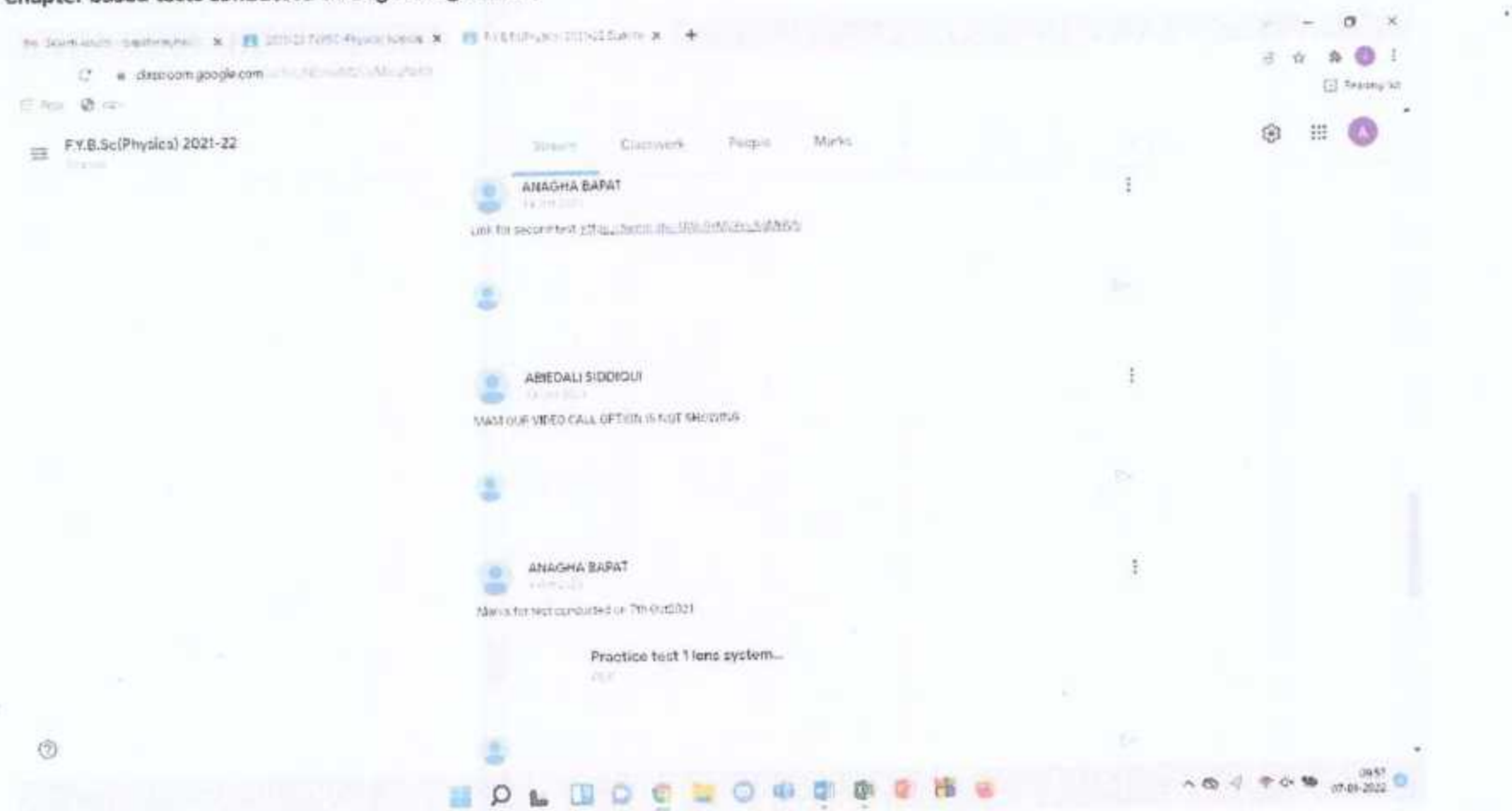
Thirumalai College of Science
Wadala, Mumbai-400 031

Chapter based tests conducted through Google forms



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Thirumalai College of Science
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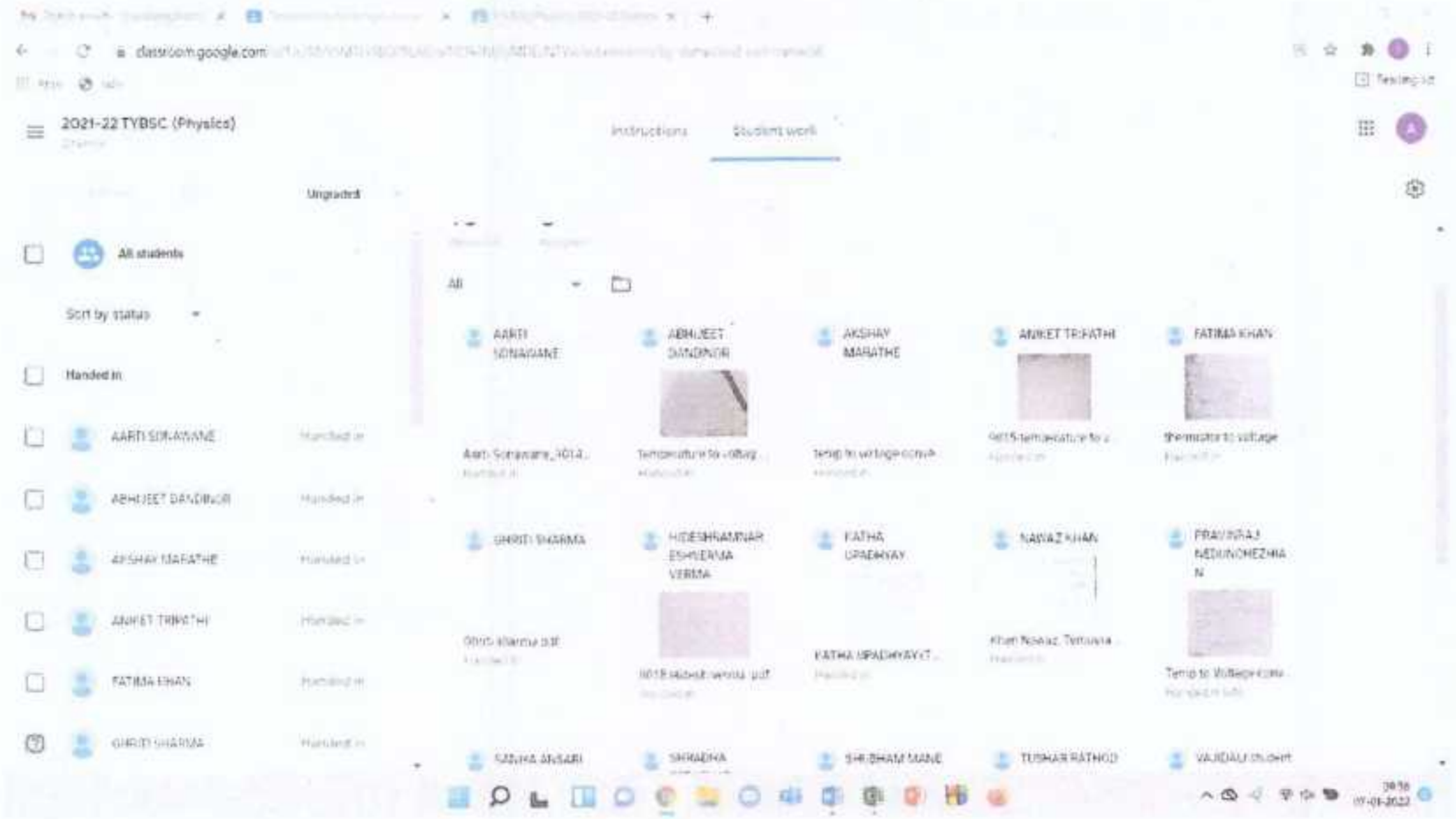
Submission of assignments & practical work by students



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Thirumala College of Science
Wadala, Mumbai-400 031