



**TELANGANA SOCIAL WELFARE RESIDENTIAL  
DEGREE COLLEGE FOR WOMEN, MANCHERIAL,  
DIST: MANCHERIAL-504208**

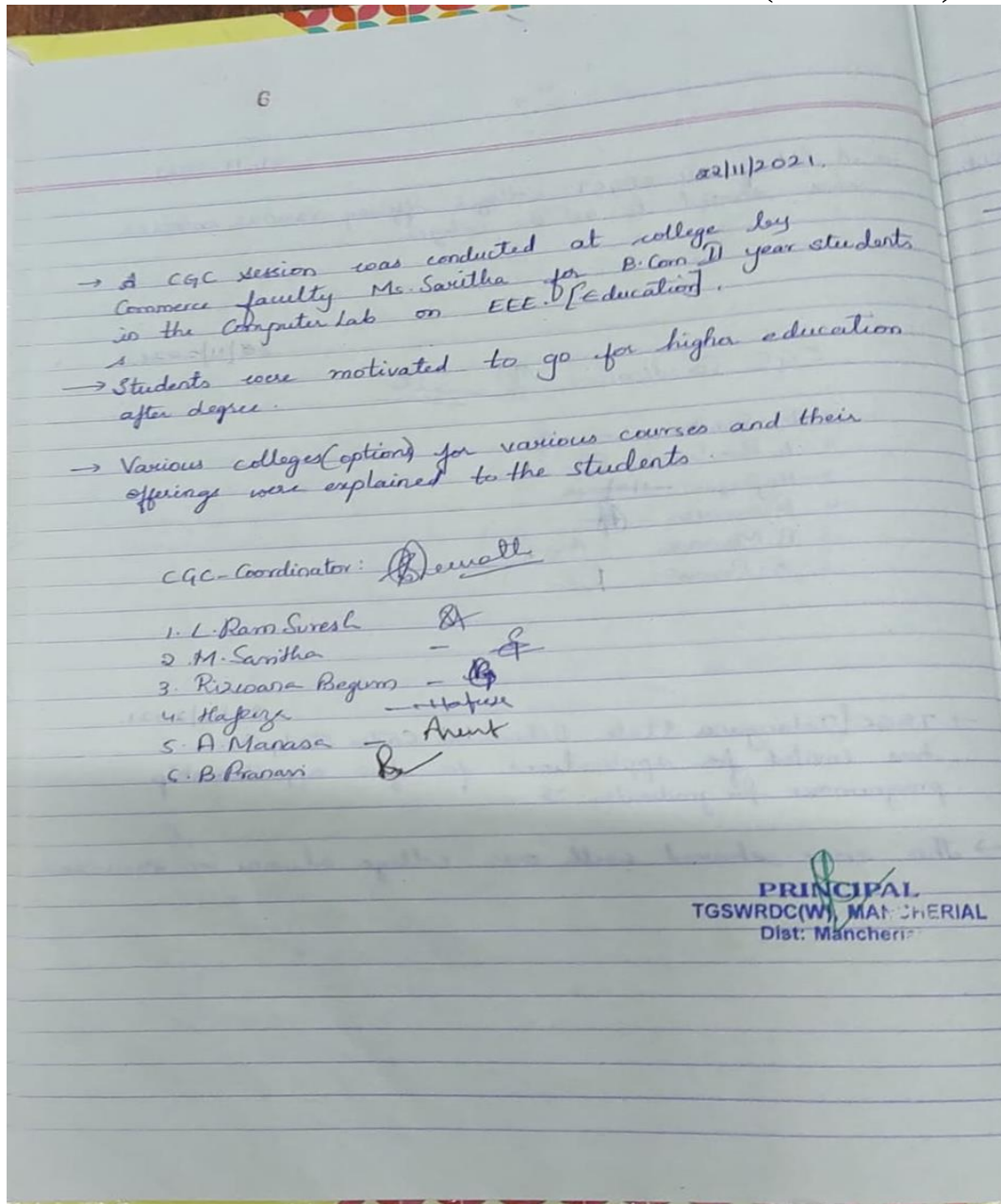


**(Affiliated to Kakatiya University, College Code: 635)**

**Sumathi**  
**M.A. (Ph.D)**  
**Principal**

**Mobile: 7995010674**  
**E-mail: Prl-rdcw-mncrl-swrs@telangana.gov.in**

**CAREER GUIDANCE (2021-22)**





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22/11/2021

TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1.	Borabi Roy	B.com(CA)-II	Borabi Roy
2.	B. Abanbsha	"	Abanbsha
3.	D. Anjali	"	D. Anjali
4.	D. Shirani	"	D. Shirani
5.	N. Navaneetha	"	N. Navaneetha
6.	D. Indira	"	Indira
7.	D. Pravalika	"	Pravalika
8.	D. Sulochana	"	Sulochana
9.	C. Supraja	"	C. Supraja
10.	E. Shyamala	"	E. Shyamala
11.	G. Ramadevi	"	Ramadevi
12.	G. Nibhika	"	Nibhika
13.	J. Bharathi	"	Bharathi
14.	J. Krishnaveni	"	J. Krishnaveni
15.	J. Anusha	"	Anusha
16.	K. Anjali	"	K. Anjali
17.	K. Poojitha	"	Poojitha
18.	K. Pavani	"	Pavani
19.	M. Vanitha	"	Vanitha
20.	M. Shyamala	"	Shyamala
21.	P. Sneha	"	P. Sneha
22.	P. Tejaswini	"	P. Tejaswini
23.	R. Harshitha	"	R. Harshitha
24.	S. Abshaya	"	Abshaya
25.	S. Sushmitha	"	Sushmitha
26.	M. Sushmitha	"	Sushmitha

**PRINCIPAL**  
**PRINCIPAL**  
TSWRDC(W), MANCHERIAL



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13  
4<sup>th</sup> Feb, 2022 ✓

→ TISSNET & APUNET-2022 institutional level screening  
Circular issued - 29-01-22  
Circular posted in CGC - 30<sup>th</sup>-01-2022.

→ HO requested to furnish the details of TISSNET & APUNET  
interested candidates in prescribed format by 01-02-2022.

→ 3 students & 2 from BA  
01 from B.Com(CA) have applied for TISSNET

→ Details submitted to HO through the provided Google link  
in the circular on 01-02-2022.

\* Screening test to be conducted on 04<sup>th</sup> Feb 2022.

Due to some reasons TISSNET & APUNET institution  
level screening is postponed.

CGC Co-ordinator Sumathi

1. M. Saritha - <u>S</u>	G. Hafeeza - <u>Hafeeza</u>
2. L. Ram Suresh - <u>R</u>	S. A. Manasa - <u>Manasa</u>
3. Rizwana - <u>R</u>	G. B. Pranavi - <u>B</u>

Students applied for TISSNET

1. Avunuri Prasanna, SC-Madiga, Political Science. Prasanna
2. Jakkula Alekhya, B.C.D, " - Alekhya
3. Bodduna Rajitha, B.C.(Padma shali), Rural-Development Rajitha
4. Jodi Saraswati, SC(Nelthakani), Political Science - Saraswati

B  
PRINCIPAL



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## TISSNET 2024 Sectional Weightage

The table below indicates a section-wise break-up of questions and difficulty level of TISSNET exam:

Subject	Questions per section	Difficulty Level
General Awareness	40 MCQs	Moderate to Difficult
English Proficiency	30 MCQs	Moderate
Mathematical Skills and Logical Reasoning	30 MCQs	Easy
<b>Total</b>	<b>100 MCQs</b>	<b>Moderate</b>



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## APUNET Exam Pattern

However, the national placement test is objective and consists of multiple choice questions. Moreover, the following are the topics that are

topics come under the university entrance exam, these are as follows –

1. Reading Comprehension
2. Logical Skills and
3. General and the Social Awareness.



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Sections	No of Questions asked in exam	Type of question	Duration
Reading Comprehension or English	20	MCQs	2 hours
Reasoning	10		
Quantitative Aptitude	20		
General and the Social Awareness	30		
Total Questions	80		
Statement of the Purpose	1	Essay (on about 500 words)	45 minutes



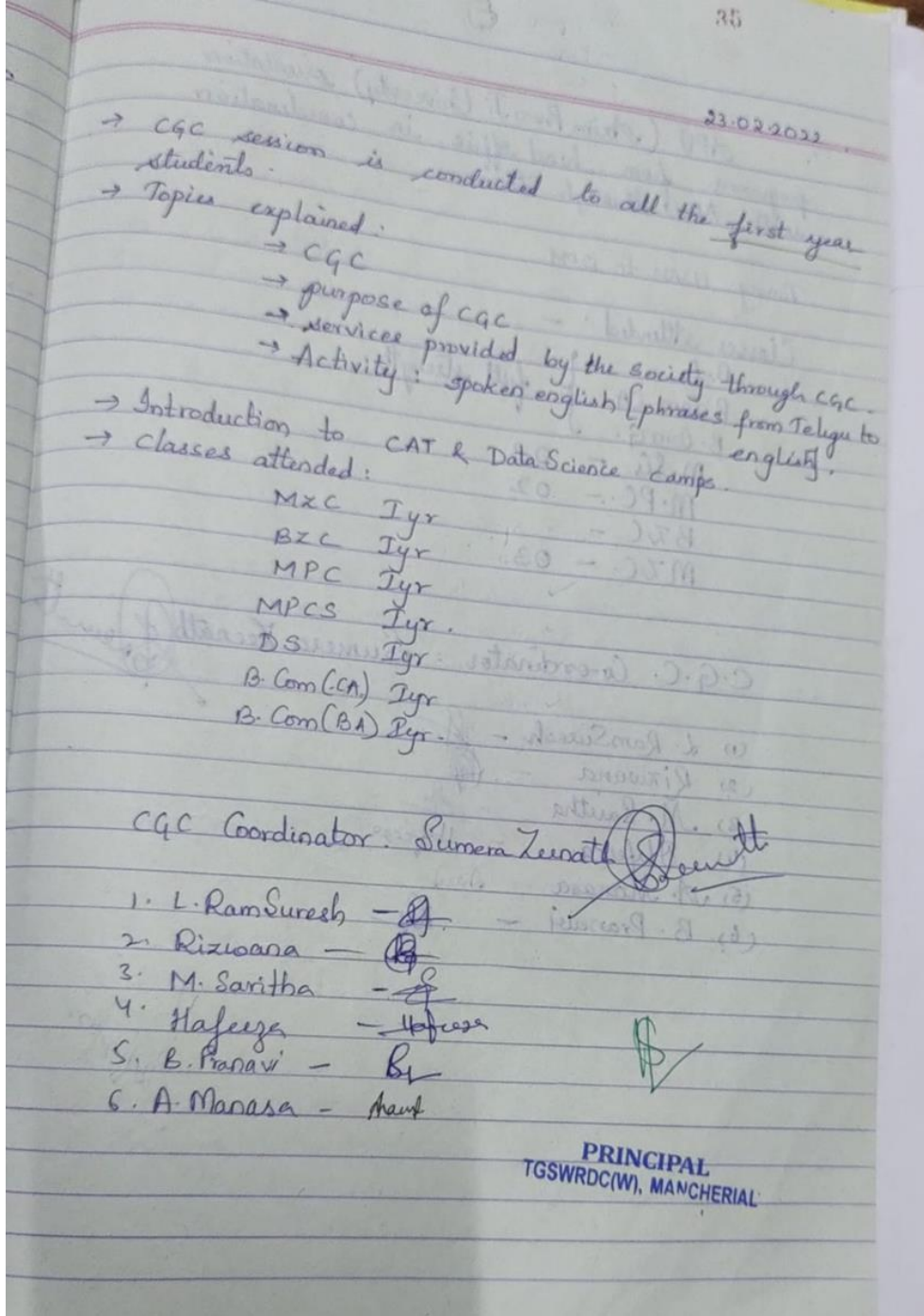
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TGSRWDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Akhila	D.S -I Year	Akhila
2	A. Mamatha	"	Mamatha
3	A. poojitha	"	poojitha
4	G. Gouri	"	Gouri
5	M. Jayasri	"	Jayasri
6	P. Vandana	"	Vandana
7	T. Meghana	"	Meghana
8	T. Navyasree	"	Navyasree
9	V. Samatha	MPC-I	Samatha
10	J. Mayuri	"	Mayuri
11	J. pragathi	"	pragathi
12	M. pravalika	"	pravalika
13	P. Saijiya	"	Saijiya
14	G. Shyamala	"	shyamala
15	R. Vyshnavi	"	Vishnavi
16	A. pravalika	MPCs-I	Pravalika
17	Ch. shivani	"	shivani
18	D. Deepthi	"	Deepthi
19	K. Aruna	"	Aruna
20	K. Silaya	"	Silaya
21	O. Akshaya	"	Akshaya
22	S. Jyothi	"	Jyothi
23	B. Shailaja	MZC-I	shailaja
24	Ch. Vaishnavi	"	Vaishnavi
25	G. Neemaavathi	"	Neema
26	J. Supriya	"	Supriya
27	K. Pallavi	"	Pallavi
28	MD. Samiya Begum	"	Samiya
29	M. Sotiya	"	Sotiya
30	J. Aparna	"	Aparna

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23/2/2022

TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Sonika	BZC -I	A. Sonika
2	D. prathyusha	"	D. prathyusha
3	D. Sweetha	"	D. Sweetha
4	G. Swathi	"	G. Swathi
5	J. Ranaya	"	J. Ranaya
6	J. Prarthi	"	J. Prarthi
7	J. Anjali	"	J. Anjali
8	K. Anjali	"	K. Anjali
9	Ch. prathyusha	B.com(CA)-I	Ch. prathyusha
10	Ch. pravalika	"	Ch. pravalika
11	D. vinedha	"	D. vinedha
12	D. shilpa	"	D. shilpa
13	D. swarna	"	D. swarna
14	D. Thirumala	"	D. Thirumala
15	G. Ashwini	"	G. Ashwini
16	G. Malavika	"	G. Malavika
17	J. Nikitha	"	J. Nikitha
18	J. Sulochana	"	J. Sulochana
19	A. Jayalaxmi	B.com(CA)-I	A. Jayalaxmi
20	B. prathyusha	"	B. prathyusha
21	B. shailaja	"	B. shailaja
22	Ch. Srividhya	"	Ch. Srividhya
23	D. Saranya	"	D. Saranya
24	D. Sandhyaarani	"	D. Sandhyaarani
25	G. Divyanshi	"	G. Divyanshi
26	G. Swathi	"	G. Swathi
27	J. Anjali	"	J. Anjali
28	J. Ranali	"	J. Ranali
29	K. Sanyasa	"	K. Sanyasa
30	K. Shasradha	"	K. Shasradha

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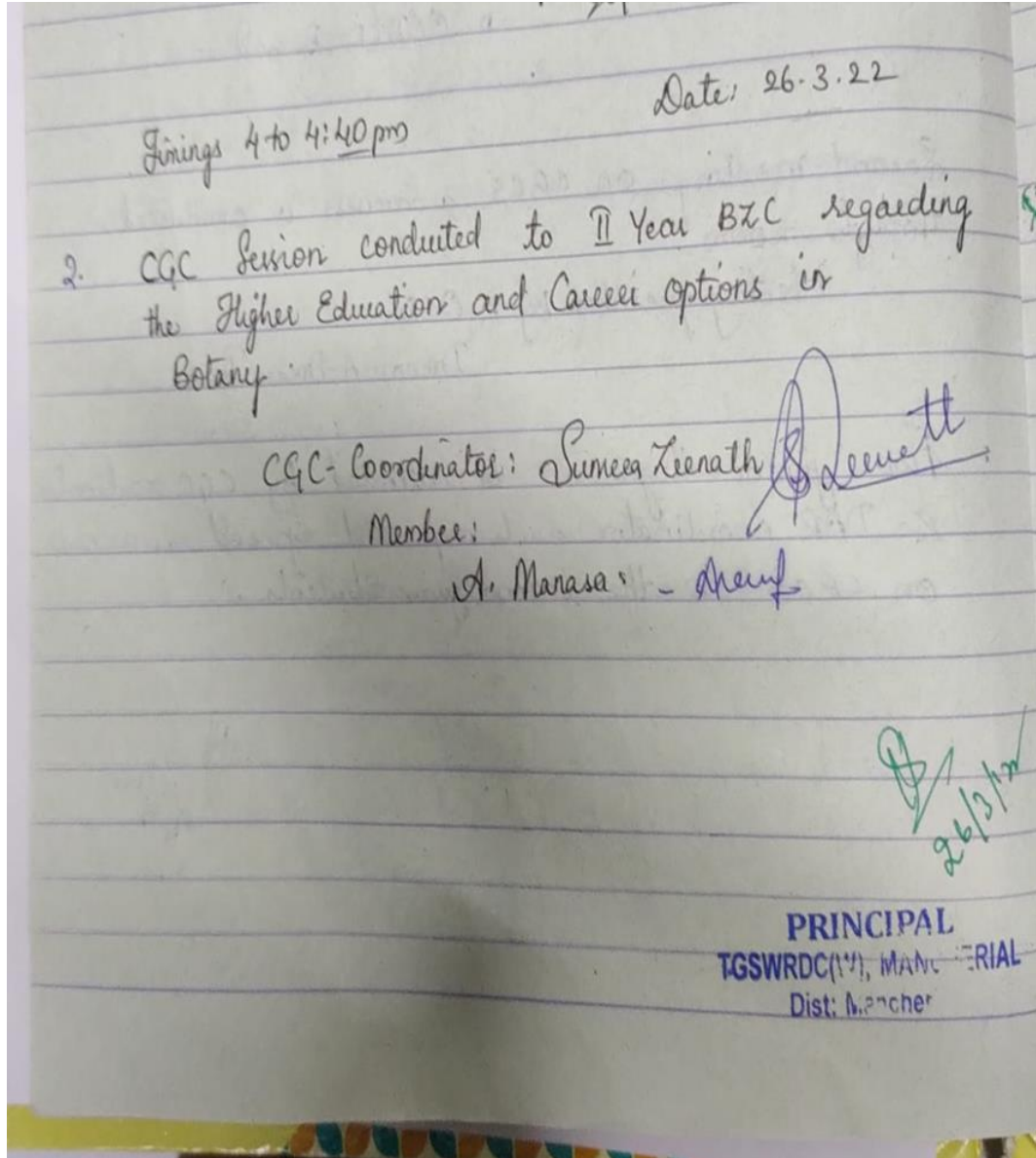
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26.3.22

TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Akshitha	Bzc-II	Akshitha
2	A. Sarika	"	A. sarika
3	D. Prathiyatha	"	Prathiyatha
4	D. Rajitha	"	Rajitha
5	D. Swetha	"	Swetha
6	G. Sumathi	"	Sumathi
7	G. Kranthi	"	Kranthi
8	J. Aparajayathi	"	Aparajayathi
9	J. Ramya	"	Ramya
10	J. Sravani	"	Sravani
11	J. Anjali	"	J. Anjali
12	J. Arshitha	"	Arshitha
13	K. Anjali	"	Anjali
14	K. Sucharitha	"	Sucharitha
15	K. Sruithi	"	Sruithi
16	K. Ashwini	"	Ashwini
17	L. Vasavi	"	L. Vasavi
18	L. Anvitha	"	Anvitha
19	M. Soujanya	"	Soujanya
20	M. Shireetha	"	Shireetha
21	P. Mounika	"	P. Mounika
22	R. Priyadharshini	"	Priyadharshini
23	S. Anvitha	"	Anvitha
24	J. Samitha	"	Samitha
25	V. Pavani	"	V. Pavani
26			
27			
28			
29			
30			

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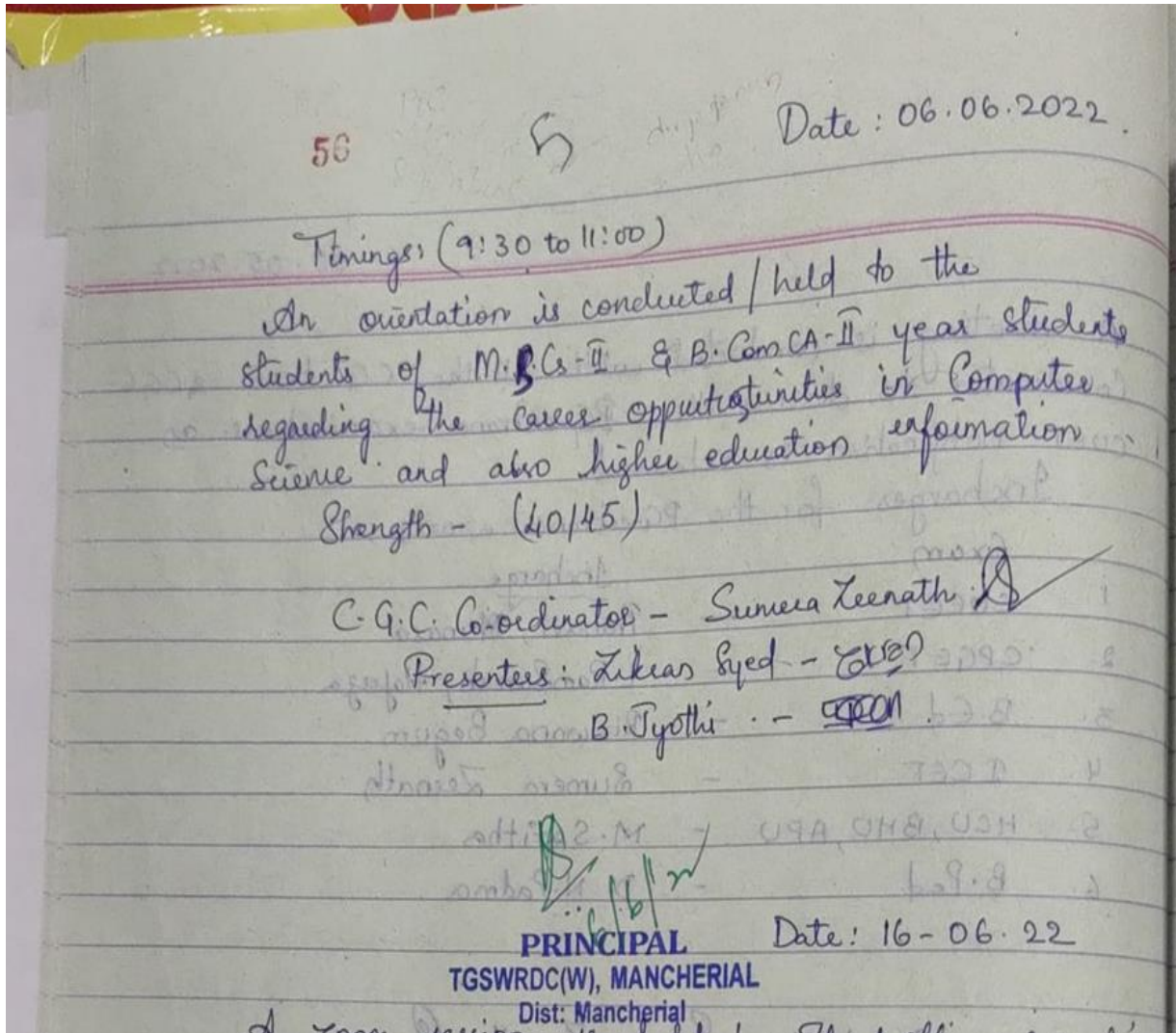
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06.06.2022

TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Mounika	MSCs - II	Mounika
2	A. Ramya	"	A. Ramya
3	Ch. Divyaganesh	"	Divyaganesh
4	D. Sai priya	"	Sai priya
5	D. panyasri	"	panyasri
6	G. Nagamani	"	Nagamani
7	G. Akhila	"	Akhila
8	K. pooja	"	pooja
9	D. keerthi Sri	"	keerthi Sri
10	M. Mounika	"	mounika
11	M. sudharani	"	sudharani
12	Palli Akhila.	"	Akhila
13	P. pentabai	"	pentabai
14	R. swetha	"	R. swetha
15	R. Ramya	"	Ramya
16	Barani Roy	B.com-CA-II	Barani Roy
17	B. Akanksha	"	Akanksha
18	D. Anjali	"	Anjali
19	D. shivani	"	shivani
20	D. Navaneetha	"	Navaneetha
21	D. Indira	"	Indira
22	D. pravalika	"	Pravalika
23	D. sulochana	"	sulochana
24	C. Supraja	"	Supraja
25	C. Shyamala	"	Shyamala
26	G. Ramadevi	"	Ramadevi
27	J. Bharathi	"	Bharathi
28	J. Krishnaveni	"	Krishnaveni
29	K. Anjali	"	K. Anjali
30	K. poojitha.	"	Poojitha

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65

GRE(2021) Students Status      21/08/2022

3 students of 2021 batch have scored good in GRE  
trained through GRE Camp

- ①. R. Indupriya MScs (Indupriya)
- ②. Lakmi Prasanna (Lakmi Prasanna)
- ③. Aare Swathi B.Com(CA) Swathi

① & ② got seat in US Universities but dropped  
due to financial problems.

→ R. Indupriya & Lakmi Prasanna took data Science coaching  
& ① is working as MIS Analyst in 20NO-Hyd.

→ Aare Swathi received scholarship of Rs 40,00,000 through  
National Overseas Policy & is in verification at Embassy  
Applied for MBA.  
- Admission Confirmed in University of Leicester - England.  
last joining date Sep-23-2022.

1. M. Saritha - ~~S~~
2. B. Prasanna - ~~B~~
3. A. Manasa - ~~M~~
4. HAFEEZA - ~~H~~
5. Rizwana - ~~R~~

*Swathi*  
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→ Data Science Camp resumed on 20/8/2022.  
6 students: R. Keshavathi, K. Archana, M. Sandhya, T. Ramya  
Sundhila Uma, R. Meekana - MPC. (MScs)



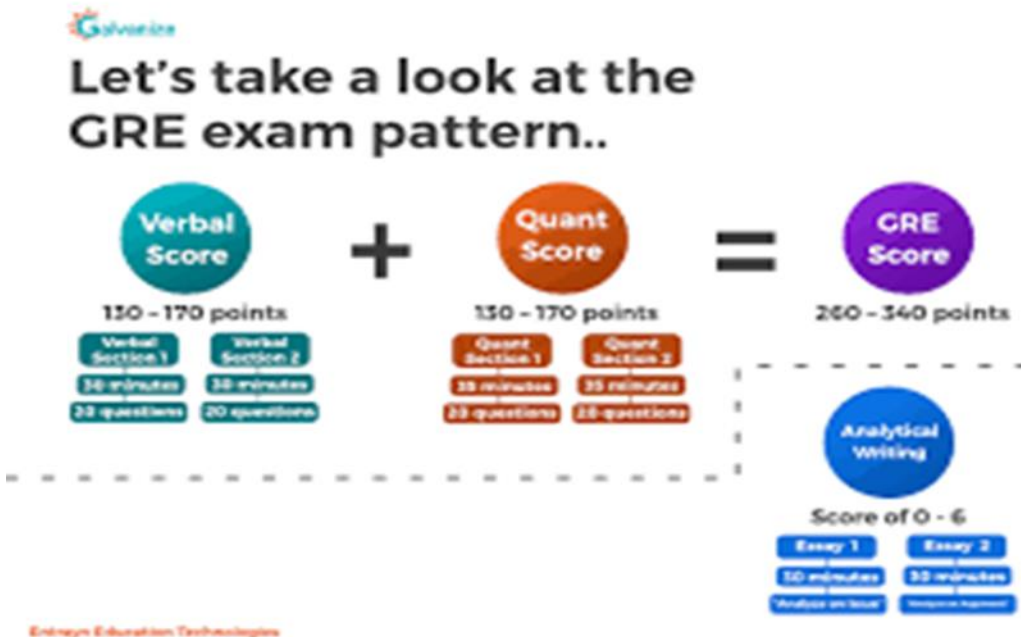
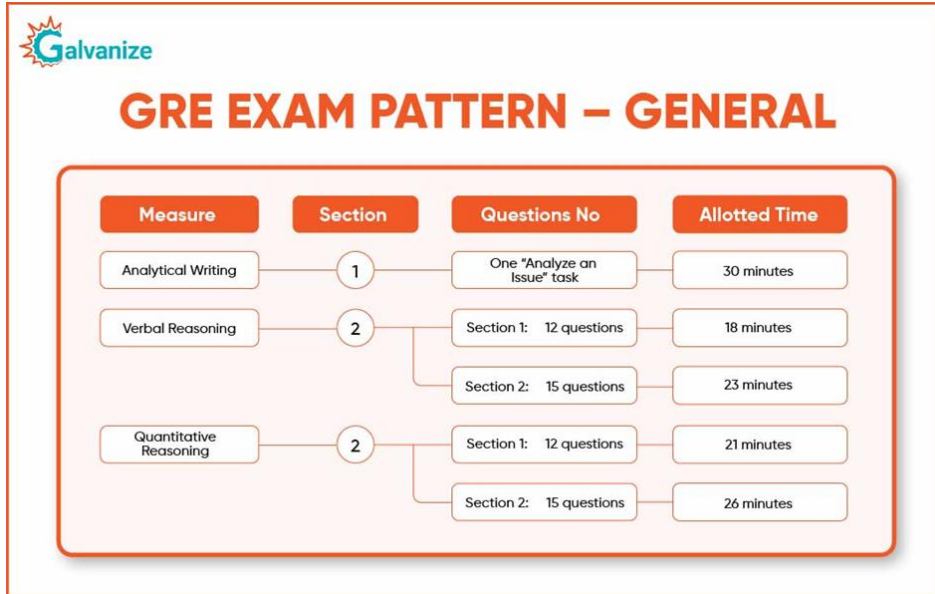
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## CGC ACTIVITIES FROM A.Y 2022 – 2023

- **CAT – 2022**
  - Common Admission Test [CAT - 2022] for the admission into various post graduate programs of IIMS [MBA]
  - Number of students applied – 02
  - Among them one student got admission in MBA at HCU Hyderabad
- **CGC ORIENTATION SESSION**

CGC team have conducted in orientation session to all final year students to discuss about higher education

  - CAT , JAM entrance exams and admission process
  - CAT and JAM camps organized by HE wing and selection process
- **JAM -2023 CAMP**

Joint Admission Test (JAM) provides admission into MSC , MSC-PHD in premier institutions across the country like IIT, NIT And IISC etc.

To select the students for JAM camp organized by TSWREIS

  - We conducted a screening test for final year students at our college
  - Total 42 students attended the screening test in science subject
  - 3 students from our college got selected for CAT camp
- **CCIP**
  - Community College Interaction Program
  - HE wing asked to nominate one student from each college for CCIP based on their communication skills and confidence levels
  - G. Swathi from BZC second year have been nominated after selection process conducted at college level
  - But she did not selected in the screening conducted by HE wing
- **CPGET AND CUET RANKER MEETING**
  - Higher education wing conducted a meeting with CPGET 2022 and CUET 2022 rankers to discuss the admission process
  - We passed the information to all the passed out students and they attended the session
- **YOUNG INDIA FELLOWSHIP (YIF)**
  - It is a one year residential PG diploma course in liberal studies offered by Ashoka University
  - Achieving conducted an orientation session for the all final year students
  - 5 students from our college have applied for the program
  - No one got selected in final year results
- **SCREENING TEST FOR DATA SCIENCE CAMP**
  - CGC team have conducted an orientation on data science camp organized by higher education wing at Hyderabad
  - We collected interested student names from all final years
  - Higher education wing conducted a two level screening test to select the students for data science camp

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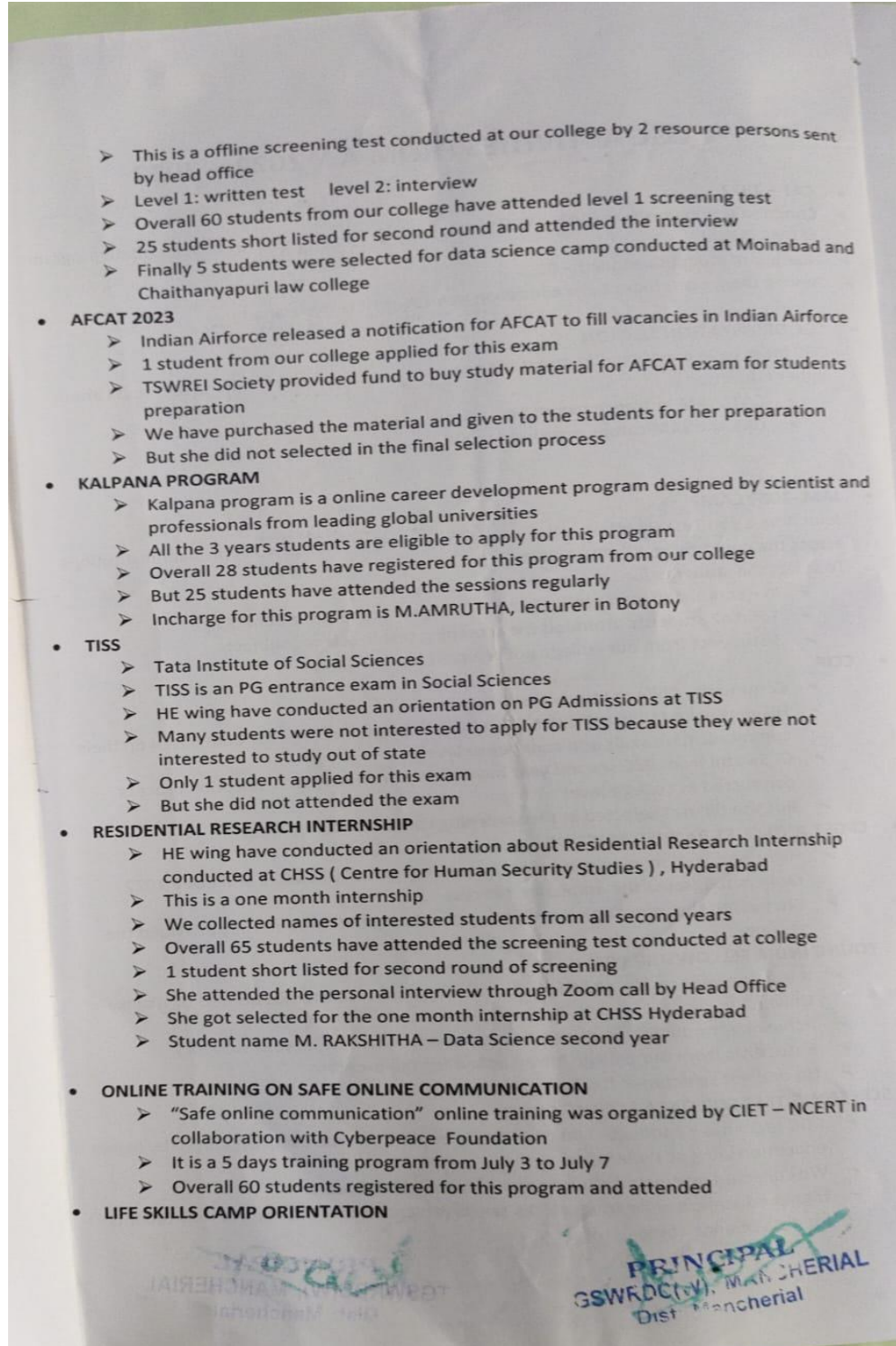
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➤ This is a offline screening test conducted at our college by 2 resource persons sent by head office

➤ Level 1: written test level 2: interview

➤ Overall 60 students from our college have attended level 1 screening test

➤ 25 students short listed for second round and attended the interview

➤ Finally 5 students were selected for data science camp conducted at Moinabad and Chaithanyapuri law college

- **AFCAT 2023**
  - Indian Airforce released a notification for AFCAT to fill vacancies in Indian Airforce
  - 1 student from our college applied for this exam
  - TSWREI Society provided fund to buy study material for AFCAT exam for students preparation
  - We have purchased the material and given to the students for her preparation
  - But she did not selected in the final selection process
- **KALPANA PROGRAM**
  - Kalpana program is a online career development program designed by scientist and professionals from leading global universities
  - All the 3 years students are eligible to apply for this program
  - Overall 28 students have registered for this program from our college
  - But 25 students have attended the sessions regularly
  - Incharge for this program is M.AMRUTHA, lecturer in Botony
- **TISS**
  - Tata Institute of Social Sciences
  - TISS is an PG entrance exam in Social Sciences
  - HE wing have conducted an orientation on PG Admissions at TISS
  - Many students were not interested to apply for TISS because they were not interested to study out of state
  - Only 1 student applied for this exam
  - But she did not attended the exam
- **RESIDENTIAL RESEARCH INTERNSHIP**
  - HE wing have conducted an orientation about Residential Research Internship conducted at CHSS ( Centre for Human Security Studies ) , Hyderabad
  - This is a one month internship
  - We collected names of interested students from all second years
  - Overall 65 students have attended the screening test conducted at college
  - 1 student short listed for second round of screening
  - She attended the personal interview through Zoom call by Head Office
  - She got selected for the one month internship at CHSS Hyderabad
  - Student name M. RAKSHITHA – Data Science second year
- **ONLINE TRAINING ON SAFE ONLINE COMMUNICATION**
  - "Safe online communication" online training was organized by CIET – NCERT in collaboration with Cyberpeace Foundation
  - It is a 5 days training program from July 3 to July 7
  - Overall 60 students registered for this program and attended
- **LIFE SKILLS CAMP ORIENTATION**

Principal  
GSRWDC (W), Mancherial  
Dist Mancherial



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- CGC team conducted an orientation about Life Skills Camp, which will be starting soon by the HE wing
- It is an offline 30 days program, which will give students the knowledge about Life Skills and Soft Skills
- We explained the selection process of Life Skills Camp for all final year students
- **CAT 2023 CAMP**
  - For CAT 2023 Camp the selection is done in two levels
  - Total 56 students from final years have appeared CAT Screening Test 1 at college
  - 13 students were short listed for Screening Test 2
  - This 13 students attended computer based screening test 2 from our college
  - But only 1 student got selected for the CAT 2023 Camp from our college
  - Student name: K. SRILAYA – MPCs Final year
  - She went to camp at Chaithanyapuri Law College on August 16<sup>th</sup> 2023
- **ORIENTATION ON GRE – IELTS**
  - HE wing conducted an orientation on GRE-IELTS for all second and final year students
  - It is a entrance exam to pursue Higher Education in abroad
  - Students attended the program.

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## **CAT 2024 Syllabus: An Overview**

- There is a total of 66 questions in the **CAT exam** but the three sections in the CAT syllabus carry different weightage in the exam.
- Although the CAT syllabus 2024 is divided into 3 sections, the effective number of sections is five as VARC and DILR sections are further subdivided into 2 sub-sections.
- Despite being very wide, the CAT entrance exam syllabus is neither specifically defined nor released by IIMs. Instead, IIMs release an official Mock Test which is as per the forthcoming CAT exam topics and consists of question types that are expected in the actual CAT Exam.

Section	No. of Questions	Time limit	Time limit for PwD students
Verbal Ability and Reading Comprehension (VARC)	24	40 minutes	53 minutes and 20 seconds
Data Interpretation & Logical Reasoning (DILR)	20	40 minutes	53 minutes and 20 seconds
Quantitative Aptitude (QA)	22	40 minutes	53 minutes and 20 seconds
Total	66	120 minutes	160 minutes



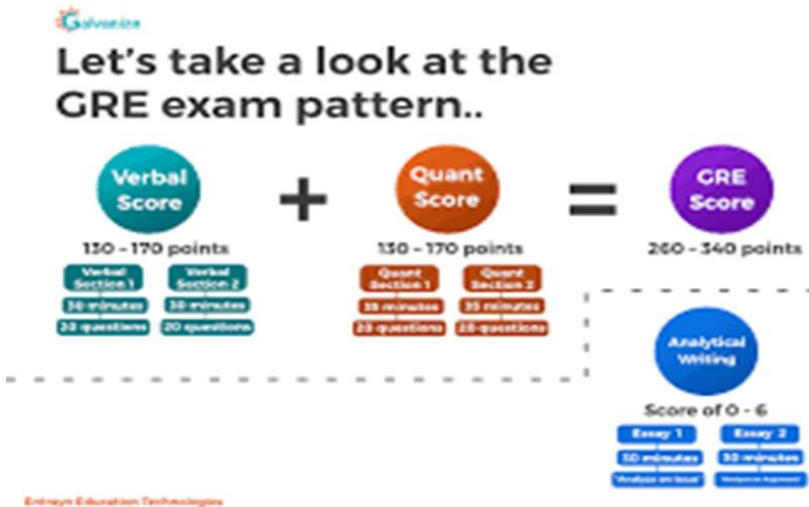
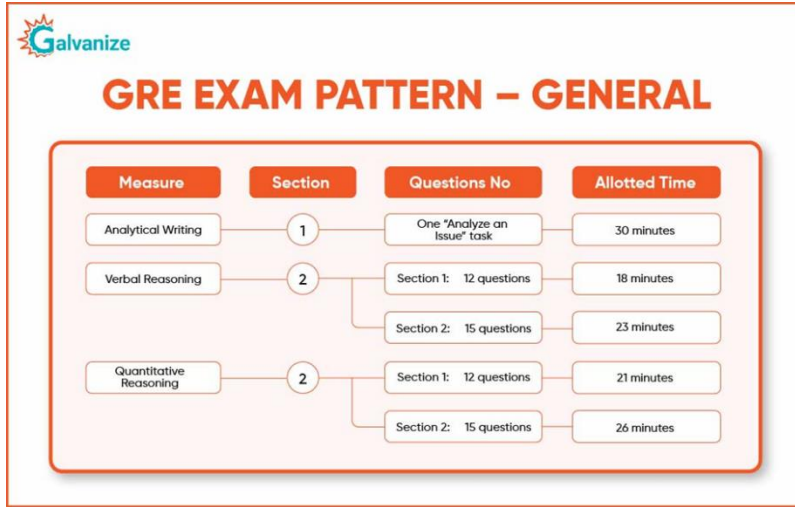
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TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
01	A. mounika	MSCS-III	Mounika.
2	A. Ramya	MSCS-III	Ramya.
3	ch. Divyaganesh	MSCS-III	Divyaganesh.
4	ch. LaxmiPrasanna	MSCS-III	LaxmiPrasanna.
5	D. saipriya	MSCS-III	Saipriya.
6	D. punyasa	MSCS-III	Punyasa.
7	G. Nagamani	MSCS-III	Nagamani.
8	G. Akhila	MSCS-III	Akhila.
9	K. pooja	MSCS-III	Pooja.
10	D. Keerthi Sri	MSCS-III	Keerthi Sri.
11	D. Amulya	M2C-III	Amulya.
12	B. ReshmaSree	M2C-III	ReshmaSree.
13	B. Navanitha	M2C-III	Navanitha.
14	B. Akhila	M2C-III	Akhila.
15	B. sruthi	M2C-III	Sruthi.
16	ch. vijetha	M2C-III	Vijetha.
17	D. mounika	M2C-III	Mounika.
18	D. Prathyusha	M2C-III	Prathyusha.
19	G. Hasthika	M2C-III	Hasthika.
20	B. sony	M2C-III	Sony.
21	A. Prathyusha	MPC-III	Prathyusha.
22	B. shrayasani	MPC-III	Shrayasani.
23	J. Brahmasani	MPC-III	Brahmasani.
24	ch. Chandana	MPC-III	Chandana.
25	ch. Ravaiice	MPC-III	Ravaiice.
26	ch. kavya	MPC-III	Kavya.
27	ch. Sravya	MPC-III	Sravya.
28	J. sravya	MPC-III	Sravya.
29	J. pavani	MPC-III	Pavani.
30	J. Deepa	MPC-III	Deepa.

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TGSRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Pragathika	BZC-III	Pragathika
2	A. Prathyusha	BZC-III	Prathyusha
3	B. Tyasna	BZC-III	Tyasna
4	D. vennela	BZC-III	Tyasna-vennela
5	D. Akshaya	BZC-III	Akshaya
6	D. Meghana	BZC-III	Meghana
7	D. Akanksha	BZC-III	Akanksha
8	D. Samatha	BZC-III	Samatha
9	G. Meghamala	BZC-III	Meghamala
10	G. vyshnavi	BZC-III	Vyshnavi
11	A. srilatha	Bcom-Gen-III	Srilatha
12	A. pushpalatha	Bcom-Gen-III	Pushpa
13	A. gangabharani	Bcom-Gen-III	Gangabharani
14	B. Rajeshwari	Bcom-Gen-III	Rajeshwari
15	B. pavani	Bcom-Gen-III	Pavani
16	ch. srilatha	Bcom-Gen-III	Srilatha
17	ch. kiranmai	Bcom-Gen-III	Kiranmai
18	D. Anjali	Bcom-Gen-III	Anjali
19	D. poojitha	Bcom-Gen-III	Poojitha
20	D. Anjali	Bcom-Gen-III	Anjali
21	D. srilatha	Bcom-Gen-III	Srilatha
22	D. Nishitha	Bcom-Gen-III	Nishitha
23	D. sumalatha	Bcom-Gen-III	Sumalatha
24	D. swathi	Bcom-Gen-III	Swathi
25	e. Rajitha	Bcom-Gen-III	Rajitha
26	G. soumya	Bcom-Gen-III	Soumya
27	G. Rakshitha	Bcom-Gen-III	Rakshitha
28	J. swathi	Bcom-Gen-III	Swathi
29	J. Maheshwari	Bcom-Gen-III	Maheshwari
30	K. bhavani	Bcom-Gen-III	Bhavani

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TGSWRDCW MANCHERIAL

S.NO	Name of the Student	Group	Signature of the Student
1	A. Pramila	BA-III	Pramila
2	A. Nishitha	BA-III	Nishitha
3	B. Deepika	BA-III	Deepika
4	D. Karishma	BA-III	Karishma
5	D. Sumathi	BA-III	Sumathi
6	D. Jyothi	BA-III	Jyothi
7	G. Mounika	BA-III	Mounika
8	G. Suhagini	BA-III	Suhagini
9	G. Tejaswini	BA-III	Tejaswini
10	G. Manga	BA-III	Manga
11	J. Jyothi	BA-III	Jyothi
12	J. Nishitha	BA-III	Nishitha
13	J. Navanitha	BA-III	Navanitha
14	K. Maniteja	BA-III	Maniteja
15	K. Laxmi	BA-III	Laxmi
16	Ch. Prathyusha	B.com-CA-III	Prathyusha
17	Ch. Pravalika	B.com-CA-III	Pravalika
18	D. Vinodha	B.com-CA-III	Vinodha
19	D. Deepika	B.com-CA-III	Deepika
20	D. Shilpa	B.com-CA-III	Shilpa
21	D. Shireesha	B.com-CA-III	Shireesha
22	D. Swarupa	B.com-CA-III	Swarupa
23	D. Thirumala	B.com-CA-III	Thirumala
24	E. Saumya	B.com-CA-III	Saumya
25	G. Ashwini	B.com-CA-III	Ashwini
26	G. Anjalisi	B.com-CA-III	Anjalisi
27	G. Malavika	B.com-CA-III	Malavika
28	G. Prathima	B.com-CA-III	Prathima
29	J. Laxmi	B.com-CA-III	Laxmi
30	J. Nishitha	B.com-CA-III	Nishitha

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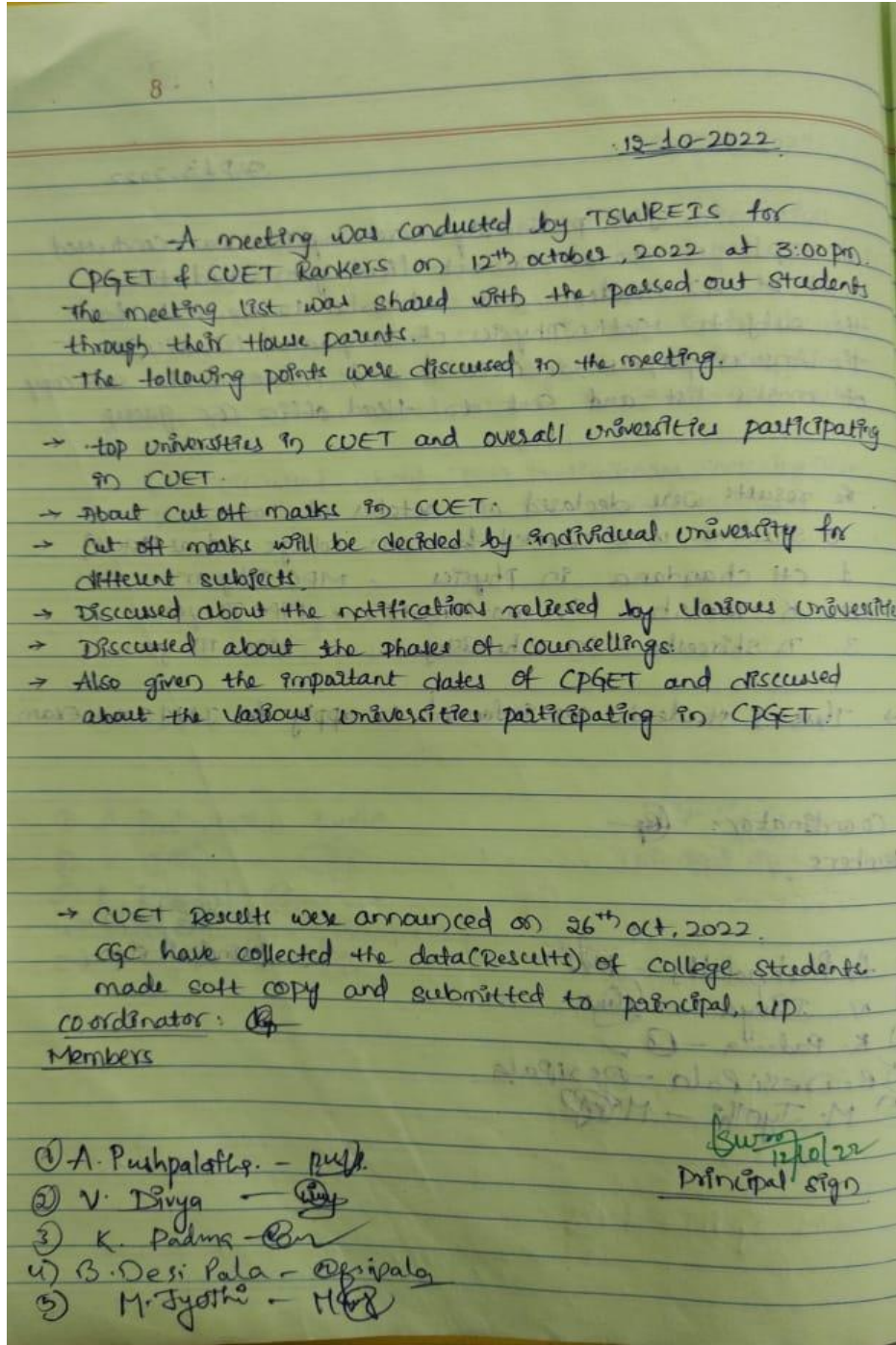
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CPGET-2024 Syllabus

## 78. M.Sc. Data Science

- 1. Fundamentals of Information Technology:** Data and Information, Acquisition of Numbers and Textual Data, Central Processing Unit, Computer Networks, Input Output Devices, Computer Software, The Software Problem. Programming Principles and Guidelines.
- 2. Problem Solving and Python Programming:** Introduction to Computing and Problem Solving. Introduction to Python Programming. Control Flow Statements. Functions. Strings. Files and exception. Object-Oriented Programming. Functional Programming.
- 3. Data Engineering with Python:** Data Science; Files and Working with Text Data, Working with Text Data. Working with Text Data, Regular Expression Operations, Working with Databases, Working with Tabular Numeric Data (Numpy with Python), Working with Data Series and Frames, Plotting (Plotting with Pandas).
- 4. Machine Learning:** Introduction, Limits of Learning, Geometry and Nearest Neighbours, The Perceptron, Practical Issues, Linear Models, Probabilistic Modeling, Neural Networks, Unsupervised Learning, Association Rules.
- 5. Natural Language Processing:** Language Processing and Python, Accessing Text Corpora and Lexical Resources, Processing Raw Text, Categorizing and Tagging Words, Learning to Classify Text, Deep Learning for NLP, Extracting Information from Text, Analysing Sentence Structure.
- 6. NoSQL Data Bases:** Why NoSQL, Aggregate Data Models, More Details on Data Models, Distribution Models, Consistency, Version Stamps, Map-Reduce, Key-Value Databases, Document Databases, Column-Family Stores, Graph Databases.
- 7. Big Data:** Getting an overview of Big Data, Introducing Technologies for Handling Big Data, Understanding Hadoop Ecosystem, Hadoop Distributed File System, Introducing HBase, Understanding MapReduce Fundamentals and HBase, Understanding Big Data Technology Foundations, Storing Data in Databases and Data Warehouses, NoSQL Data Management.
- 8. Deep Learning:** Introduction to deep learning Algorithms, Neural Networks, Scalars (0D tensors), Vectors (1D tensors), Matrices (2D tensors), 3D tensors and higher-dimensional tensors, Key attributes, Manipulating tensors in Numpy, The notion of data batches, Real-world examples of data tensors, Vector data, Timeseries data or sequence data, Image data, Video data. Tensor operations: Element-wise operations, Broadcasting, Tensor dot. Tensor reshaping, Geometric interpretation of tensor operations, A geometric interpretation of deep learning, Gradient-based optimization, Derivative of a tensor operation, Stochastic gradient descent. Chaining derivatives: the Backpropagation algorithm Neural networks: Anatomy, Layers, Models, Loss functions and optimizers. Introduction to Keras, Keras, TensorFlow, Theano, and CNTK, Recurrent neural networks: A recurrent layer in Keras, Understanding the LSTM and GRU Layers.

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CPGET-2024 Syllabus

## 71. ZOOLOGY

### Part-A (40 Marks)

#### Physiology and Biochemistry:

**Digestion** Digestion definition and extra and intracellular digestion, Digestion of Carbohydrates, Proteins, Lipids and Cellulose. Absorption and Assimilation of digested food; role of Gastrointestinal hormones in digestion. **Respiration** Definition of Respiration and Respiratory mechanisms-External, Internal and cellular. Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect, Transport of CO<sub>2</sub>. Chloride shift; Regulation of respiration - nervous and chemical. **Circulation** Types of circulation - Open and Closed circulation Structure of Mammalian Heart, Types of hearts - Neurogenic and Myogenic; Heart function - Conduction and regulation of heart beat. Regulation of Heart rate - Tachycardia and Bradycardia; Blood Clotting mechanism. **Excretion** Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Urotelic, Structure and function of Nephron, Urine formation, Counter current mechanism.

#### Physiology

**Muscle Contraction:** Types of Muscles, Ultra structure of skeletal muscle fibre, Sliding Filament theory, muscle contraction mechanism and energetics. **Nerve impulse:** Structure of Neuron, Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulses, Synapse, types of synapses and Synaptic transmission. **Endocrine System** Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas. Hormonal action and concept of Secondary messengers, Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

#### Physiology and Biochemistry:

**Homeostasis and Enzymes** Concept of Homeostasis, Mechanism of Homeostasis, Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals, Enzymes: Definition, Classification, inhibition and Regulation. **Biomolecules and Metabolism** Carbohydrates: Classification and function of Carbohydrates, Carbohydrate metabolism - Glycolysis, Krebs cycle, Electron transport and oxidative phosphorylation, Proteins: Classification of proteins based on functions and Chemical nature, Protein Metabolism - Transamination, Deamination and Urea Cycle, Lipids: Classification of Lipids, Lipid Metabolism - Fatty acid synthesis and Fatty acid oxidation.

#### Immunology and Animal Biotechnology:

**Immunology - Basic concepts, antigens and antibodies** Basic concepts of immunology, Cells of immune system, primary and secondary Organs of immune system, Types of Immunity - Innate and acquired, Basic properties of antigens, Structure, function and types of an antibody, D and T cell epitopes, haptens, adjuvants, Antigen-antibody reactions, T-Cell and B-Cell structure, Monoclonal antibodies and their production. **Working of an immune system** **Immune system in health and disease** Structure and functions of major histocompatibility complex, Basic properties and functions of Cytokines, Interferons and complement proteins, Humoral and Cell mediated immunity, Types of hyper sensitivity, Concepts of autoimmunity and immunodeficiency, Introduction to Vaccines and types of Vaccines. **Animal Biotechnology and Genetically modified organisms** Concept and Scope of Animal Biotechnology, Cloning vectors - Plasmids, Cosmids, Lambda bacteriophage, YAC, Cloning: Cloning methods (ICM, ASIM) and Gene cloning Animal Cell culture - Equipment and materials for animal cell culture; applications of cell culture techniques Recombinant DNA technology and its applications, Transgenesis - Methods of Transgenesis, Production of transgenic animals and Application of Transgenic animals in Biotechnology, Stem cells, types and their applications.

1

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### Part-B (60 Marks)

#### Animal Diversity - Invertebrates

**Brief history of Invertebrates:** Kingdom Animalia, Brief history of Invertebrates. **Protozoa** General characters Classification up to classes with examples, Type study - Eukaryotes, Life cycle of *Plasmodium*, Locomotion, Reproduction and Diseases. **Porifera** General characters, Classification of Porifera up to classes with examples, Type study - Sponges, Canal system in sponges and Spicules. **Cnidaria** General characters, Classification of Cnidaria up to classes with examples, Type study - *Obelia*, Polymorphism in hydroids, Corals and coral reef formation. **Platyhelminthes** General characters Classification of Platyhelminthes up to classes with examples, Type study- *Schistosoma*. **Nemathelminthes** General characters Classification of Nemathelminthes up to classes with examples Type study- *Dracunculus*, Parasitic Adaptations in Helminthes.

**Annelida** General characters, Classification of Annelids up to classes with examples Type study - *Hirudinaria grimaldus*, Evolutionary significance of Coelome and Coelomoducts and metamerism. **Arthropoda** General characters, Classification of Arthropods up to classes with examples, Type study - Prawa, Crustacean larvae, Insect metamorphosis, *Periplaneta* - Structure and affinities.

**Mollusca** General characters, Classification of Mollusca up to classes with examples, Type study - *Ms. Pearl* formation, Torsion and detorsion in gastropods. **Echinodermata** General characters, Classification of Echinodermata up to classes with examples, Water vascular system in star fish, Echinoderm larvae and their significance. **Hemichordata** General characters, Classification of Hemichordata up to classes with examples, *Dolabroglossus* - Structure and affinities.

#### Ecology, Zoogeography and Animal Behavior:

**Ecology-I:** Ecosystem structure and functions, Types of Ecosystems -Aquatic and Terrestrial, Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water, Energy flow in ecosystem, food chain, food web and ecological pyramids, Animal Associations - Mutualism, commensalism, parasitism, competition, predation.

**Ecology-II:** Concept of Species, Population dynamics and Growth curves, Community Structure and dynamics and Ecological Succession, Ecological Adaptations, Environmental Pollution - Sources, Effect and Control measures of Air, Water, Soil and Noise Pollution, Wildlife conservation: National parks and Sanctuaries of India, Endangered species, Biodiversity and hotspots of Biodiversity in India.

**Zoogeography:** Zoogeographical regions - Palaearctic, Neartic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities, Wallace line, Discontinuous distribution Continental drift, **Animal Behaviour** Types of Behaviour: Innate and Acquired, Instinctive and Modified behavior, Taxes, Reflexes, Tropisms, Biological rhythms and types of rhythms, trial and error learning, imprinting, habituation, Classical conditioning, Instrumental conditioning, Social behavior, Communication, Pheromones, Biological rhythms, Biological clocks, Circadian rhythms.

#### Animal Diversity: Vertebrates and Developmental Biology:

**Urochordata, Cephalochordata, Cyclostomata:** Salient features of Urochordata, Retrogressive, metamorphosis and its significance in Urochordata, Salient features and affinities of Cephalochordata General characters of Cyclostomata, Comparison of the *Petromyzon* and *Agnostus* General characters and classification of Chordata upto orders with examples. **Fishes** General characters of Fishes, Classification of fishes up to order level with examples, *Scorpaeniform* - Respiratory, Circulatory and Nervous system. Types of Scales and types of Fins



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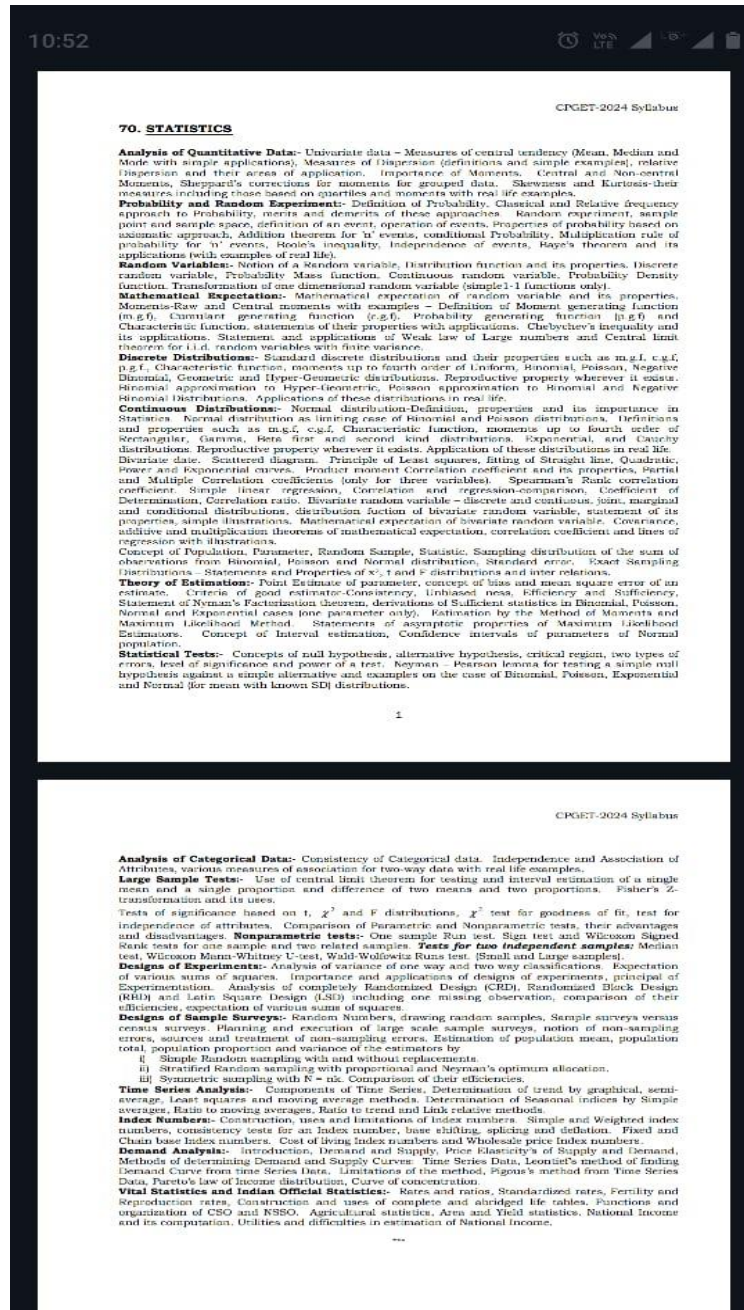


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CPGET-2024 Syllabus

## 68. MATHEMATICS

### Differential and Integral Calculus (20 Marks)

**Partial Differentiation** : Introduction - Functions of two variables - Neighborhood of a point  $(a, b)$  - Continuity of a Function of two variables - Continuity at a point - Limit of a Function of two variables - Partial Derivatives - Geometrical representation of a Function of two Variables - Homogeneous Functions.

**Theorem on Total Differentials** - Composite Functions - Differentiation of Composite Functions - Implicit Functions - Equality of  $f_{xy}$ ,  $f_{yx}$  and  $f_{y_1x_2}$ ,  $f_{x_2y_1}$  - Taylor's theorem for a function of two Variables - Maxima and Minima of functions of two variables - Lagrange's Method of undetermined multipliers.

**Curvature and Evolutes** : Introduction - Definition of Curvature - Radius of Curvature - Length of Arc as a Function, Derivative of arc - Radius of Curvature - Cartesian Equations - Newtonian Method - Centre of Curvature - Chord of Curvature.

**Evolutes**: Evolutes and Involute - Properties of the evolute.

**Envelopes** : One Parameter Family of Curves - the family of straight lines - Definition - Determination of envelope.

**Lengths of Plane Curves** : Introduction - Expression for the lengths of curves  $y = f(x)$  - Expressions for the length of arcs  $x = f(y)$ ;  $x = f(t)$ ,  $y = g(t)$ ;  $r = f(\theta)$

**Volumes and Surfaces of Revolution** : Introduction - Expression for the volume obtained by revolving about either axes - Expression for the volume obtained by revolving about any line - Area of the surface of the frustum of a cone - Expression for the surface of revolution - Pappus Theorem - Surface of revolution.

### Differential Equations (20 Marks)

**Differential Equations of first order and first degree**: Introduction - Equations in which Variables are Separable - Homogeneous Differential Equations - Differential Equations Reducible to Homogeneous Form - Linear Differential Equations - Differential Equations Reducible to Linear Form - Exact differential equations - Integrating Factors - Change in variables - Total Differential Equations - Simultaneous Total Differential Equations - Equations of the form  $\frac{dx}{dy} = \frac{P}{Q}$

**Differential Equations first order but not of first degree**: Equations Solvable for  $p$  - Equations Solvable for  $y$  - Equations Solvable for  $x$  - Equations that do not contain  $x$  for  $y$  - Equations homogeneous in  $x$  and  $y$  - Equations of the First Degree in  $x$  and  $y$  - Clairaut's equation. **Applications of First Order Differential Equations** - Growth and Decay - Dynamics of Tumour Growth - Radioactivity and Carbon Dating - Compound Interest - Orthogonal Trajectories.

**Higher order Linear Differential Equations**: Solution of homogeneous linear differential equations with constant coefficients - Solution of non-homogeneous differential equations  $P(D)y = Q(x)$  with constant coefficients by means of polynomial operators when  $Q(x) = e^{ax}$ ,  $b \sin ax/c \cos ax$ ,  $Ve^{ax}$  - Method of undetermined coefficients. Method of variation of parameters - Linear differential equations with non constant coefficients - The Cauchy - Euler Equation - Legendre's Linear Equations - Miscellaneous Differential Equations.

**Partial Differential Equations**: Formation and solution- Equations easily integrable - Linear equations of first order.

1

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### Real Analysis (20 Marks)

**Sequences**: Limits of Sequences. A Discussion about Proofs-Limit Theorems for Sequences- Monotone Sequences and Cauchy Sequences -Subsequences-Lim superiors and Lim inferior- Series- Alternating Series and Integral Test.

**Continuity**: Continuous Functions -Properties of Continuous Functions -Uniform Continuity - Limits of Functions

**Differentiation**: Basic Properties of the Derivative - Mean Value Theorems - L'Hospital Rule - Taylor's Theorem.

**Integration** : The Riemann Integral - Properties of Riemann Integral-Fundamental Theorem of Integral Calculus.

### Algebra (20 Marks)

**Groups**: Definition and Examples of Groups- Elementary Properties of Groups-Finite Groups - Subgroups -Terminology and Notation -Subgroup Tests - Examples of Subgroups

**Cyclic Groups**: Properties of Cyclic Groups - Classification of Subgroups - Cyclic Groups.

**Permutation Groups**: Definition and Notation -Cycle Notation-Properties of Permutations -A Check-Digit Scheme Based on  $Z_6$  Isomorphisms ; Motivation- Definition and Examples - Cayley's Theorem Properties of Isomorphisms- Automorphisms-Cosets and Lagrange's Theorem.

Properties of Cosets - Lagrange's Theorem and Consequences-An Application of Cosets to Permutation Groups -The Rotation Group of a Cube and a Soccer Ball.

**Normal Subgroups and Factor Groups**: Normal Subgroups-Factor Groups -Applications of Factor Groups -Group Homomorphisms - Definition and Examples -Properties of Homomorphisms -The First Isomorphism Theorem.

**Introduction to Rings**: Motivation and Definition -Examples of Rings -Properties of Rings - Subrings.

**Integral Domains**: Definition and Examples - Fields -Characteristics of a Ring.

**Ideals and Factor Rings**: Ideals -Factor Rings -Prime Ideals and Maximal Ideals.

**Ring Homomorphisms**: Definition and Examples-Properties of Ring- Homomorphisms.

### Linear Algebra (20 Marks)

**Vector Spaces**: Vector Spaces and Subspaces -Null Spaces, Column Space, and Linear Transformations

-Linearly Independent Sets; Bases -Coordinate Systems -The Dimension of a Vector Space- Rank-Change of Bases - Eigenvalues and Eigenvectors - The Characteristic Equation - Diagonalisation -Eigenvectors and Linear Transformations -Complex Eigenvalues - Applications to Differential Equations.

**Orthogonality and Least Squares** : Inner Product, Length, and Orthogonality -Orthogonal Sets -Orthogonal Projections - The Gram-Schmidt orthogonalization Process.

2



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## 69. PHYSICS

### MECHANICS & OSCILLATIONS

#### 1. Vector Analysis

Scalar and Vector fields, Gradient of a Scalar field and its physical significance. Divergence and Curl of a Vector field and related problems. Vector integration, line, surface and volume integrals. Stokes', Gauss's and Green's theorems- simple applications.

#### 2. Mechanics of Particles

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section.

#### 3. Mechanics of Rigid Bodies

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope.

#### 4. Central Forces

Central forces - definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws.

#### 5. Special theory of Relativity

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

#### 6. Oscillations

Simple harmonic oscillator, and solution of the differential equation- Physical characteristics of SHM, torsion pendulum measurements of rigidity modulus, compound pendulum, measurement of  $g$ , combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures.

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance.

### THERMAL PHYSICS

#### 1. Kinetic theory of gases

Introduction - Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena - Viscosity of gases - thermal conductivity - diffusion of gases.

#### 2. Thermodynamics

Basics of Thermodynamics- Carnot's engine (qualitative)-Carnot's theorem -Kelvin's and Clausius statements - Thermodynamic scale of temperature - Entropy, physical significance - Change in entropy in reversible and irreversible processes - Entropy and disorder - Entropy of universe - Temperature-Entropy (T-S) diagram - Change of entropy of a perfect gas-change of entropy when ice changes into steam.

#### 3. Thermodynamic potentials and Maxwell's equations

Thermodynamic potentials - Derivation of Maxwell's thermodynamic relations - Clausius-Clayperon's equation-derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

#### 4. Low temperature Physics

Joule Kelvin effect - liquefaction of gas using porous plug experiment. Joule expansion - Distinction between adiabatic and Joule Thomson expansion - Expression for Joule Thomson cooling - Liquefaction of helium, Kapitza's method - Adiabatic demagnetization - Production of low temperatures - Principle of refrigeration, vapour compression type.

1

CPGET-2024 Syllabus

## 5. Quantum theory of radiation

Black body-Ferry's black body - distribution of energy in the spectrum of black body - Wein's displacement law, Wein's law, Rayleigh-Jean's law - Quantum theory of radiation - Planck's law - deduction of Wein's law, Rayleigh-Jeans law, Stefan's law from Planck's law. Measurement of radiation using pyrometers - Disappearing filament optical pyrometer - experimental determination - Angstrom pyro heliometer - determination of solar constant, effective temperature of sun.

## 6. Statistical Mechanics

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles -classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas- Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws.

### ELECTROMAGNETIC THEORY

#### 1. Electrostatics

Electric Fields- Concept of electric field lines and electric flux, Gauss's law (Integral and differential forms), application to linear, plane and spherical charge distributions. Conservative nature of electric field 'E', Irrotational field, Electric potential.- Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges, Energy density in an electric field. Calculation of potential from electric field for a spherical charge distribution.

#### 2. Magnetostatics

Concept of magnetic field 'B' and magnetic flux, Biot-Savart's law, B due to a straight current carrying conductor. Force on a point charge in a magnetic field. Properties of B, curl and divergence of B, solenoidal field. Integral form of Ampere's law, Applications of Ampere's law: field due to straight, circular and solenoidal currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity, Ballistic Galvanometers- torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

#### 3. Electromagnetic Induction and Electromagnetic waves

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction. Continuity equation, modification of Ampere's law, displacement current, Maxwell equations. Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium, Poynting's theorem.

#### 4. Varying and alternating currents

Growth and decay of currents in LR, CR and LCR circuits - Critical damping, Alternating current, relation between current and voltage in pure R, C and L-vector diagrams - Power in ac circuits. LCR series and parallel resonant circuit - Q-factor. AC & DC motors-single phase, three phase (basis only).

#### 5. Network Theorems

Passive elements, Power sources, Active elements, Network models: T and  $\pi$  Transformations, Superposition theorem, Thevenin's theorem, Norton's theorem. Reciprocity theorem and Maximum power transfer theorem (Simple problems).

### WAVES AND OPTICS

#### 1. Waves

Fundamentals of Waves -Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance. Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends; ii) bar fixed at the mid-point; iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.





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## 2. Interference

Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light. Interference by division of wave front: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using Biprism – change of phase on reflection – Lloyd's mirror experiment.

Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non-reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes) – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium  $D_1, D_2$  lines and thickness of a thin transparent plate.

## 3. Diffraction

Introduction – Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction: Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer diffraction pattern with N slits (diffraction grating), Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating, Fresnel diffraction-Fresnel's half period zones – area of the half period zones – zone plate – Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

## 4. Polarization

Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewster's law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

## MODERN PHYSICS

### 1. SPECTROSCOPY

**Atomic Spectra:** Introduction – Drawbacks of Bohr's atomic model - Sommerfeld's elliptical orbits - relativistic correction (no derivation), Stern & Gerlach experiment, Vector atom model and quantum numbers associated with it, L-S and j-j coupling schemes, Spectral terms, selection rules, intensity rules - spectra of alkali atoms, doublet fine structure, Zeeman Effect, Paschen-Back Effect and Stark Effect (basic idea).

**Molecular Spectroscopy:** Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule, Determination of inter nuclear distance, Vibrational energies and spectrum of diatomic molecule, Raman effect, classical theory of Raman effect, Experimental arrangement for Raman effect and its applications.

### 2. Quantum Mechanics

Inadequacy of classical Physics: Spectral radiation - Planck's law (only discussion), Photoelectric effect - Einstein's photoelectric equation, Compton's effect - experimental verification.

**Matter waves & Uncertainty principle:** de Broglie's hypothesis - wavelength of matter waves, properties of matter waves, Phase and group velocities, Davison and Germer experiment, Double slit experiment, Standing de Broglie waves of electron in Bohr orbits - Heisenberg's uncertainty principle for position and momentum ( $x$  and  $p_x$ ), Energy and time ( $E$  and  $t$ ), Gamma ray microscope, Diffraction by a single slit, Position of electron in a Bohr orbit, Complementary principle of Bohr.

**Schrodinger Wave Equation** Schrodinger time independent and time dependent wave equations, Wave function properties - Significance, Basic postulates of quantum mechanics, Operators, eigen functions and eigen values, expectation values.

3

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### 3. Nuclear Physics

**Nuclear Structure:** Basic properties of nucleus - size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment, Binding energy of nucleus, deuteron binding energy, p-p, n-n, and n-p scattering (concepts), nuclear forces, Nuclear models- liquid drop model, shell model.

**Alpha and Beta Decays:** Range of alpha particles, Geiger - Nuttall law, Gamow's theory of alpha decay, Geiger - Nuttall law from Gamow's theory, Beta spectrum - neutrino hypothesis, **Particle Detectors:** GM counter, proportional counter, scintillation counter.

### 4. Solid State Physics & Crystallography

**Crystal Structure:** Crystalline nature of matter, Crystal lattice, Unit Cell, Elements of symmetry, Crystal systems, Bravais lattices, Miller indices, Simple crystal structures (S.C., BCC, FCC, CsCl, NaCl, diamond and Zinc Blende)

**X-ray Diffraction:** Diffraction of X-rays by crystals, Bragg's law, Experimental techniques - Laue's method and powder method.

**Bonding in Crystals:** Types of bonding in crystals - characteristics of crystals with different bondings, Lattice energy of ionic crystals - determination of Madelung constant for NaCl crystal, Calculation of Born Coefficient and repulsive exponent, Born-Haber cycle.

## ELECTRONICS

1. **Band theory of P-N junction:** Energy band in solids (band theory), valence band, conduction band and forbidden energy gap in solids, insulators, semiconductors and pure or intrinsic semiconductors and impure or extrinsic semi-conductors, N-type semi-conductors, P-type semi-conductors, Fermi level, continuity equation.  
**Diodes:** P-N junction diode, Half-wave, full-wave and bridge rectifier, Zener diode & its characteristics, Zener diode as voltage regulator.

2. **Bipolar Junction Transistor (BJT)** - p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations - transistor as an amplifier - RC coupled amplifier - Frequency response (Qualitative analysis).

3. **Feedback concept & Oscillators:** Feedback, General theory of feedback - Concepts of oscillators, Barkhausen's criteria, Phase shift oscillator - Expression for frequency of oscillation.

4. **Special devices-** Construction and Characteristics: Photo diode - Shockley diode - Solar cell, Opto-couplers - Field Effect Transistor (FET) - FET as an Amplifier - Uni-Junction Transistor (UJT), UJT as a relaxation oscillator - Silicon controlled rectifier (SCR) - SCR as a switch.

5. **Digital Electronics:** Binary number system, conversion of binary to decimal and vice-versa, Binary addition and subtraction ( $1$ 's and  $2$ 's complement methods), Hexadecimal number system, Conversion from binary to hexadecimal and vice-versa, Decimal to hexadecimal and vice-versa, **Logic gates:** OR, AND, NOT gates, truth tables, realization of these gates using discrete components, NAND, NOR as universal gates, Exclusive - OR gate (EX-OR), De Morgan's Laws - Verification.

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**63. COMPUTER SCIENCE**

**Programming in C: (15 Marks)**

Computer Fundamentals: Introduction of Computers, Classification of Computers, Anatomy of a Computer, Memory Hierarchy, Introduction to OS, Operational Overview of a CPU.  
Program Fundamentals: Generation and Classification of Programming Languages, Compiling, Interpreting, Loading, Linking of a Program, Developing Program, Software Development.  
Algorithms: Definitions, Different Ways of Stating Algorithms (Step-form, Pseudo-code, Flowchart), Strategy for Designing Algorithms, Structured Programming Concept.  
Basics of C: Overview of C, Developing Programs in C, Parts of Simple C Program, Structure of a C Program, Comments, Program Statements, C Tokens, Keywords, Identifiers, Data Types, Variables, Constants, Operators and Expressions, Expression Evaluation-precedence and associativity, Type Conversions.  
Input-Output: Non-formatted and Formatted Input and Output Functions, Escape Sequences.  
Control Statements: Selection Statements - if, if-else, nested if, nested if-else, comma operator, conditional operator, switch; Iterative Statements-while, for, do-while; Special Control Statement-goto, break, continue, return, exit.  
Arrays and Strings: One-dimensional Arrays, Character Arrays, Functions from ctype.h, string.h, Multidimensional Arrays.  
Functions: Concept of Function, Using Functions, Call-by-Value Vs Call-by-reference, Passing Arrays in Functions, Scope of Variables, Storage Classes, Inline Functions, and Recursion.  
Pointers: Introduction, Address of Operator (&), Pointer, Uses of Pointers, Arrays and Pointers, Pointers and Strings, Pointers to Pointers, Array of Pointers, Pointer to Array, Dynamic Memory Allocation.  
User-defined Data Types: Declaring a Structure (Union) and its members, Initialization Structure (Union), Accessing members of a Structure (Union), Array of Structures (Union), Structures versus Union, Enumeration Types.  
Files: Introduction, Using Files in C, Working with Text Files, Working with Binary Files, Files of Records, Random Access in Files of Records, Other File Management Functions.  
Textbook: Pradip Dey, Manas Ghosh, Computer Fundamentals and Programming in C (2e)

**Programming in C++ (18 Marks)**

Introduction to C++: Applications, Example Programs, Tokens, Data Types, Operators, Expressions, Control Structures, Arrays, Strings, Pointers, Searching and Sorting Arrays.  
Functions: Introduction, Prototype, Passing Data by Value, Reference Variables, Using Reference Variables as Parameters, Inline Functions, Default Arguments, Overloading Functions, Passing Arrays to Functions.  
Object Oriented Programming: Procedural and Object-Oriented Programming, Terminology, Benefits, OOP Languages, and OOP Applications, Classes: Introduction, Defining an Instance of a Class, Why Have Private Members? Separating Class Specification from Implementation, Inline Member Functions, Constructors, Passing Arguments to Constructors, Destructors, Overloading Constructors, Private Member Functions, Arrays of Objects, Instance and Static Members, Friends of Classes, Member-wise Assignment, Copy Constructors, Operator Overloading, Object Conversion, Aggregation

1

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Inheritance: Introduction, Protected Members and Class Access, Base Class Access Specification, Constructors and Destructors in Base and Derived Classes, Class Hierarchies, Polymorphism-Function Overloading, Function Overloading and Virtual Member Functions, Abstract Base Classes and Pure Virtual Functions, Multiple Inheritance.  
C++ Streams: Stream Classes, Unformatted I/O Operations, Formatted I/O Operations.  
Exceptions: Introduction, Throwing an Exception, Handling an Exception, Object-Oriented Exception Handling with Classes, Multiple Exceptions, Extracting Data from the Exception Class, Re-throwing an Exception.  
Templates: Function Templates- Introduction, Function Templates with Multiple Type, Overloading with Function Templates, Class Templates - Introduction, Defining Objects of the Class Template, Class Templates and Inheritance, Introduction to the STL.  
Textbook: Tony Gaddis, Starting out with C++: from control structures through objects (7e)

**Data Structures using C++ (17 Marks)**

Basic data Structure: Introduction to Data Structures, Types of Data Structures, and Introduction to Algorithms, Pseudo code, and Relationship among data, data structures, and algorithms, Implementation of data structures, Analysis of Algorithms.  
Stacks: Concept of Stacks and Queues, Stacks, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Multiple Stacks, Applications of Stack, Expression Evaluation and Conversion, Polish notation and expression conversion, Processing of Function Calls, Reversing a String with a Stack, Recursion.  
Recursion: Introduction, Recurrence, Use of Stack in Recursion, Variants of Recursion, Recursive Functions, Iteration versus Recursion.  
Queues: Concept of Queues, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Multi-queues, Dequeue, Priority Queue, Applications of Queues.  
Linked Lists: Introduction, Linked List, Linked List Abstract Data Type, Linked List Variants, Doubly Linked List, Circular Linked List, Representation of Sparse Matrix Using Linked List, Linked Stack, Linked Queue.  
Trees: Introduction, Types of Trees, Binary Tree, Binary Tree Abstract Data Type, Realization of a Binary Tree, Insertion of a Node in Binary Tree, Binary Tree Traversal, Other Tree Operations, Binary Search Tree, Threaded Binary Tree, Applications of Binary Trees.  
Searching and Sorting: Search Techniques-Linear Search, Binary Search, Sorting Techniques- Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Comparison of All Sorting Methods, Search Trees- Symbol Table, Optimal Binary Search Tree, AVL Tree (Height-balanced Tree).  
Graphs: Introduction, Representation of Graphs, Graph Traversal - Depth First Search, Breadth First Search, Spanning Tree, Prim's Algorithm, Kruskal's Algorithm.



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Hashing: Introduction, Key Terms and Issues, Hash Functions, Collision Resolution Strategies, Hash Table Overflow, Extendible Hashing  
Heaps: Basic Concepts, Implementation of Heap, Heap as Abstract Data Type, Heap Sort, Heap Applications.

**Text books:** 1. Varsha H. Patil "Data structures using C++"

2

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#### **Data Base Management Systems: (20 Marks)**

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators.

Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Database Design and the E-R Model: Overview of the Design Process, The Entity- Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data, Other Aspects of Database Design.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional- Dependency Theory, Decomposition Using Multivalued Dependencies, Normal Forms-2 NF, 3 NF, BCNF, The Database Design Methodology for Relational Databases.

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database.

Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.

Advanced SQL: Accessing SQL from a Programming Language. Functions and Procedures, Triggers, Recursive Queries.

Transaction Management: Transaction Support-Properties of Transactions, Database Architecture, Concurrency Control-The Need for Concurrency Control, Serializability and Recoverability, Locking Methods, Deadlock, Time Stamping Methods, Multi-version Timestamp Ordering, Optimistic Techniques, Granularity of Data Items, Database Recovery-The Need for Recovery, Transactions and Recovery, Recovery Facilities, Recovery Techniques, Nested Transaction Model. Security: Database Security-Threats, Computer-Based Controls-Authorization, Access Controls, Views, Backup and Recovery, Integrity, Encryption, RAID.

**Text book:** Silberschatz, H. Korth and S. Sudarshan, Database System Concepts, 6th Ed., Tata McGraw Hill, 2011

#### **Programming in Java: (15 Marks)**

Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Structure of Java Program, Type Casting, Conditional Statements, Loops, Classes, Objects, Class Declaration, Creating Objects.

Method Declaration and Invocation, Method Overloading, Constructors – Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects. Class Variables & Method-static Keyword, this Keyword, One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Inheritance: Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, final Keyword, Abstract classes, Interfaces, Abstract Classes Verses Interfaces.

Packages: Creating and Using Packages, Access Protection, Wrapper Classes, String Class, String Class.

Exception: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

3 / 4





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**62. CHEMISTRY**

**Part-A (40 Marks)**

Coordination Compounds, Applications of Coordination Compounds, Organo metallic Chemistry, Metal Carbonyls and Related Compounds, Bioinorganic Chemistry, Hard and Soft Acids and Bases (HSAB). Carboxylic Acids and Derivatives, synthesis Based on Carbanions, Nitro Hydrocarbons, Amines, Cyanides and Isocyanides, Heterocyclic Compounds, Carbohydrates, Amino Acids and Proteins, Electrochemistry and Emf, Chemical Kinetics, Thermodynamics. Photochemistry.

**Part-B (60 Marks)**

P-Block Elements, Chemistry of Zero Group Elements, Chemistry of d-Block Elements, Chemistry of f-Block Elements, General Principles of Inorganic Qualitative Analysis, Chemical Bonding, Molecular Orbital Theory, Theory of Quantitative Analysis, Theories of Bonding in Metals. Structural Theory in Organic Chemistry, Acyclic Hydrocarbons, alicyclic Hydrocarbons, aromatic Hydrocarbons, Halogen Compounds, Alcohols, Phenols, Ethers and Epoxides, Carbonyl Compounds, Conformational Analysis, Stereochemistry of Carbon Compounds. Atomic Structure and Elementary Quantum Mechanics, Gaseous State, Liquid State, Solutions, Dilute Solutions and Colligative Properties, Solid State Chemistry, Phase Rule, Colloids and Surface Chemistry, adsorption, Evaluation of Analytical Data.

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## 61. BOTANY

### Part-A (40 Marks):

#### Microbial Diversity :

**Bacteria:** Structure, nutrition, reproduction and economic importance. An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice. Brief account of Archaeobacteria, Actinomycetes. General account of Mycoplasma with reference to Little leaf of brinjal and Papaya leaf curl.

**Viruses:** Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro.

#### Algae

**Algae:** General characters, structure, reproduction and classification of algae (Fritsch).  
**Cyanobacteria:** General characters, cell structure, thallus organisation and their significance as biofertilizers with special reference to Oscillatoria, Nostoc and Anabaena.

#### Structure and reproduction of the following:

Chlorophyceae-Volvox, Gelidium, Chara.  
Phaeophyceae-Ectocarpus.  
Rhodophyceae-Polythronia.

#### Fungi

**Fungi:** General characters and classification of fungi (Ainsworth). Structure and reproduction of the following:

Macrosporogonia-Albugo  
Zygomycotina-Mucor  
Ascomycotina-Saccharomyces, Penicillium  
Basidiomycotina-Puccinia  
Deuteromycotina-Cercospora.

**Lichens:** Ecological and economic importance.

#### Bryophytes, Pteridophytes, Gymnosperms and Paleobotany:

**Bryophytes:** Structure, reproduction, life cycle and systematic position of *Marchantia*, *Anthoceros* and *Polypodium*. Evolution of Sporophyte in Bryophytes. **Pteridophytes:** Structure, reproduction, life cycle and systematic position of *Equisetum*, *Lycopodium*, *Equisetum* and *Marsilea*. Stear evolution, heterospory and seed habit in Pteridophytes. **Gymnosperms:** General characters, structure, reproduction and classification (Sparre). Distribution and economic importance of Gymnosperms. Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum*. **Paleobotany:** Introduction, Fossils, types of fossils and fossilization. Importance of fossils. Geological time scale.

#### Taxonomy of Angiosperms:

**Principles of plant systematics, Types of classification:** Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantl. An introduction to Angiosperm Phylogeny Group (APG). **Current concepts in Angiosperm Taxonomy.** Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy. Nomenclature and Taxonomic resources: An introduction to ICN, Shenzhen code - a brief account. Herbarium: Concept, techniques and applications. Systematic study and economic importance of plants belonging to the families: Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae, Apilaceae, Asteraceae, Asclepiadaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Monocotyledons: Orchidaceae and Poaceae, Zingiberaceae.

1

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#### Ecology

Component of eco system, energy flow, food chain and food webs. Plants and environment, ecological adaptations of plants, Hydrophytes, Xerophytes and Mesophytes. Plant Succession serial stages, modification of environment, climax formation with reference to Hydrosere and Xerosere. General account of adaptations in serophytes and hydrophytes.

### Part-B (60 Marks)

#### Plant Anatomy

**Meristems:** Types, histological organization of shoot and root apices and theories. Tissues and Tissue Systems: Simple, complex and special tissues. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths. Stem and root anatomy: Vascular cambium - Formation and function. Anomalous secondary growth of Stem - *Achyrocline*, *Boerhaavia*, *Rhynchosia*, *Dracaena*. Root- *Beta vulgaris*. Wood structure: General account. Study of local timbers - Teak, Rosewood, Red sanders, Nallamaddi and Neem.

#### Embryology

History and importance of Embryology. Anther structure, Microsporogenesis and development of male gametophyte. Ovule structure and types; Megasporogenesis; types and development of female gametophyte. Pollen morphology, pollination and fertilization. Pollination - Types, Pollen - pistil interaction, double fertilization. Seed structure appendages and dispersal mechanisms. Endosperm - Development and types. Embryo - development and type, Polyembryony and Apomixis - an outline.

#### Cell Biology

**Plant cell envelope:** Ultra structure of cell wall. Models of membrane structure, structure and functions of Semipermeable Plasma membrane. **Cell Organelles:** Structure and semiautonomous nature of Mitochondria and Chloroplast. **Nucleus:** Ultra structure, types and functions of DNA & RNA. Mitochondrial DNA & Plastid DNA and Plasmids. **Chromosomes:** Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lamphrush and Polytene chromosomes. **Cell division:** Cell and its regulation; mitosis, meiosis and their significance

#### Genetics

**Mendelian:** History, Principles of inheritance, Chromosome theory of inheritance, Autosomes and sex chromosomes, Incomplete dominance and Co-dominance. Multiple alleles, Lethal alleles, Epistasis, Recessive and Dominant traits, Polygenic inheritance, Linkage and crossing over, Recombination frequency, two factor and three factor crosses; Interference and coincidence. Numericals based on gene mapping; Sex Linkage. Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy. Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagen-physical and chemical (Base analogs, deaminating, alkylating and intercalating agents).

#### Plant Physiology

**Plant-water Relations:** Water potential, osmosis, osmotic and pressure potential, absorption and transport of water. **Mineral Nutrition:** Essential micro & macro nutrients and symptoms of mineral deficiency. **Transpiration:** Stomatal structure and movement. Mechanism of phloem transport. Enzymes: Nomenclature, properties, Classification and factors regulating enzyme activity. **Photosynthesis:** Photosynthetic pigments, Cyclic and Non-cyclic Photophosphorylation. Carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub> and CAM. **Respiration:** Aerobic and Anaerobic; Glycolysis, Krebs cycle and oxidative phosphorylation. **Nitrogen Metabolism:** Biological nitrogen fixation. Physiological role of Phytohormones: Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids.

2



# TELANGANA SOCIAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN , MANCHERIAL, DIST: MANCHERIAL-504208



**(Affiliated to Kakatiya University , College Code: 635)**

**Sumathi**  
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Principal

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CPGET-2024 Syllabus

**40. POLITICAL SCIENCE**

**Part - A (Marks: 30)**

**Political Science: Theories, Concepts and Institutions**

Political Science – definition, scope and Political Science as a Policy Science; Political Science- and its relations with other social sciences – History, Economics and Sociology; Approaches to the Study of Politics—Liberal, Marxist, Behavioral; Ideologies—Individualism, Marxism, Anarchism, Fascism and Socialism; Theories of Origin of the State – Divine, Evolutionary (Historical) and Social Contract.

Concepts – State; Nation; Civil Society; Sovereignty; Monism and Pluralism; Law; Sources of Law, Rule of Law; Power, Authority and Legitimacy; Citizenship; Liberty and Equality and inter-relationship between liberty and equality; Rights: theories and kinds; Human Rights; Forms of Government – Democracy: Direct and Indirect; Unitary and Federal; Parliamentary and Presidential; Theory of separation of powers (Montesquieu); Organs of Government: Legislature – unicameral, bi-cameral, powers and functions; Executive – powers and functions; Judiciary – Powers and functions; Independence of judiciary and Judicial Review.

**Part - B (Marks: 40)**

**Indian Government and Politics**

Nationalist Movement and Constitutional Development – Impact of Colonial Rule and Indian National Movement; Making of the Indian Constitution; Philosophical Foundations and Salient Features of the Indian Constitution, Fundamental Rights and Directive Principles – Fundamental Rights and Duties; Directive Principles of State Policy; Relationship between Fundamental Rights and Directive Principles of State Policy.

Statutory Commissions for Protection of Rights – National Human Rights Commission, Emergency, Evolution and Functioning (NHRC); National Commission for Women (NCW); National SC & ST Commission; National Minorities Commission; Social and Political Movements in India – Farmers Movements; Dalit Movements; Tribal Movements; Environmental Movements; Women's Movement.

Union Government – President: Election, Powers and Functions; Parliament – Composition; Powers and Functions; Prime Minister and Council of Ministers; Supreme Court – Composition; Powers and Functions; Judicial Review; Judicial Activism; State Government – Governor; Chief Minister and Council of Ministers; Legislature; High Court – Composition; Powers and Functions; Union - State Relations – Features of Indian Federal System; Centre - State Relations; Recent Trends in Centre-State Relations.

Local Self Government—Democratic Decentralisation; Panchayati Raj Institutions—73rd Constitutional Amendment; Urban Self Governing Bodies; 74th Constitutional Amendment.

Political Process; Nature of Indian Political Party System – National Political Parties – INC, BJP, CPI, CPM, BSP, SP, JD(V); Regional Political Parties – Akali Dal, JMM, AIADMK, TRS, TDP; Pressure Groups; Media; Right to Information Act; Electoral Politics: Election Commission – Composition, Powers and Functions; Voting Behavior – Influence of Socio-Economic Factors; Electoral Reforms.

CPGET-2024 Syllabus

**Part - C (Marks: 30)**

**Political Thought**

Political Thought – Nature, Methods and Significance; Western and Indian Political Thought – Comparison; Ancient and Medieval Political Thought – Plato: Theory of Justice and Ideal State; Aristotle: Classification of Governments, Theory of Revolutions and Slavery; Manu-Dharma and Varma; Kautilya – Saptanga Theory, Mandala Theory; Thomas Aquinas: Theory of Law; Early Modern Western Political Thought: Church - State Controversy; Nicolo Machiavelli as a modern political thinker and views on State Craft.

Social Contractualists: Thomas Hobbes- Individualism and Absolute (State) Sovereignty; John Locke - Natural Rights and Limited Government; Jean Jacques Rousseau- General Will and Popular Sovereignty; Utilitarians: Jeremy Bentham- Principles of Utilitarianism; J.S. Mill-Liberty, Representative Government; Idealists: GWF Hegel- Dialectics and Theory of State; TH Green- Rights and Political Obligation.

Marxist Philosophy – Karl Marx- Dialectical and Historical Materialism; Mao Ze deng: On Contradictions, New Democratic Revolution; Antonio Gramsci: Hegemony and Civil Society.

Indian Political Thought: Buddha- Social and Political Ideas; Dharma and Sangha; Bauva - Social Ideas; Jyotirao Phule- Critique of Brahmanism, Social Revolution; Mohandas Karamchand Gandhi - Ahimsa, Satyagraha; Jawaharlal Nehru - Democratic Socialism, Secularism; Dr. B.R. Ambedkar- Theory of Caste, Annihilation of Caste and State Socialism.



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CPGET-2024 Syllabus

### 33. HISTORY

#### Part - A: (40 Marks)

**World History (1453-1950 C.E.) : Introduction :** Fall of Constantinople, end of crusades, Renaissance, Geographical Discoveries, Reformation, Rise of Nation States; Enlightened Despotism; American war of Independence; French Revolution : Causes - Course - Constitutional Assembly - National Convention - Directory - Effects of the Revolution; Emergence of Napoleon Bonaparte - Expansion - Consolidation and Downfall; Vienna Congress - Concert of Europe - Metetrnich - Revolutions of 1830 - 1848; The Industrial Revolution - its effects ; Second Republic in France - Napoleon III - Paris Commune - The Rise of III French Republic; National Movements : Unification of Italy, Unification of Germany; Liberalism and Democracy in Britain; The Eastern Question - Crimean War - Berlin Congress; Revolution in Turkey - Balkan wars; Scramble for African and Asian Colonies - Theories and Mechanisms of Imperialism; Power blocks in Europe - Imperial Rivalry - Causes and System; First World War - Causes and Effects - Treaty of Versailles; Russian Revolution 1917 - Causes and Significance; World under Economic crisis - Great Depression. Rise of Fascism and Nazism; League of Nations - Achievements and Failures; Second World War - Causes, Course and Effects; Post Second World War Developments - U.N.O. - Cold War.

#### Part B : (60 Marks)

##### History and Culture of India up to 1964 C.E.

**Unit 1:** Introduction to History - Influence of Geography on History - Survey of the Sources- Pre-Historic period - Paleolithic, Mesolithic and Neolithic Cultures - Role of Technology. Indus Valley Civilization - Its Characteristic Features - Vedic Culture - Early and Later Vedic Periods - Post-Vedic period - Emergence of Varna and Jati - Rise of New Religious Movements - Jainism and Buddhism in 6<sup>th</sup> Century B.C. Impact on Society and Culture.

**Unit 2:** A Brief Survey of Political Conditions in Ancient Indian - Magadha, Alexander's Invasion and Mauryas - Ashoka's Dhamma, Its Nature and Propagation - Mauryan Administration, Society and Economy - Art and Architecture.

**Unit 3:** Post-Mauryan period in North India - A Brief Political Survey of Kushana, Gupta, Pushyabuthi and Rajput; Polity and Administration - Social Conditions - Caste System - Position of Women - Economy, Indian Feudalism - Art - Architecture - Education, Literature, Philosophy, Science and Technology.

**Unit 4:** A Brief Political Survey of South India - Sangam Age - Satavahanas - Pallavas - Cholas - Chalukyas and Rastrakutas - Kakatiyas, Vijayanagara and Bahaimains: Polity and Administration, Society, Economy Art, Architecture and Literature.

**Unit 5:** Invasions of Arabs, Ghaznavids and Ghoris and Delhi Sultanate - A Brief Political Survey of Delhi Sultanate Polity and Administration, Reforms of Alauddin and Mohd. Bin Tughaq, Society, Nobility - Status of Women, Economics and Technological Developments, Agriculture - Industry - Trade and Commerce - Urbanization, Art and Architecture - Fine Arts - Education and Literature.

**Unit 6:** Impact of Islam on Indian Society and Culture - Bhakti and Sufi Movements - Emergence of Composite Culture.

1

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**Unit 7:** Survey of Sources - Establishment of Mughal Empire - Sherahah Sur - Brief Survey of Political History up to A.D. 1707 - Polity and Administration - Society - Social Composition - Ulama - Nobility - Peasantry - Artisans - Slaves - Status of Women - Economy: Agriculture Industries, Trade and Commerce - Economic and Technological Developments, Religion - Hindu-Muslim Relations - Composite Culture, Education, Literature, Art, Architecture and Fine Arts, Decline and Disintegration of Mughal Empire - Rise of Regional Powers - Marathas and Sikhs.

**Unit 8:** Advent of European Powers - Portuguese, Dutch, English and French Expansion and Consolidation of British Empire - Wars - Diplomacy - Policies Pursued - Subsidiary Alliance - Doctrine of Lapse; Economics Policies and Changes - Mercantilism and Free Trade Policies - Land Revenue Settlements - permanent - Ryotwari - Mahalwari Systems - Irrigation - Commercialization of Agriculture - Condition of Peasants - Famines - Decline of Cottage Industries.

**Unit 9:** Anti-colonial Uprising - Peasant and Tribal Revolts, Revolt of 1857 - Causes - Nature and Results.

**Unit 10:** Factors for Social Change - Christian Missionaries - Western Education - Emergence of New Middle Classes - Growth of Press - Socio-Religious Reforms Movements - Brahma Samaj - Arya Samaj - Theosophical Society - Ramakrishna Mission - Aligarh Movement - Jyotiba Phule - Narayana Guru, Periyar's Self-Respect Movement - Dr.B.R.Ambedkar.

**Unit 11:** National Movement - Factors for the Growth of Nationalism - Indian National Congress - Three Phases of Freedom Struggle - Revolutionary Movements - Left Wing Movements - Peasant and Workers Movements.

**Unit 12:** Emergence of Communal Trends - Partition of India - Integration of Princely states into Indian Union - Formation of Indian Republic, Jawaharlal Nehru as first Prime Minister and his Policies.

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CPGET-2024 Syllabus

### 31. ECONOMICS

#### MICRO ECONOMICS

**Introduction:** Importance of Economics. Definition: Wealth, Welfare, Scarcity and Growth, Scope and Limitations. Micro and Macro Analysis. Approaches to Economic Analysis. Partial Equilibrium vs. General Equilibrium. Comparative Static and Dynamic analysis. Positive and Normative Approaches.

**Theory of Consumer Behavior:** Utility Analysis. Cardinal Utility Theory, Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Consumer Equilibrium. Ordinal Utility Theory: Indifference Curve Analysis, Consumer's Equilibrium. Price, Income and Substitution Effects. Types of Goods: Normal, Inferior and Giffen Goods. Derivation of Individual Demand Curve and Market Demand Curve with the help of Indifference Curve. Consumer Surplus.

**Supply and Demand Analysis:** Law of Demand, Movement and Shifts in Demand Curve. Elasticity of Demand, Price, Income and Cross Elasticity, Degree of Elasticity. Methods of Measuring Elasticity are of Demand, Point, Arc and Chord Methods. Law of Supply, Movement and Shifts in Supply Curves. Elasticity of Supply, Determinants of Supply. Derivation of Supply curve.

**Theory of Production:** Concept of Production, Production Functions: Linear and Non - Linear Homogeneous Production Functions. Isoquants, Scale of Production, Returns to Scale, Law of Variable Proportions and Variable Returns to Scale, Economies of Scale and Scope, Limitations of Production Function Analysis. Production Surplus.

**Production Costs: Concepts and Types:** Money, Accounting, Real, Opportunity, Economic, Implicit and Explicit, Short Run, Long Run, Fixed and Variable Costs, Concepts of Total, Average and Marginal costs. Derivation of Long run Average and Marginal Cost Curves. Relationship between Average and Marginal Costs Curves in Short run and Long run.

#### MACRO ECONOMICS

**Introduction:** Meaning, Scope and Limitations of Macro Economics. National Income: Concepts, Methods of Measurement and Difficulties in Estimation of National Income and Limitations. National Income as a Measure of Welfare. Social Accounting.

**Theories of Output and Employment:** The Classical Theory of Employment (Say's Law and Pigou's Wage cut Policy) and Criticism, Keynesian Theory. Effective Demand, Aggregate Demand and Aggregate Supply Function, Consumption Function. Factors influencing consumption function, Investment Multiplier its relevance in emerging economies. Concept of Accelerator.

**Investment & Theories of Interest Rate:** Capital and Investment, Types of Investment, Determinants of level of Investment, MEC, Co-Fund and Ex-Ante Investment and Savings. Classical, Neo-classical, And Keynesian Theories of Interest. Liquidity Trap, Simultaneous Determination of Interest and Real Income through IS-LM Framework in a closed Economy.

**Supply of Money & Demand for Money:** Definition of Money - Money Supply. Measures of Money Supply (M<sub>1</sub>, M<sub>2</sub>, M<sub>3</sub> & M<sub>4</sub>). RBI approach to money supply. High powered money and money multiplier. Control of money supply. Variations in money supply in India. Theories of demand for money - Classical and Neo Classical approaches, Keynesian liquidity preference approach. Derivation of LM curve.

**Inflation & Business Cycles:** Definition of Inflation. Causes, consequences and control of inflation - Deflation and stagflation. Nature, Characteristics and Phases of Business Cycles. - Samuelson's Business Cycle Theory. Stock market crashing, Inflation, Insurance-Life Insurance and General Insurance.

1

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#### MICRO ECONOMICS

**Types of Revenue and Objectives of Firm:** Revenues of the Firm, Concept of Revenue: Total Revenue (TR), Average Revenue (AR) and Marginal Revenue (MR). Relationship between AR and MR and the Elasticity of Market Demand. Traditional Objectives of the Firm: Profit Maximization, Modern Objectives of the Firm: Output/Sales/Market Share Maximization.

**Perfect Competition and Monopoly:** Classification of Market, Perfect Competition, Short Run and Long Run Analysis, Equilibrium of the Firm and Industry. Monopoly Features, Equilibrium, Discriminatory Pricing, Differences between Perfect Competition and Monopoly.

**Monopolistic Competition and Oligopoly Markets:** Monopolistic Competition, Product Differentiation, Sinking Costs, Oligopoly: Homogeneous and Heterogeneous Oligopoly, Price Equilibria in Oligopoly, kinked Demand Curve.

**Pricing Strategies:** Cost Plus Pricing, Marginal Cost Pricing, Rate of Return Pricing, Product Life Pricing, Price Skimming, Penetration Pricing, Markup Pricing, State Intervention and Administered Prices.

**Distribution and Factor Pricing:** Functional and Personal Distribution, Marginal Productivity Theory of Distribution, Ricardo's Theory of Rent and Quasi-Rent, Theories of Wages - Theories of Profit, Risk and Uncertainty, Concept of Interest.

#### PUBLIC ECONOMICS

**Introduction:** Meaning and importance of Public Finance - Evolution of public Finance. Multiple theory of public household-Public and Private goods. Markets mechanism in public and private goods. State as an agent of planning and development.

**Public Expenditure:** Theories of public expenditure- Wagner's law of increasing state activities - Prudish-Wiseman hypothesis. Principle of Maximum Social Advantage - Growth and pattern of public expenditure, Effects of public expenditure-Cost benefit analysis.

**Taxation & Public Debt:** Approaches to taxation- Benefit approach, Ability to pay approach and Neutrality approach- Elasticity and buoyancy of taxation incidence and shifting of taxation-Types and classification of taxes and VAT, Approaches to public debt.

**Fiscal Policy & Federal Finance:** Definition of fiscal policy and its objectives; Fiscal Policies for redistribution of income and wealth and stabilization - Fiscal policies in a developing country, federal financial structure and its main features - Direct taxes-income tax-Corporate tax, Indirect tax structure- Union excise duties, customs duties, sales tax-VAT, Centre-State financial relations.

**Budget:** Budget - Classification of budgets - Economic, Functional, organizational, classification of budgets- performance programming and zero based budgets-surplus, balanced and deficit budgets-Concepts of budget deficit and their implications - State and Central budgets. Fiscal crisis and Fiscal sector reforms in India. Reports on Finance Commissions in India.

#### DEVELOPMENT ECONOMICS

**Economic Development and Growth:** Concepts of Economic Growth and Development. Measurement of Economic Development: Per Capita Income, Basic Needs, Physical Quality of Life Index, Human Development Index and Gender Empowerment Measure. Role of State and Market in Economic Development.

**Factors in Economic Development:** Factors affecting Economic Development-Characteristics of developing Countries- Population and Economic Development- Theories of Demographic Transition, Human Resource Development and Economic Development.

**Theories of Economic Development:** Theories of Adam Smith, David Ricardo, Karl Marx and Schumpeter.

2

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**Theories of Under Development:** Lewis, Rodrik, Liberman, Nurkse's Balanced Growth Strategy, Hirsch man's Un-balanced Growth Strategy, Myrdal model.

#### INTERNATIONAL ECONOMICS

**Theories of International Trade:** Theories of absolute advantage, comparative advantage and opportunity costs, Theorem of factor price equalization - Heckscher - Ohlin theory of trade.

**Trade and Growth:** Static Trade Trade as an Engine of Economic Growth. Concepts of Terms of Trade-Factors affecting Terms of Trade: Singer-Feldman's secular deterioration of Terms of Trade.

**Barriers to Trade:** Tariffs, Quotas and Subsidies and their effects. The optimum tariff.

**Balance of Payments:** Concepts and Components of BOP, Equilibrium and disequilibrium in Balance of payments, Types of Disequilibrium, Remedial measures to control disequilibrium. Devaluation: Direction and Composition of Foreign trade, Export and Import Policies of India.

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**13. ENGLISH**

**Part A-40 Marks**

- **Spelling & Punctuation**
- **Vocabulary:** Antonyms – Synonyms – One-word substitutes - Words often confused – Idiomatic expressions
- **Grammar:** Tenses - Propositions - Concord - Auxiliary verbs - Active passive Voice
- **Correction of sentences:** Identify the error - Identify the correct sentence
- **Exercises in Jumbling:** Jumbled words to be arranged in the right order to form a sentence -Paragraph sequencing.

**Part B-60 Marks**

- History of English Literature
- Literary Terms
- Literary Forms
- Literary Movements
- Books & Authors (canonical texts)
- Comprehension (Poetry)
- Comprehension (Prose)

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**11. ANCIENT INDIAN HISTORY, CULTURE & ARCHAEOLOGY (AIHCA)**

**Part – A: (40 Marks)**

Fundamentals of Indian Archaeology, Indian Art and Architecture

**Part – B: (60 Marks)**

Indian History from the earliest time to the present day including political, social, economic, religious and cultural aspects.

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