

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
AGRICULTURE
(OPTIONAL)
PAPER - II
[07]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instructions carefully before attempting the paper.

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SECTION - A

Answer the following in about 150 words each.

1.
 - a) Why is incomplete dominance considered to be an exception to the Mendelian principles of inheritance? Why did Mendel's experiments fail to explain the concept of linkage? (10)
 - b) Explain photosynthesis and the methods to measure its rate. State the merits and demerits of each method. (10)
 - c) Discuss plant resistance to insects and its mechanisms. Quote three historical examples of plant resistance for pest management. (10)
 - d) Explain various methods of gene transfer in plants. Discuss the status of transgenic crops in India. (10)
 - e) What is the impact of WTO agreement on Indian agriculture? How Intellectual Property Rights for living organisms are regulated? (10)
2.
 - a) Explain the genetics of salinity resistance. Describe the approaches for estimation of salinity resistance and discuss their usefulness as selection criteria. (20)
 - b) Discuss the principle and application of plant mutagenesis in crop improvement. (15)
 - c) Explain the application of genetic engineering in agriculture and industry. (15)
3.
 - a) Enlist different groups of new chemistry pesticides. Discuss the mode of action of neonicotinoids along with their merits and demerits. (20)
 - b) Describe the backcross breeding programme to transfer the desired dominant gene(s) or traits for crop improvement. (15)
 - c) Explain the role of PPV and FRA in protecting the rights of farmers and plant breeders. (15)
4.
 - a) How do genetically modified crop varieties differ from traditionally bred varieties? What are biosafety issues related to these and how can these be addressed? (20)
 - b) Justify the statement that inversion suppresses crossing over. Discuss cytological basis of crossing over. (15)
 - c) What do you understand by the centre of origin of crop plants? Discuss its importance in crop improvement. (15)

SECTION - B

Answer the following in about 150 words each

5. a) How does abiotic stress influence the productivity and quality of crops? (10)
b) Explain national food and nutritional policy. Discuss the constraints in food procurement and distribution. (10)
c) What is the significance of disease forecasting? Discuss the factors affecting the disease epidemic. (10)
d) Discuss the mechanisms of nutrient transport in plants. (10)
e) Explain plant cell structure and the functions of cell organelles (10)
 6. a) What is the central dogma of molecular biology? Discuss the procedure of translation and transcription in protein synthesis. (20)
b) Discuss five major diseases of cole crops giving causal organisms, symptoms and control measures. (15)
c) Discuss the role of plant growth hormones and regulators in crop production. (15)
 7. a) What are the important insect-pests of paddy? Discuss the integrated pest management strategies for their control. (20)
b) Why vegetables and fruits are protective foods? How can biofortification enhance nutritional quality? (15)
c) Discuss the role of medicinal and aromatic plants in maintaining personal and group health. (15)
 8. a) Discuss the types, designs and main features of recreational public gardens in India. (20)
b) Discuss the status and prospects of protected cultivation in India and abroad. (15)
c) Discuss the role of public and private sectors in quality seed production and marketing in India. (15)
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Total No. of Printed Pages-3]

Roll No. _____

CC(M)
ANIMAL HUSBANDRY AND VETERINARY SCIENCE
(OPTIONAL)
PAPER - II
[09]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION - A

1. a) Explain nitrate and nitrite poisoning in ruminants, its etiology, signs, diagnosis, treatment and control. (20)
b) Explain mineral and vitamin deficiency diseases in poultry birds. (10)
c) Explain the key features of the World Trade Organization Agreement on Sanitary and Phytosanitary Measures. (10)
d) Differentiate between. (2×5= 10)
i) *Kulfi* and ice cream.
ii) Cheese and *Paneer*
2. a) Explain etio-pathogenesis, clinical findings, diagnosis and treatment of abomasal displacement and volvulus in cattle. (20)
b) What do you mean by the term 'zoonoses'? Classify the zoonoses based on their transmission cycle. (10)
c) Describe anatomy and vascularization of bovine intestinal tract. (10)
d) Explain the following: (2×5= 10)
i) Nutritional and health benefits of fermented dairy products.
ii) Prevention of Cruelty to Animals Act of India.
3. a) What is canning? Write the steps involved in canning of meat products. Explain the types of spoilage which can be found in canned meat products. (20)
b) Classify air pollutants. Discuss the nature of pollutants commonly found within the animal houses. (10)
c) Explain female reproductive organs in birds and discuss the production of an egg? (10)
d) Write about humoral and cell mediated immunity in animals. (10)
4. a) Explain the following: (4×5=20)
i) Pregnancy toxemia in sheep.
ii) Fatty liver disease in cattle.
iii) Hyperlipemia in ponies.
iv) Sporadic exertional rhabdomyolysis in horses.
b) Differentiate between active and passive immunity. Write advantages and disadvantages of live and inactivated vaccines. (10)
c) Discuss the role and mandates of the global 'quadripartite platform' to tackle antimicrobial resistance threats to human and animal health and ecosystems. (10)
d) Write an explanatory note on GMP (Good Manufacturing Practices) implementation in a meat plant. (10)

SECTION - B

5. a) Enlist the name of various dairy by-products of milk processing industry in India. Write an explanatory note on various food and non-food uses of casein. (20)
- b) Describe infectious causes of respiratory diseases in horses. (15)
- c) Describe common waterborne infections with their prevention and control strategies. (15)
6. a) Explain the toxicities of the following drugs: (4×5=20)
- i) Tetracyclines.
 - ii) Non-Steroidal Anti-Inflammatory Drugs.
 - iii) Aminoglycosides.
 - iv) Sulphonamides-Trimethoprim.
- b) Explain various neurological disorders associated with lameness or gait abnormalities in domestic animals. (15)
- c) Explain the following: (3×5=15)
- i) Antineoplastic compounds.
 - ii) Antinematodal and anticestodal drugs.
 - iii) Autocoids.
7. a) Write mechanism of action of following: (4×5=20)
- i) Ivermectin.
 - ii) Fluoroquinolones.
 - iii) Anticholinergic drugs.
 - iv) Ketamine.
- b) What do you understand by milk standardization? Explain in detail the importance of standardization in dairy plant in Indian context. (15)
- c) Explain in detail the role of veterinarians in quality milk production at dairy farm with special reference to food safety issues. (15)
- 8) a) What is tenderness of meat? Enlist the methods used for meat tenderization. Explain the importance of enzymes in meat industry. (15)
- b) Discuss the following: (3×5=15)
- i) American Society of Anesthesiologists (ASA) classification based on physical status of the animals.
 - ii) Preanesthetic drugs having analgesic property.
 - iii) Dissociative anesthetics.
- c) Enlist various diseases causing nervous signs in cattle and discuss briefly about Bovine Spongiform Encephalopathy. (10)
- d) Describe the types of epidemiological studies and their measures of association. (10)

CC(M)
ANTHROPOLOGY
PAPER - II
[11]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION - A

Write notes on the following in about 150 words each.

(5×10=50)

1. a) Ramapithecus.
b) Mon-Khmer Languages.
c) Robert Bruce Foote.
d) Impact of Buddhism on Indian Society.
e) Indian Mesolithic rock Art
2. a) Describe salient features of Indian Neolithic Age. Highlight findings from Chirand and Daojali Halding. (20)
b) What is Purushartha? What is the contemporary relevance of Purushartha? (15)
c) Describe the hurdles faced in the implementation of the Forest Rights Act 2006. What steps the government has taken to resolve them? (15)
3. a) What is the impact of Islam on the Scheduled tribes? Explain its difference from other types of religious transformations. (20)
b) Discuss Verrier Elwin's contributions towards understanding of tribal culture and its relevance in contemporary context. (15)
c) Who are the P.V.T.Gs ? Describe geographical distribution and cultural characteristics among the P.V.T.Gs. (15)
4. a) How does the concept of Little and Great Traditions help in understanding Indian villages? (20)
b) Explain the existence of urban villages in the context of metropolitan cities in India. (15)
c) Critically compare 'Affirmative Action' of USA and 'Protective Discrimination' for scheduled Tribes in India. (15)

SECTION - B

Write notes on the following in about 150 words each.

(5×10=50)

5. a) Gandhi and Tribes
b) Rina and Rebirth
c) B.H. Baden Powell
d) Parsis in India
e) Ethno-Archaeology

6. a) Critically explain the contemporary relevance of Mckim Marriot's conceptual categories to explain civilisational change in India. (20)
- b) Describe the George Abraham Grierson's classification of Indian Languages. (15)
- c) Describe the salient features of the PESA Act of 1996 and attempt a comparison with the features of VI Schedule. (15)
7. a) Critically examine the impacts of outside contact on the Jarawas and Great Andamanese: What approach do you recommend for the Sentinelese? (20)
- b) Delineate the constitutional measures to ensure autonomy to tribes in northeast India and why are these safeguards important. (15)
- c) Comment on the presence of Negrito elements in Indian population. (15)
8. a) Describe with suitable examples the merits and demerits of 'ethnic identity based politics among the tribal communities of eastern India. (20)
- b) Tribal groups are particularly vulnerable to bonded labour, strict enforcement is needed to prevent exploitation. In this context, what are the measures adopted by the Central and State governments to solve these problems. (15)
- c) Foreign Contribution Regulation Act (FCRA) guidelines to NGO's have been criticized for interfering with developmental process in Tribal heartland. Comment on the role of NGO's in tribal development. (15)
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Total No. of Printed Pages-3]

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CC(M)
BOTANY
(OPTIONAL)
PAPER - II
[13]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION - A

1. Write notes on:
 - a) Biological nitrogen fixation. (10)
 - b) Nuclear pore complex. (10)
 - c) Bulk flow hypothesis of phloem transport. (10)
 - d) DNA fingerprinting. (10)
 - e) Sex linked inheritance in plants. (10)
2.
 - a) Describe the process of signal transduction in eukaryotic cells. (20)
 - b) Enumerate the general characteristics of enzymes and explain their mechanism of action. (15)
 - c) Define standard deviation and coefficient of variation. If mean and standard deviation of a data series are 34.60 and 14.00 respectively, compute the value of coefficient of variation. (15)
3.
 - a) Discuss the various modes of solute movement across cell membrane. (20)
 - b) Highlight the essential properties of plant growth regulators. List the physiological roles of auxin and ethylene. (15)
 - c) Comment on the role of RNA in origin and evolution of life on earth. (15)
4.
 - a) What are the reasons for global warming? Mention the mitigation strategies to combat climate change. (20)
 - b) List the types and causes of seed dormancy. What are the treatments to overcome the dormancy of seeds? (15)
 - c) Describe the semi autonomous organelles of eukaryotic cells. Comment on the endosymbiotic theory. (15)

SECTION - B

5. Briefly explain
 - a) Hybridization. (10)
 - b) Mode of action of phytochrome. (10)
 - c) Phytogeographical regions of India. (10)
 - d) Phytoremediation. (10)
 - e) Incomplete dominance using Punnett square. (10)

6. a) What are the various types of intellectual property rights? Illustrate with examples how IPR can be used to protect farmers' rights (20)
- b) Describe plant succession in aquatic environment (hydrosere). (15)
- c) How are plants affected by heat stress and what are the various coping strategies? (15)
7. a) Compare and contrast C4 and CAM pathways of photosynthesis. Comment on their evolutionary significance. (20)
- b) List the methods of producing transgenic plants and explain the biosafety concerns involved. (15)
- c) Differentiate between (any **THREE**). (3×5=15)
- i) Oxidative phosphorylation and photophosphorylation.
 - ii) Light microscope and electron microscope .
 - iii) Phototropism and geotropism .
 - iv) Polytene chromosome and B-chromosome.
 - v) Lysosome and peroxisome.
 - vi) Florigen and vernalin.
8. a) Explain the process of photoperiodism. List the categories of plants based on their response to critical day length. Comment on the importance of dark period in photoperiodic response. (20)
- b) List the various ways in which gene expression is regulated. What is gene silencing? (15)
- c) Critically analyze the need to conserve biodiversity and the strategies being adapted for the same. (15)
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CC(M)
CHEMISTRY
(OPTIONAL)
PAPER - II
[15]

Time Allowed - Three Hours

Maximum Marks-250

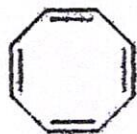
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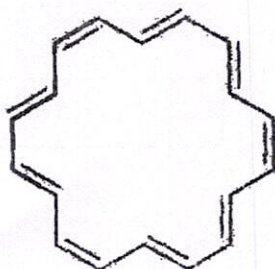
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SECTION - A

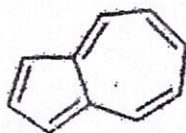
1. (a) Explain aromaticity and anti-aromaticity. Categorize the following organic compounds as aromatic, non-aromatic and antiaromatic. Give suitable explanation for your answer. (10)



i) **Cyclooctatetraene**



ii) **[18]-Annulene**

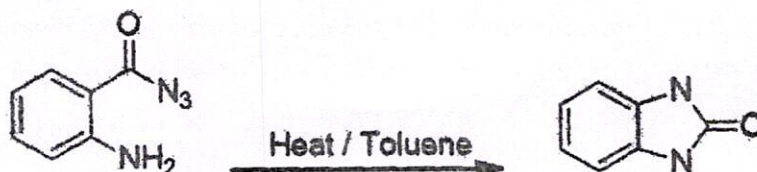


iii) **Azulene**

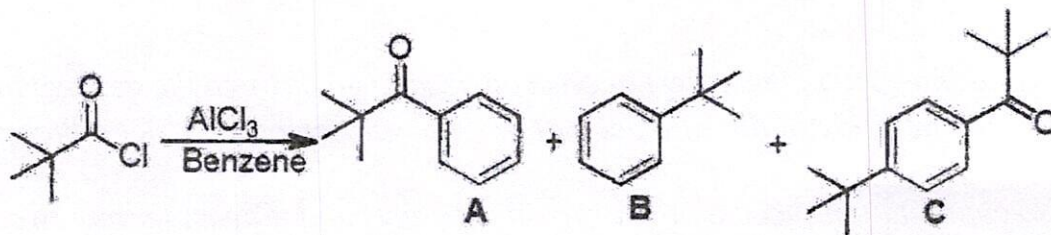


iv) **1,3-Cyclobutadiene**

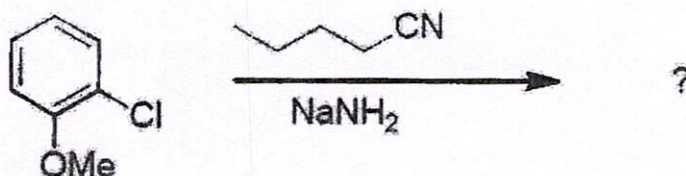
- (b) The acyl azide, shown in the following reaction, is refluxed in dry toluene for three hours to generate 90% yield of a heterocycle(product). Formulate the mechanism of the reaction, emphasizing on the role of the involved reactive intermediate. (15)



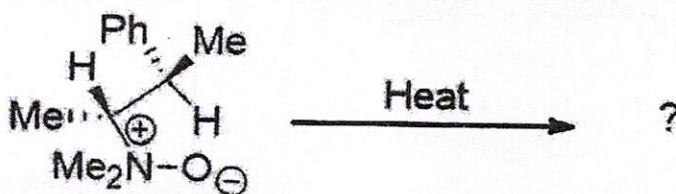
- (c) Friedel - Crafts acylation of benzene with $t\text{-BuCOCl}$ gives rise to three compounds. **A,B,C**. Explain how these compounds are formed and predict the major product in the reaction. (15)



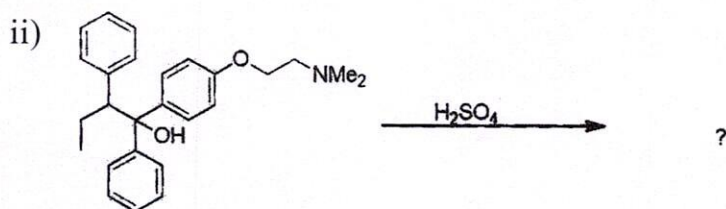
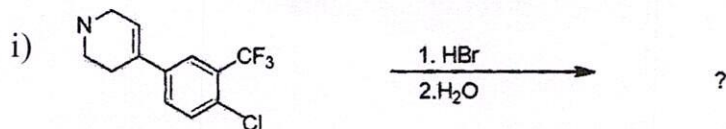
- (d) Predict the product for the following reaction and write the mechanism for the reaction: (10)



2. (a) N-oxide of *erythro*-2-dimethylamino-3-phenylbutane is subjected to heating. Explain the reaction with correct stereochemistry of the product. (10)

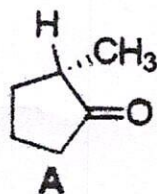


- (b) Write the product in the following reactions: (20)

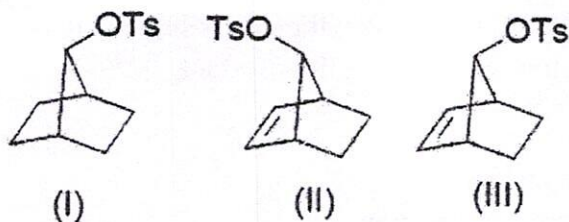


- (c) Explain the following: (20)

- Optically active *cis* 2,3 - dimethylcyclobutanone on reaction with diazomethane yields optically inactive compound.
- Optically active ketone(A) undergoes racemization on reaction with dilute sulphuric acid.



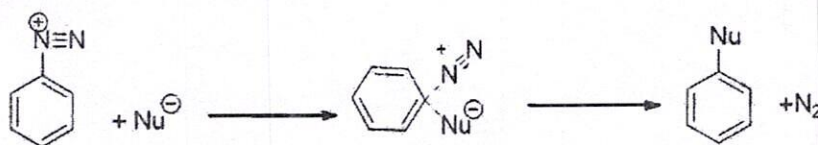
- What happens when pyrrole is reacted with chloroform and NaOH? Give the mechanism of ring expansion reaction.
- The rate of acetolysis of the following norbornane derivatives follows the order: III > II > I.



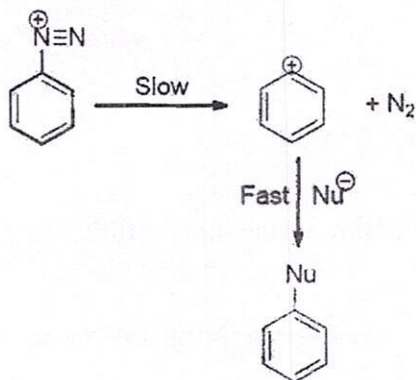
3. (a) Decomposition of aryl diazonium salts in an aqueous solution containing nucleophile (Nu^-) can proceed via two mechanisms, **A** or **B**. Explain how you can confirm the correct mechanism by using the following approaches: (10)

- i) Kinetic studies
- ii) Isotopic labelling
- iii) Substituent effect

Mechanism A:

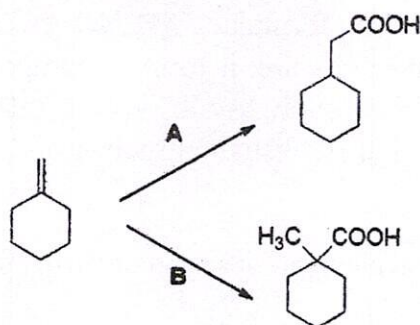


Mechanism B:

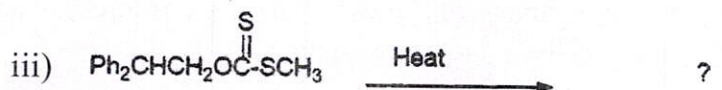
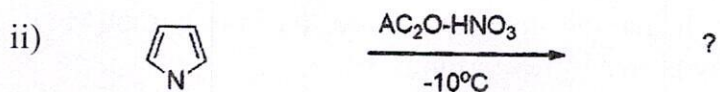


- (b) Explain the following: (15)
- i) 2,5-hexanedione reacts with aqueous NaOH to form a cyclic ketone? Name the involved reaction.
 - ii) Which will undergo elimination faster: *cis* or *trans*-1-bromo-4-*tert.* butyl cyclohexane?
 - iii) Phenyl acetate reacts with anhydrous AlCl_3 to give a pair of isomers, one of which is steam volatile. Give the mechanism of the reaction.

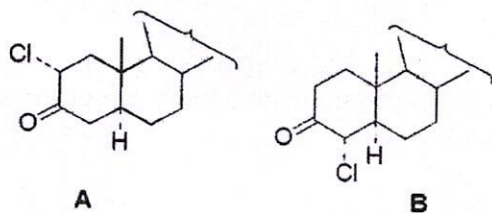
- (c) Give suitable reason to explain which reagent/s will you chose for the following reactions? (10)



- (d) Predict the product formed in the following reaction and write the mechanism of the involved pathway: (15)



4. (a) Photolysis of diaryl ketones normally does not involve Norrish Type I mechanism. Explain with suitable mechanism. (15)
- (b) Pentane-2,4-dione undergoes photochemical reaction with cyclohexene to form **A**, $\text{C}_{11}\text{H}_{18}\text{O}_2$. **A**, on reaction with sodium hypobromite in alkaline medium followed by treatment with mild acid gives **B**, $\text{C}_9\text{H}_{14}\text{O}_4$. **B**, on heating with soda lime forms **C**, C_7H_{14} , a compound which does not decolorize bromine water. Deduce the structures of **A**, **B** and **C** and write all the involved reactions. Give the mechanism of photochemical process. (15)
- (c) A compound with molecular formulae, $\text{C}_4\text{H}_6\text{O}$, shows a strong band at $\lambda_{\text{max}} 217\text{nm}$. Predict the structure of the compound giving suitable explanation. Also explain if it is possible that the compound lacks carbonyl group? (10)
- (d) Explain how you can use Woodward-Fieser rules to distinguish between the dehydrohalogenation products of regioisomeric α -chlorocholestan-3-one (**A** and **B**). (10)

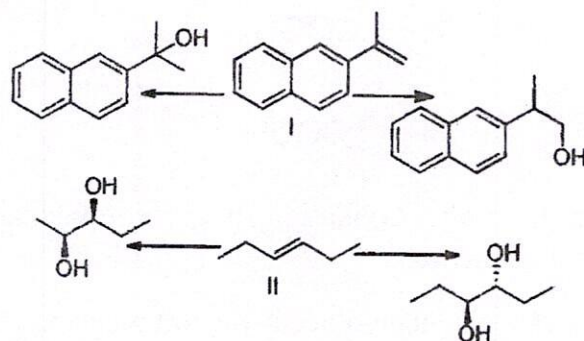


SECTION - B

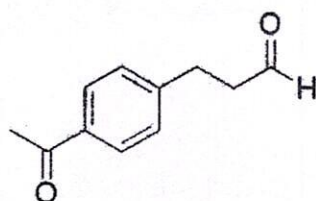
5. (a) A compound having general formulae, C_3H_7NO , gives a sharp band at 1680 cm^{-1} . On reduction with sodium in ethanol, it forms a compound with molecular formulae, C_3H_9N . The product did not show any absorption at 1680 cm^{-1} , but gave two bands at 3500 and 3400 cm^{-1} each. Establish the structure of the compound and explain all the reactions. (10)
- (b) How many kinds of equivalent protons are there in the following? Illustrate. (6+2+2=10)
- Three isomers of dimethyl cyclopropane
 - 2-chlorobutane
 - Vinyl bromide
- (c) Indicate if the following statements are correct for Mass spectra and give valid reason for your answer: (10)
- Presence of a peak having mass one more than the parent ($M+1$) is due to replacement of hydrogen by deuterium (2H).
 - Presence of a peak having mass one more than the parent ($M+1$) is due to replacement of Carbon (^{12}C) by heavier isotope (^{13}C).
 - Presence of a peak having mass two more than the parent ($M+2$) is due to natural abundance of ^{18}O .
 - In compounds containing Nitrogen (N), presence of a peak having mass one more than the parent ($M+1$) is due to natural abundance of ^{15}N .
 - In compounds containing Nitrogen (N), presence of a peak having mass two more than the parent ($M+2$) is due to natural abundance of ^{15}N and ^{13}C .
- (d) An organic compound having molecular formula, $C_8H_8O_2$, showed the following spectral characteristics: (20)
- UV: $\lambda_{max} = 202, 254 (\xi_{max} 230); 280nm (\xi_{max} 22)$
 - IR: 1745 cm^{-1} .
 - 1H -NMR: $\delta 7.20 - 7.6 (5H, m); 4.3 (3H, s)$

Calculate the DBE for the compound, deduce its structure and explain all the absorption bands in UV, IR and NMR region.

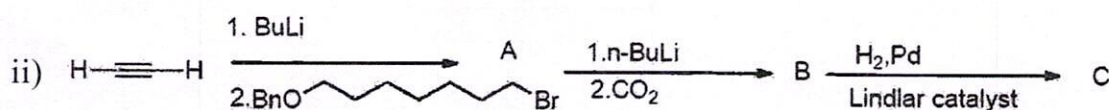
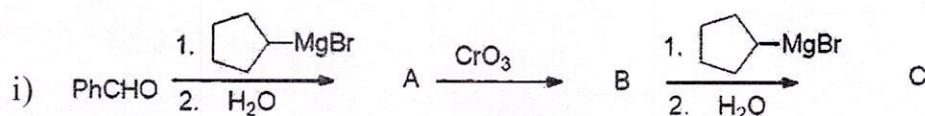
6. (a) Describe the three types of secondary structures of proteins. (10)
- (b) Explain the term 'Denaturation' for proteins and explain why proteins get denatured when exposed to the following: (10)
- Heat
 - Excess of Acid/Alkali
 - Heavy Metal ions
 - Urea
- (c) Suggest the structure for a compound (C_9H_{12}) showing NMR peaks at δ values of 7.1, 2.2, 1.5 and 0.9 ppm. (10)
- (d) The alkenes (I and II) are to be converted into two regioisomers or two diastereomers as shown in the following reaction sequence. Suggest reagents/and carry out these transformations. (20)



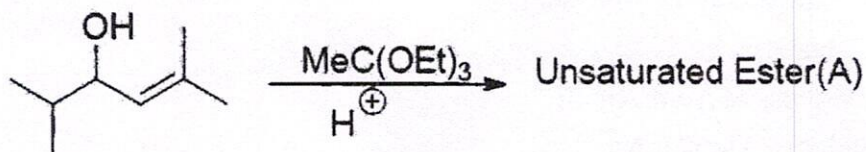
7. (a) Give general mechanism of reduction of carbonyl compounds with sodium borohydride. The dicarbonyl compound shown below can be reduced to three possible products with sodium borohydride. Give their structures and explain how they can be distinguished using IR spectroscopy, assuming you can isolate pure compounds? (5+5+10=20)



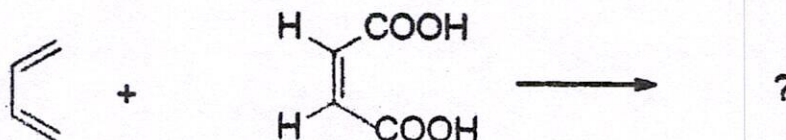
- (b) Complete the following reactions, write the structures for product formed in each step. Indicate the stereochemistry of final product, C on reaction with Lindlar's catalyst. (20)



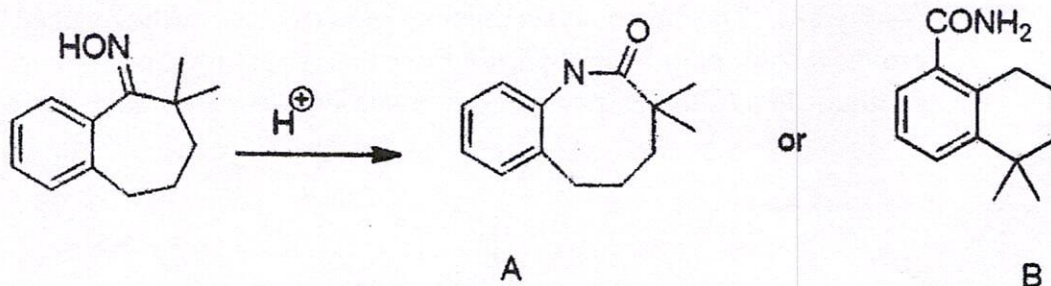
- (c) Predict the structure of the product formed in the following reaction and give the involved mechanism. (10)



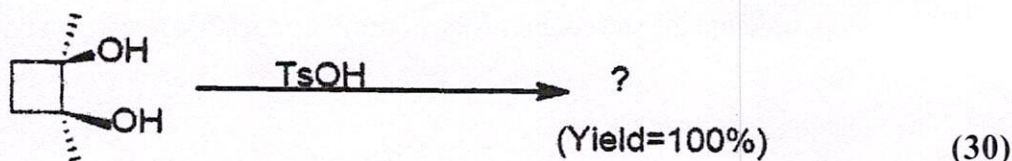
8. (a) A polymer consists of 20% by weight of one macromolecule, having molar mass 10^4 and 80% by weight of second macromolecule, having molar mass 10^5 . Calculate the number average (M_n) and weight average molecular weight (M_w) for this polymer. (10)
- (b) State the Woodward-Hoffmann rules for pericyclic reactions, identify the reaction and predict the correct product in the following reaction: (10)



- (c) i) Carry out Baeyer Villiger Oxidation for *p*-chlorobenzaldehyde and write the mechanism of the reaction.
- ii) Identify the rearrangement involved in the following reaction and explain which will be correct product in the reaction, A or B?



- iii) Identify the following rearrangement, predict the correct product and write the mechanism of the involved reaction:



CC(M)
CIVIL ENGINEERING
(OPTIONAL)
PAPER - II

Time Allowed - Three Hours

[17]

Maximum Marks-250

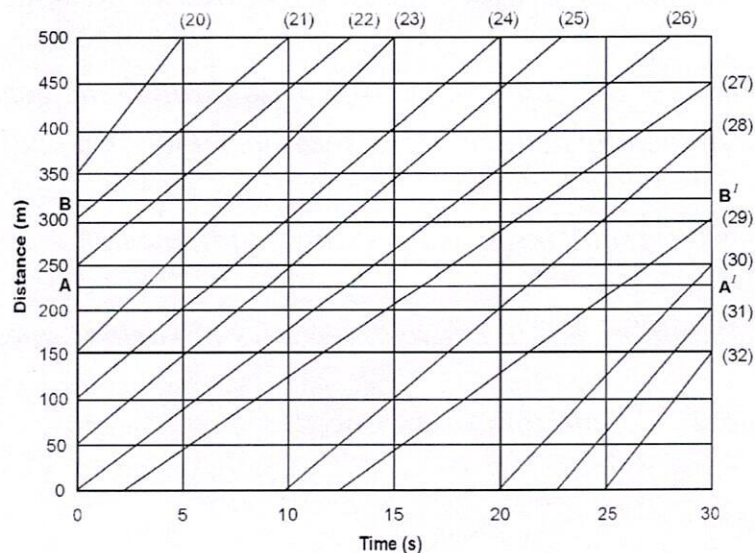
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- ii) Your answer should be precise and coherent.
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- vii) No blank page should be left in between answers to various questions.
- viii) Non Programmable Calculators are allowed.

SECTION - A

1.
 - a) What is meant by seasoning timber? Why is it necessary for timber to be seasoned? Briefly describe some of the methods commonly used to season timber artificially. **(10)**
 - b) Three formations, each 25m thick, lie over one another. If a constant-velocity vertical flow field is set up across the set of formations with hydraulic head $h = 120\text{m}$ at the top and $h = 100\text{m}$ at the bottom. The hydraulic conductivity of the top formation is 0.0001 m/s , the middle formation 0.0005 m/s , and at the bottom formation 0.0010 m/s . Calculate the hydraulic head h at the two internal boundaries. **(10)**
 - c) A driver travelling at 70kmph on an urban road approaches a queue of vehicles during red interval at the controlled intersection. The driver suddenly observes a person stepping from a parked car and approaching towards the path of the driver, separated by a distance of 90m . The section of the roadway has an upgrade of 3% and the coefficient of friction between tyres and the pavement is 0.47 . Assuming 80% brake efficiency, ascertain whether the driver can safely stop her/his vehicle if reaction time of the driver is 2.5s . **(10)**
 - d) What is shotcrete? Give a few examples where shotcrete is used in the construction process. **(10)**
 - e) What do you understand by hysteresis in rating curve? Explain with the help of a diagram. **(10)**
2.
 - a) As part of a water quality project, aeration devices need to be installed in a river at location(s) where the DO falls below 2 mg/L . The ultimate BOD of the river water just below the only sewage outfall is known to be 40 mg/L and the saturation-dissolved oxygen (DO) is 10 mg/L . The deoxygenation rate coefficient is $0.3/\text{d}$ (k_d) and the self-purification constant (S) is 3 . The river is flowing at a speed of 50 km/day . Are aerators needed for this river? If so, at what distance from the outfall will they have to be placed? State clearly any assumptions you may use in your calculations. **(15)**
 - b) The figure presents the trajectory of vehicles within a time-space domain and the numbers within brackets represent unique identification of each vehicle. **(15)**



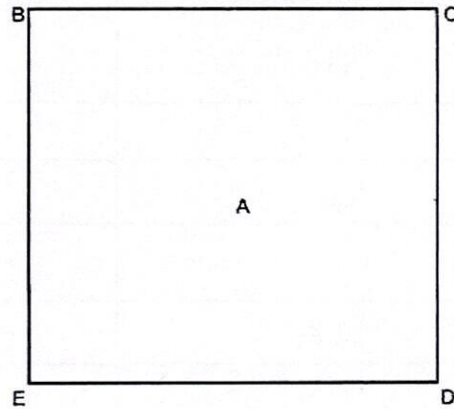
- i. An observer recorded the times at which the front end of the vehicles passed sections A-A' and B-B' and the data were noted as shown in the table below. Based on the information provided in both the table and time-space plot, determine the space mean speed (in km/h) of the vehicles travelling within the section A-A' and B-B'.

Vehicle id	Time of passing A-A' (s)	Time of passing B-B' (s)
23	3.2	9.7
24	6.1	13.6
25	9.0	16.5
26	12.8	21.0
27	16.2	25.3
28	21.1	28.8

- ii. Determine traffic flow (in vehicles per hour), density (vehicles per km) and space mean speed (km/h) within the entire time-space domain as shown in the two-dimensional plot of vehicles.
- c) The following observations were taken with a 4 m staff. Find the missing values (X) in a levelling page. Show the calculations and apply the necessary checks. (20)

Points	BS (m)	IS (m)	FS (m)	Rise (m)	Fall (m)	RL (m)	Remark
1	3.250					249.260	BM
2	1.755		X		0.750	X	CP
3		1.950			0.195	X	
4	X		1.920			X	CP
5		2.340		1.500		X	
6		X		1.000		X	
7	1.850		2.185			X	CP
8		1.575				X	
9		X				X	
10	X		1.895	1.650		X	CP
11			1.350	0.750		X	

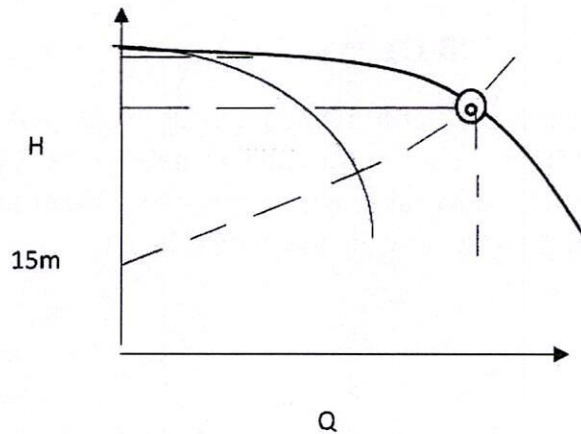
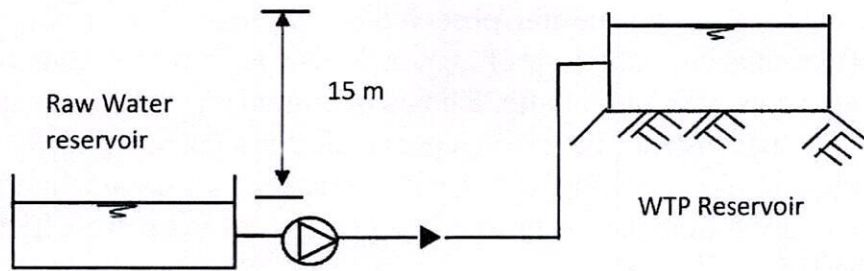
3. a) Five rain gauge stations A, B, C, D and E are located in a square shaped hypothetical basin whose each side is 51.75 km, as shown below. Station A is at the center of the basin. Compute the Thiessen weights for the stations and mean areal rainfall over the basin by using Thiessen polygon method if the rainfall at stations A, B, C, D and E are 100 cm, 95 cm, 105cm, 114cm and 86cm, respectively. (15)



- b) Calculate the super-elevation, maximum permissible speed and transition length for a 3° curve on a high-speed BG section with a maximum sanction speed of 120 kmph. Assume the equilibrium speed to be 75 kmph and the booked speed of the goods train to be 50 kmph. (15)
- c) The figure below shows a schematic of a rising main that delivers water from a raw water reservoir to another reservoir located at a Water Treatment Plant (WTP) through a 3 km long Ductile Iron (DI) pipeline having 300 mm diameter. The value of Hazen-William's friction factor for the DI pipe is 120 ($C_H=120$). Minor losses in the pipeline shall be 10% of the frictional and loss in the pipeline. The existing inventory of centrifugal pumps have the following characteristics. (20)

Find out the maximum flow rate of water that can be pumped to the WTP reservoir with two pumps running in parallel.

Flow Rate (m^3/d)	0	980	1460	1960	2450	2940	3420	3900
Head (m)	26.3	25.8	25	24.1	23.2	21.4	18.9	15.8



4. a) The water content of solids slurry (sludge from wastewater treatment) was 98% by weight. Initially the solids contained 72% organic matter of specific gravity 1.1 and 28% mineral matters of specific gravity 2.6. The sludge was then digested when 70% of the initial volatile solids were destroyed and then the water content was reduced to 90% by weight. What is the percentage reduction in the volume of slurry at the end? (15)
- b) Determine the minimum cost and optimum duration for the network of the project. The data of each activity is given in the following Table. Indirect cost may be taken as Rs 2,500/- per week. (15)

Activity	Normal		Crash	
	Time (weeks)	Cost (Rs.)	Time (weeks)	Cost (Rs.)
1-2	3	5000	2	5500
2-4	14	10000	11	13000
2-3	7	6000	4	9000
3-4	9	11000	6	18000
4-5	4	9000	3	12000

- c) A 6-hour storm with constant rainfall occurred over an agricultural catchment of 2.4 km^2 area and the total rainfall observed was 8 cm. Infiltration curve for the event showed the initial infiltration rate of 1 cm/hr. Reducing linearly, infiltration rate attained a constant value of 0.2 cm/hr after 5 hours of rainfall and for the remaining duration of rainfall. A pan installed in the catchment indicated a fall of 0.5 cm in the water level (after allowing for rainfall) for that day. Other losses were negligible. Determine volume of runoff from the catchment. If required, assume a pan coefficient of 0.7 and crop coefficient of 1.15. **(20)**

SECTION - B

5. a) A 0.3 m well fully penetrates a confined aquifer 30 m deep. After a long period of pumping at a rate of $1500 \text{ m}^3/\text{day}$, the drawdowns in the wells at 20 and 45 m from the pumping well are found to be 2.2 and 1.8 m, respectively. Determine the transmissivity of the aquifer. What is the drawdown in the pumped well? **(10)**
- b) Define the terms: **(10)**
- (i) Line of collimation
 - (ii) Parallax of a point
 - (iii) Phreatic line
 - (iv) Self cleansing velocity of sewer line
 - (v) Ruling gradient
- c) Differentiate between **(10)**
- (i) GWT and piezometric surface
 - (ii) BOD and COD
 - (iii) Overtaking sight distance and inter mediate sight distance
 - (iv) Potential Evaporation and Actual ET
 - (v) Expressway and Highway.
- d) State and explain four important durability tests performed on building stones. **(10)**
- e) Derive the expression for self-cleansing velocity of sewers. Mention clearly (with a well-labelled diagram) the forces acting on the sediment and the provide details of the notations used in the derivation. **(10)**

6. a) An impervious floor of a weir on permeable soil is 16 m long and has sheet piles at both the ends. The upstream pile is 4 m deep and the downstream pile is 5 m deep. The weir creates a net head of 2.5 m. Neglecting the thickness of the weir floor, calculate the uplift pressures at the junction of the inner faces of the pile with the weir floor, by using Khosla's theory. (Required curves are provided) (15)
- b) Draw a neat sketch of the following road sign, highlighting the background colour of all the signs. (15)
- RESTRICTION ENDS
 - LEFT REVERSE BEND and
 - NO STOPPING & NO STANDING
 - BRIDGE
 - PARKING LOT
- c) Water at a rate of $0.005 \text{ m}^3/\text{day}$ per m^2 of horizontal area, is pumped from a 1000 m wide unconfined aquifer lying between two parallel canals. It is underlain by a horizontal impervious stratum. The depth of water above the impervious stratum on the left and right canals are 12 m 8 m respectively. Assuming a permeability of 10 m/day with vertical boundaries, determine. (20)
- Equation of water table taking left canal as origin.
 - Compute the discharges per meter length from both the canals. If there is no pumping, what would be the seepage from left canal to right canal.
7. a) An approach to a signalized intersection has an effective green of 25s and a saturation flow rate of 1300 veh/h. The length of the cycle is 50s. At the beginning of the effective red, vehicles arrive at 80% of the saturation flow for 10s, following which the vehicle arrivals are observed at half of the saturation flow for 10s and then arrivals stop for 5s. Then the arrivals are observed at 55% of the saturation flow for the remaining of the cycle. After the end of the first cycle, vehicles begin to arrive at 60% of the saturation flow. Plot a graph showing the cumulative arrivals and cumulative departures against time for the two cycles of the intersection approach. Determine the total vehicle delay for both the cycles and the maximum queue lengths observed in each cycle. (15)
- b) For the data given in the following table, perform resource levelling within the minimum project duration for the smallest number of workers, if activities can not be split. (15)

Activities	Duration (days)	No. of workers
1-2	8	4
1-3	7	8
1-5	10	6
2-3	5	6
2-4	8	9
3-4	4	5
4-5	5	8

- c) At 20°C, DO tests were carried out on a wastewater sample, where DO measurements at the beginning of the tests show values of 8.2 mg/l. Subsequently, DO values of 5.6 mg/l and 2.7 mg/l were noted after 8 days and 100 days respectively. Calculate the following: **(20)**
- What is the ultimate BOD of this sample?
 - What is the value of k , the reaction rate constant (calculate for both base e and base 10)?
 - What is the 5-day DO reading for this sample?
 - What is the BODs value at 27°C? Based on this answer and your answer from part c, comment on the role of temperature in the BOD exertion process.

8. a) Explain the fineness modulus of aggregates? What is the significance of fineness modulus in the concrete mix? Write precisely the important steps associated with the concrete design mix procedure. **(15)**

- b) Define the ϕ index.

A storm with a 15.0 cm precipitation and time distribution given below produced a direct runoff 8.7 cm. Estimate the time ϕ index of the storm? **(15)**

Time from start (hr)	1	2	3	4	5	6	7	8
Rainfall in each hour (in cm)	0.6	1.35	2.25	3.45	2.7	2.4	1.5	0.75

- c) A Tacheometer was used for a traverse MNOP and the readings are given below. Compute the bearing and distance of line MP if the levelling staff was held vertical at all points. Take standard values of tacheometric constants. **(20)**

Line	Bearing	Vertical angle	Staff readings (m)		
			Top hair	Middle hair	Bottom hair
MN	00° 00'	+05° 11'	0.900	1.872	2.844
NO	289° 54'	+02° 30'	0.939	1.677	2.415
OP	201° 12'	-02° 43'	0.891	1.949	3.007

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
ECONOMICS
(OPTIONAL)
PAPER - II
[21]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION-A

Answer the following questions in about 150 words.

(5×10= 50)

1.
 - a) Critically evaluate the economic plight of Indian economy during the British rule in terms of industry and service sector.
 - b) Were land reforms successfully implemented in India? Explain how land reforms help in the development of a nation.
 - c) What is current EXIM policy in India? Discuss its significance in Indian economy.
 - d) Do Intellectual Property rights encourage innovations? Give suitable examples.
 - e) What is capital formation in agriculture? Discuss the current scenario of investments in Indian agriculture.

2.
 - a) What is the current unemployment status in India? Do you think labour-intensive industries are what India needs to focus on? Explain. **(20)**
 - b) The salvation of India lies in the cottage and small-scale industries. Do you agree? **(15)**
 - c) Explain how the Green revolution made India self-reliant. Do you think India is ready for another green revolution? **(15)**

3.
 - a) How has the sectoral contribution of GDP in India changed over the years? **(20)**
 - b) Is the demographic dividend of India a boon or bane? Discuss. **(15)**
 - c) What is the present status of Foreign Direct Investments (FDI) in India? Explain their relevance in job creation. **(15)**

4.
 - a) What is poverty, and how is absolute poverty different from relative poverty? Also, explain two main methods to estimate poverty in India. **(20)**
 - b) Explain the relevance of streamlined tax collection in the form of the Goods and Services Tax (GST). Do you think it has provided more fiscal space to the states? **(15)**
 - c) Explain the relevance of schemes such as the MGNREGS. Also, suggest ways to reform the various components of this scheme with changing times. **(15)**

SECTION-B

Answer the following questions in about 150 words.

(5×10= 50)

5.
 - a) Farm mechanisation is the way forward to rural transformation from a traditional to modern farming. Elucidate.
 - b) How is disinvestment helping the Government of India to improve the efficiency of Public Sector Units?
 - c) What are the conditions the SS Tarapore Committee put forward on capital account convertibility? Do you think that India is ready for full capital account convertibility?
 - d) Critically examine the Impact of Covid-19 on Indian economy.
 - e) Discuss the success of Reserve Bank of India in achieving its objectives.

6. a) Explain the role and structure of the Finance Commission of India. How does the Finance Commission of India serve as the balancing wheel of fiscal federalism? (20)
- b) Discuss the colonial land system policy in India. (15)
- c) Is privatisation of sectors like health and education a way forward to establish modern India? Elaborate your views. (15)
7. a) Discuss the main poverty reduction schemes in India. (20)
- b) Explain the importance of health economics in making India a Viswa Guru. (15)
- c) What are the impacts of 'Make in India' appeal to the foreign investors on Indian economy? Explain. (15)
8. a) How did the 73rd and 74th amendments to the constitution make India more decentralised? (20)
- b) Explain the Fiscal Responsibility and Budget Management (FRBM) Act. Do you think that there is a need to reform the FRBM Act the post-pandemic? Discuss. (15)
- c) Examine the present status of the Public Distribution System in India. State suitable reforms. (15)
-

CC(M)
ELECTRICAL ENGINEERING
(OPTIONAL)
PAPER - II
[23]

Time Allowed - Three Hours

Maximum Marks-250

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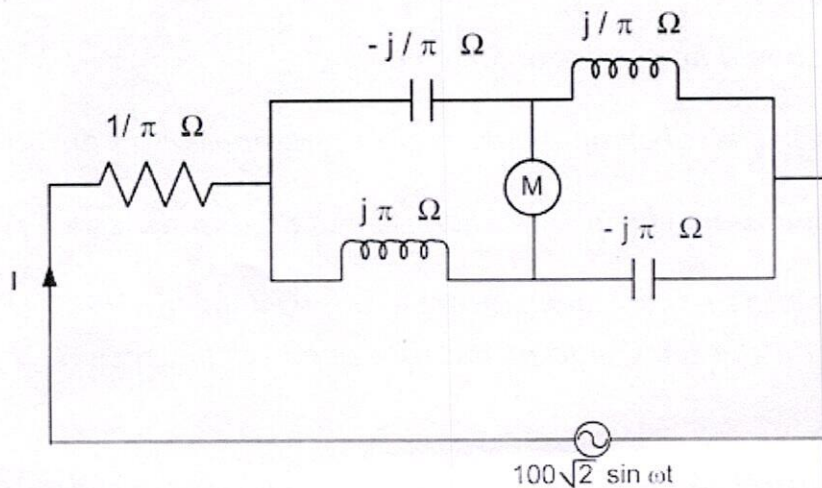
SECTION - A

1. a) The open loop transfer function of a unity feedback system is given by

$$G(s) H(s) = \frac{K(s+1)(s+3)}{(s-2)(s-4)}$$

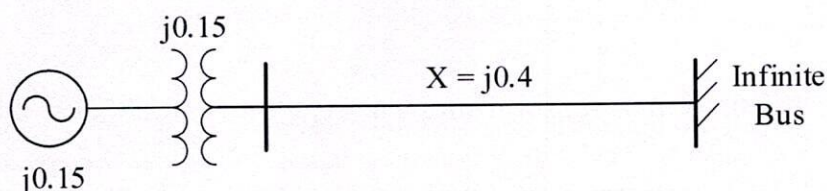
Determine the point at which the root locus crosses the imaginary axis. Also determine the break-in point. (10)

- b) A 3-phase induction motor draws 60 kW at a power factor of 0.7 lagging from a 415 V, 50 Hz supply. To improve the power factor to 0.9 lagging, a capacitor bank is connected across the motor terminals. Determine: (10)
- reactive power supplied by the capacitor bank.
 - capacitance per phase required if the capacitor bank is connected in delta.
- c) An array of 8-bit signed numbers (in 2's complement) is stored in sequential memory locations starting from $X+1_H$. The length of the array is 'N' (≤ 255) and is stored in location X_H . Write an assembly language program to count non-zero positive numbers and negative numbers and store the results in memory locations 'POS' and 'NEG' respectively. (10)
- d) For the bridge circuit shown in the figure, find the following: (10)
- meter reading if the meter M is an ammeter
 - current (I) supplied by the source
 - meter reading if the meter M is a voltmeter.

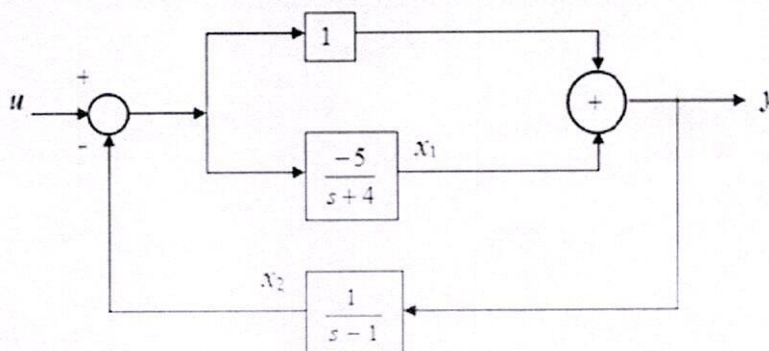


- e) Consider a differential pulse code modulator (DPCM) system that uses a linear predictor with a single tap to minimize the prediction error variance. The autocorrelation and normalized autocorrelation function of the input signal for a lag of zero and one sampling interval are 1 and 0.5, respectively. Determine the minimum prediction error variance attained by the use of this linear predictor. (10)

2. a) Consider a message signal $5 \cos(2\pi 1000t) + 2 \cos(2\pi 2000t)$ where time t is in seconds. This message signal is sampled at 56,000 samples per second and passed through a delta modulator (DM). Find the minimum value of step-size which will avoid slope overload distortion. (20)
- b) A synchronous generator is connected to an infinite-bus through transformer and transmission line as shown in the single-line diagram. All reactance values indicated are in pu on a common base value. The generator is supplying 0.6 pu real power and the voltages at the generator terminal and infinite-bus are 1.0 pu. Taking the angle of voltage at infinite-bus as reference, determine (20)
- angle of voltage at the generator terminal (in degree)
 - current supplied by the generator (in pu)
 - internal voltage of the generator (in pu)



- c) A 200 V voltmeter having an accuracy of $\pm 1.5\%$ of full-scale and a 300 mA ammeter having an accuracy of $\pm 1\%$ of full-scale are used to determine the power dissipated in a resistor. The meter readings were 150 V and 75 mA respectively. Find the limiting error in the measurement of power dissipated. (10)
3. a) Choose state variables x_1 and x_2 as shown for the system shown in the figure. Write the state equations and output equations. The input to the system is u and the output is y . Find the transfer function from the state and output equations. (20)



- b) A short circuit test is conducted on three-phase, 132 kV breaker with neutral earthed. The short circuit fault is also earthed. The observations of the test are as follows: (20)
- The breaker current is symmetrical.
 - The power factor of the fault is 0.3.
 - The recovery voltage is 0.96 times the full line voltage.
 - The natural frequency of the restriking transients is 20 kHz.
- Find the value of average RRRV.

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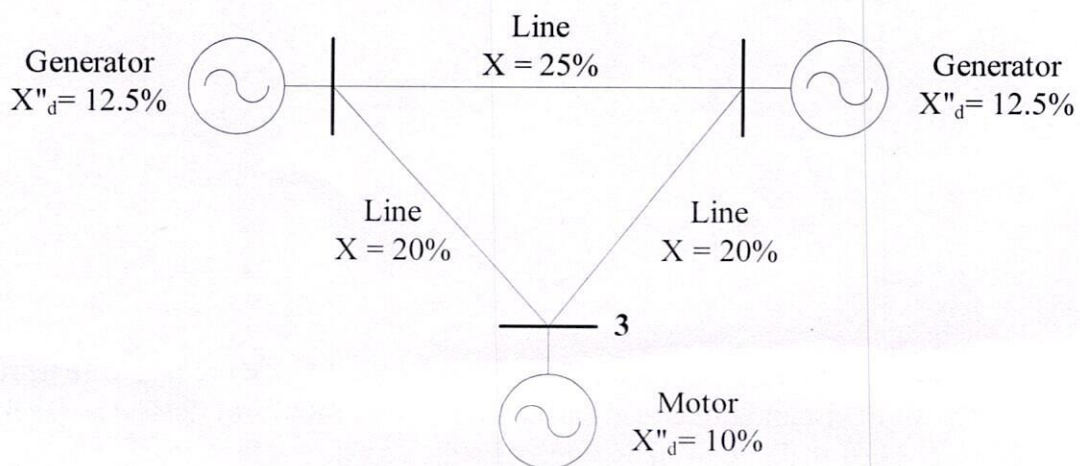
- c) Give the meaning, macro RTL, addressing mode and micro RTL flow for the instruction **STAX D** for 8085A microprocessor. Assume READY=1 and HOLD=0 during the execution of the instruction. Indicate the status signals in each machine cycle. (10)

4. a) Consider a pulse-code modulation (PCM) system that uses a mid-rise type uniform quantizer and a 5-bit binary encoder. The bit rate of the system is 10×10^6 bits/sec. The quantization error for this system is uniformly distributed. Assuming a load of 1Ω , determine the output signal-to-quantization noise ratio when a full-load sinusoidal modulating signal of amplitude 1 volt and frequency 1 MHz is applied at the input. (20)

- b) The open loop transfer function of a unity feedback system is given as $G(s)H(s) = \frac{K}{s(s+2)(s+3)(s+4)}$. Use Nyquist stability criterion to find the range of K for closed loop stability. (20)

- c) The single-line diagram for a power system network is shown in the figure. All reactance values indicated are in pu on a common base value. (10)

- i) Draw the admittance diagram of the given network.
ii) Find the admittance matrix, Y_{bus} for the network.



SECTION - B

5. a) Determine the number of roots in L.H.S. plane, R.H.S. plane and on the imaginary axis for the equation $s^5 + 3s^4 - 3s^3 + s^2 - 18s - 24$. Determine the roots on the imaginary axis. **(10)**

b) The tests conducted on a three-core metal sheathed belted cable for measurement of capacitance yielded capacitance between the sheath and all the cores bunched together as $1.5 \mu\text{F}$, and the capacitance between one conductor and the remaining conductors together connected to the sheath as $0.9 \mu\text{F}$. Find **(10)**

- i) capacitance between conductor and sheath
- ii) capacitance between any pair of conductors

c) A current transformer rating is 200/1 A. The over-current relay connected to CT has the following characteristics: **(10)**

- The nominal current rating is 1 A.
- Current setting is 100% and time multiplier setting (TMS) is 0.2.
- At TMS = 1, the operating times at various plug setting multiplier (PSM) values are given in the following table.

PSM	2	4	6	8	10	15	20
Operating time (sec)	10	5	3.6	3	2.8	2.6	2.4

Find the time of operation of the relay when the fault current is 3000 A.

d) For a $4\frac{1}{2}$ digit voltmeter, answer the following: **(10)**

- i) find the resolution of the meter on 10 V and 100 V ranges
- ii) how would 11.667 V be displayed on 10 V range
- iii) how would 0.13579 be displayed on 100 V range

e) A coherent binary frequency shift keying (FSK) system transmits binary data at the rate of 5×10^6 bits per second. During the transmission of data, white Gaussian noise of zero mean and two-sided power spectral density 10^{-20} W/Hz gets added to the signal. In the absence of noise, the amplitude of the received sinusoidal signal is $0.5 \mu\text{V}$. Determine the average probability of symbol error in terms of the complementary error function. **(10)**

[Turn Over

6. a) Three phase 33 kV/11 kV, star/delta connected power transformer is protected by Merz-Price circulating current system. The current transformers connected on HV side have ratio of 400/5. What is the ratio of the current transformers connected on LV voltage side? (20)

- b) A control system is described by the following equations: (20)

$$x_1 = r - c$$

$$x_2 = x_1 - H_1 x_4$$

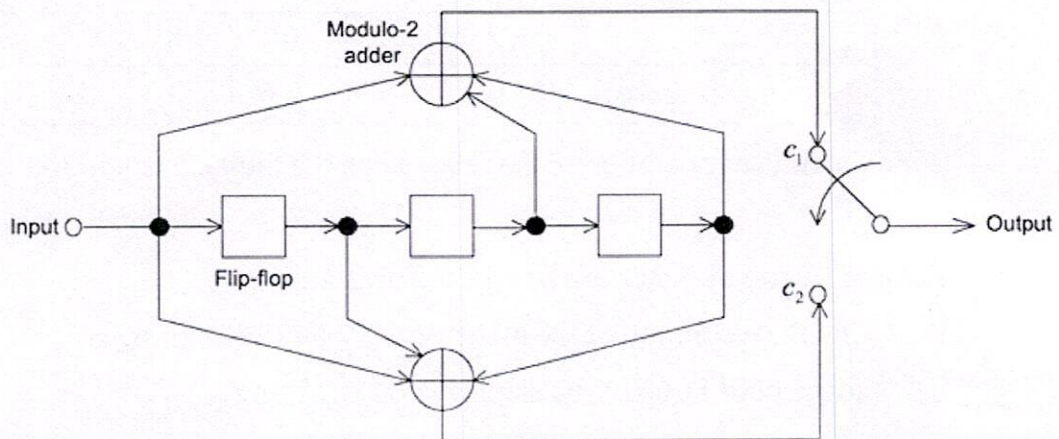
$$x_3 = G_1 x_2 - H_2 c$$

$$x_4 = G_2 x_3$$

$$c = G_4 x_3 + G_3 x_4$$

where r is the input and c is the output. x_1, x_2, x_3 and x_4 are internal variables of the system. Draw a block diagram and determine $\frac{C(s)}{R(s)}$ using block diagram reduction.

- c) Figure shows the encoder for a rate $r = 1/2$, constraint length $K = 4$ convolutional code. Determine the encoder output produced by the message sequence 10010... (10)



7. a) A 3 MVA, 3 kV, star-connected synchronous generator has positive, negative and zero sequence reactances of 80%, 15%, and 10%, respectively. All reactance values are based on the generator rating. The neutral of generator is solidly grounded. A single line to ground fault occurs at phase 'a' of the generator terminals through a fault resistance of 1.2 Ω . If the generator was unloaded before occurrence of the fault, determine (20)
- fault current in all phases.
 - fault voltage of phase 'a' with respect to ground.

- b) Design a complete interfacing circuit to interface 8-toggle switches through an input port and 8-LEDs through an output port to 8085A microprocessor using isolated I/O. The address assigned to input port is A0H and to output port is A1H. Use 3L x 8L decoder, having one active high and two active low enable inputs, and logic gates for interfacing. A push button switch is used to generate an interrupt at RST 7.5. Write main program and interrupt service subroutine (ISR) in assembly language to read an 8-bit data from toggle switches and output it to 8-LEDs at an interval of T sec when push button is pressed. Assume that T sec delay routine 'TDELAY' is available. (20)

- c) A symmetrical star-connected inductive load is connected to a 3-phase balanced system having RYB phase sequence. The current coil of a wattmeter is connected in the R-phase whereas the pressure coil of this meter is connected between R-phase and neutral. For this condition, the meter reading was 400 W. If the pressure coil is connected between Y and B phases without changing the current coil connection, the meter reads 519.6 W. Find the power factor of the load. (10)

8. a) The operating costs of two generating units are given as: (20)

$$C_1(P_1) = 0.005P_1^2 + 2P_1 + 110 \text{ Rs.per hour}$$

$$C_2(P_2) = 0.01P_2^2 + 2P_2 + 210 \text{ Rs.per hour}$$

where, P_1 and P_2 are power (in MW) generated by the unit 1 and unit 2, respectively.

The limits on output power from the generating units are as follows:

$$50 \text{ MW} \leq P_1 \leq 500 \text{ MW}$$

$$50 \text{ MW} \leq P_2 \leq 500 \text{ MW}$$

If both the units are operated, and the transmission losses are ignored, find

- economic dispatch of the two units to meet a load demand of 480 MW
 - total operating cost with optimal loading of units
 - incremental operating cost at economic dispatch.
- b) Two ammeters A and B having resistances of 1Ω and 2Ω respectively give full scale deflection with 200 mA and 300 mA respectively. Find the shunt to be connected with these meters to extend their range to 20 A. The range extended ammeters are connected in parallel and then placed in a circuit in which a total current of 15 A is flowing. Find the readings of the meters. (20)
- c) The transfer function of a lead network is given by $G(s) = \frac{2s + 1}{0.6s + 1}$. Determine the maximum phase lead produced by this network. Also, determine the frequency at which the maximum phase lead occurs. (10)

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
GEOLOGY
(OPTIONAL)
PAPER - II
[29]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

Answer the following in about 150 words each.

1. a) Describe Ewald's construction in X-ray diffraction. (10)
b) Describe graphic texture in granite and degree of freedom associated with it in terms of phase rule. (10)
c) Describe differences in crystal structures of serpentine minerals. (10)
d) Discuss classification scheme for sandstones. (10)
e) Elaborate on distinctions between mafic granulites and eclogites. (10)
2. a) The structure of silicate melts is dependent on their composition and controls their physical properties. Answer the following questions. (20)
 - i) Explain the structural roles of Si, Mg, Al and K within a silicate melt.
 - ii) Describe the three main structural types of oxygen atom found within a silicate melt. Include a brief explanation of their role in the structure.
 - iii) What structural changes occur in a pure SiO_2 melt if MgO is added and why?
b) Explain and illustrate with suitable sketches following structures a) sill, b) laccolith, (c) cinder cone, (d) caldera, (e) batholith. (15)
c) Discuss two fundamental types of fluid flows in context of sediments and how the transition from one to another can be explained by Reynolds number. (15)
3. a) What are phyllosilicates? Describe essential elements of 1:1, 2:1 and 2:1:1 layer silicates along with approximate c-axis dimensions. Name at-least one phyllosilicate mineral for each type. Describe common types of micas and its crystal structures. (20)
b) Define metamorphic facies. Describe facies of high pressure series in detail. (15)
c) What do you understand by the term "heavy minerals" in context of study of sedimentary provenance? How these minerals are useful in deducing the provenance. (15)

4. a) Discuss the role of atmospheric CO₂ in deposition of carbonates in varying proportions in the past geological successions. Also describe the main diagenetic features of carbonate rocks. (10)
- b) Describe various considerations in reducing a typical basalt composition to three pseudocomponents for plotting in ACF diagrams. Calculate A, C and F for plagioclase (CaAl₂Si₂O₈), clinopyroxene (CaMgSi₂O₆), garnet (Fe₂MgAl₂Si₃O₁₂) and kyanite (Al₂SiO₅) and schematically plot in a sketch ACF diagram. (15)
- c) Describe principles of stereographic projection in crystallography. Differentiate between spherical and stereographic projection. (15)

SECTION - B

5. a) Describe the cross section method of ore-reserve computation. (10)
- b) Discuss basic principles of placer deposit formation with examples from India. (10)
- c) Geochemical characteristics of magmatic rocks at Mid-Ocean ridges and island arcs. (10)
- d) Describe process of evaporite deposit formation with examples. (10)
- e) Discuss environmental impact of fly-ash and remediation measures. (10)
6. a) Define anomaly. Describe factors which enhance geochemical anomaly. What is the relationship between size of mineralization and strength of a geochemical anomaly? (20)
- b) What are the likely causes of sea level changes? Illustrate using significant sea level changes in the geologic past. Critically analyze the anthropogenic influence in this context. (15)
- c) What are Rare Earth Elements (REE) and which property of these elements controls their distinctive chemical behaviour in natural systems? Why are chondrites typically used for normalization of REE data? (15)
7. a) Discuss the concept of weighted average. What is "characterization curve" and how it is useful in mineral exploration? Describe basic elements of UNFC classification. (20)
- b) Describe locales of arsenic contamination in ground water in India. What possible causes are attributed for this hazard? (15)
- c) Describe important mineral deposits associated with the Singhbhum Shear Zone. (15)

8. a) Discuss briefly about the source, properties and transport of hydrothermal fluids. How are ores deposited by them? Give any three Indian examples of such deposits. (20)
- b) What are the significant processes associated with the formation of large aluminium deposits in India? Describe major Indian bauxite deposits along with the ore mineral/s in these deposits. (15)
- c) Discuss in detail the ideal electrical geophysical method for locating a disseminated sulphide ore deposit. (15)
-

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
GEOGRAPHY
(OPTIONAL)
PAPER - II
[27]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION-A

1. a) On the outline map of India provided to you, mark the location of all the following. Write in your QCA booklet the significance of these locations whether physical/commercial/economic/ecological/environmental/cultural in not more than 30 words. (10×02=20)
- i) Drass
 - ii) Pachmarhi
 - iii) Sir Creek
 - iv) Bailadilla
 - v) Saramati Peak
 - vi) Kolleru Lake
 - vii) Saddle Peak
 - viii) Kaiga
 - ix) Neyveli
 - x) Silent Valley
- b) Explain how Andaman and Nicobar Islands are different from Lakshadweep islands. (10)
- c) Describe the formation, characteristics and distribution of black soils in India. (10)
- d) Discuss that agro-forestry is a sustainable management system. (10)
2. a) Discuss the origin, structure and relief of Himalayas. (20)
- b) Describe the impact of climate change and its mitigation strategy in Indian context. (15)
- c) Explain the measures of flood management and efficacy in India. (15)
3. a) Give a reasoned account of spatial and temporal variations in distribution of precipitation in India. (20)
- b) Describe the factors responsible for contemporary distress and unrest in Indian agriculture. (15)
- c) Describe the causes and solutions for mushrooming of slums in big cities of India. (15)
4. a) Sustainability of agriculture sector in India depends on its diversification. Elaborate (20)
- b) Discuss the potential, achievements and challenges of blue revolution in India. (15)
- c) Describe the factors responsible for growth of automobile industry in last two decades in India. (15)

SECTION - B

Answer the following questions in 150 words

(5×10=50)

5. a) Briefly point out problems faced by tribal communities in India. (10)
b) Mention water conservation measures with reference to Indian agriculture sector. (10)
c) Describe the extent and significance of mangrove ecosystems. (10)
d) Discuss the role of SEZs in trade promotion in India. (10)
e) Explain that development is the best contraceptive to control population explosion. (10)
 6. a) Discuss the achievements, challenges and significance of renewable energy sector especially with reference to India's Net Zero Target. (20)
b) Tourism industry potential is under-utilised in India. Explain (15)
c) Describe the role of space technology in national development of India. (15)
 7. a) Integration of Bharatmala and Sagarmala projects ensures holistic development of India. Elaborate. (20)
b) Chinese interferences in Indian Ocean have intensified its geopolitical significance for India. (15)
c) Watershed management ensures integrated resource management elaborate. (15)
 8. a) Give a reasoned account of the emerging conurbations in India with suitable examples. (20)
b) Discuss the geographical basis of Indian federalism. (15)
c) Describe planning measures introduced in 21st century by the government of India to reduce regional imbalances and to speed up development in backward areas of the country. (15)
-

CC(M)
HISTORY
(OPTIONAL)
PAPER - II
[31]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION -A

1. Write short notes in not more than 150 words in each of the following. (5×10=50)
 - a) Trace British administration reforms from diarchy to direct control.
 - b) Examine the significance of 'Treaty of Amritsar'(1809).
 - c) What were the implications of battle of Buxar?
 - d) Recently International Lusophone festival was organised in India, trace the Portuguese history in Indian subcontinent.
 - e) What are the major achievements of CSIR in post independent India?
2.
 - a) How far the post independent agrarian reforms are able to undo the damage caused by British agrarian policies? (20)
 - b) "Before one's own interest, seeing the interest of society and country is the religion of a true citizen with a conscience"- Ishwar Chandra Vidyasagar. Bring out the relevance of his statement in contemporary times. (15)
 - c) Analyse the nature of peasant movements during nationalist phase and bring out their short comings. (15)
3.
 - a) Discuss the nature of Khalifat movement and what role did it play in formation of non cooperative movement. (20)
 - b) A revolutionary and a socialist, the contribution of Bhagat Singh to the Independence Movement of India is immense. Discuss (15)
 - c) Gandhi remarked "post dated cheque on a crumbling bank". What was Gandhi addressing and why? (15)
4.
 - a) Lal Bal Pal was a triumvirate of assertive nationalists in British-ruled India in the early 20th century, from 1906 to 1918. Discuss the relevance of unique ideas articulated by them. (20)
 - b) Why did Panipat became centre of so many empire shaking battles? (15)
 - c) What were the objectives of Young Bengal movement? How far was it successful in achieving them? (15)

SECTION-B

5. Write short notes in not more than 150 words in each of the following. (5×10=50)
- a) How did industrialisation affect family and women's work in nineteenth-century Europe?
 - b) Why was Europe divided during the Cold War?
 - c) How was trench warfare used in World War 1?
 - d) Neo-imperialism.
 - e) Boston Tea party.
6. a) What were the unintended consequences of Treaty of Versailles and Treaty of Trianon. (20)
- b) To what extent was Europe's fragmentation into opposing groupings responsible for the outbreak of the First World War? (15)
- c) How far was Hitler responsible for the rise of Nazism in Germany? (15)
7. a) To what extent did the various economic and social developments in nineteenth century Britain, impact upon the parliamentary system and political parties? (20)
- b) The period from 1905 to 1917 marked a series of setbacks to the Tsarist regime. To what extent did this influence the course of events leading up to the October Revolution? (15)
- c) Bring out an estimation of the Congress of Vienna. (15)
8. a) In what ways was the experience of industrialization different for European countries which industrialized after England in the nineteenth century? (20)
- b) Discuss the causes and consequences of the growth of nationalism in the Balkans during the last quarter of the nineteenth century. (15)
- c) Examine the major shifts in British colonial policies from mid eighteenth century and how they were responsible in the making of the American Revolution. (15)

Total No. of Printed Pages-4]

Roll No. _____

CC(M)
LAW
(OPTIONAL)
PAPER - II
[33]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION-A

Write short notes on the following.

(5×10=50)

1. (a) Trial by Media
(b) Principle of Privity of Contracts
(c) Quantum Meruit
(d) Plea Bargaining
(e) Public Interest Litigation

2. **(20+20+10=50)**

- (a) What is meant by the Contract of Guarantee? Discuss with necessary illustration the consideration for Guarantee.
- (b) Write an analytical note on Undue Influence and the element of Fraud in contracts.
- (c) 'A', offered by a letter to 'B' to sell his house on a specified date. 'B' in turn, expressed his willingness to buy that house by that date at a lesser rate. 'A' did not accept. 'A' did not withdraw his original offer. 'B' afterwards, accepted the rate originally offered. 'A' did not accept. 'B' sued 'A' for breach of contract. Decide.

3. **(20+30=50)**

- (a) Explain and evaluate the principle "*actus non facit reum, nisi mens sit rea*" and its applicability in India.
- (b) Death penalty, even though a valid punishment in India is seldom used by the judiciary. The change in procedural law emphasising for special reasons and judicial mandate for its use in the rarest of the rare cases are examples of a gradual shift against death penalty in India. Accordingly, it is frequently observed that 'Life Imprisonment is the rule, death sentence is an exception.' Discuss in detail the gradual change in respect of the use of death penalty, indicating relevant provisions of law and judicial interpretations.

4. **(20+10+20=50)**

- (a) Write a note on insanity as defence under the IPC with reference to 'McNaghten Rules' and landmark judicial decisions.
- (b) Does the law (Indian Penal Code) permit to cause lesser harm to prevent larger harm? If yes, under what circumstances and under which provision of law is this permissible?
- (c) Human Trafficking is the most heinous crime which is still perpetuated against millions of people throughout the globe. It is being committed for several purposes, including sexual exploitation, organ transplantation, slavery, etc. Discuss in detail the provisions in IPC that can be used to combat Human-Trafficking in India.

SECTION - B

Write short notes on the following.

(5×10=50)

5. (a) Principle 'Delegatus Non-Potest Delegare' in relation to principle of Agency.
- (b) No Estoppel Against a Minor
- (c) Principles of Joint Liability for a criminal act
- (d) Res Ipsa Loquitor.
- (e) Enforcement of Arbitral Award.

6.

(20+15+15=50)

- (a) Analyze the shift in judicial interpretation in respect of reliance on the statement of prosecutrix from Mathura Rape Case (Tukaram Case) to Gurmeet Singh case and beyond. Discuss how far the Courts rely on statement of prosecutrix.
- (b) From the body of a dead man found floating in a river, 'A', the policeman on duty recovered an identity card of the deceased, a costly wrist-watch and a gold ring. He did not record in the recovery memo the last two items and pocketed them. What offence, if any were committed by 'A'? Answer with reasons.
- (c) The question of defamation under IPC has been retained because Criminal Law alone can effectively deal with such law breakers. As regard to the freedom of speech and expression, it is sufficiently safeguarded by the several explanations added to the definition of Defamation. Explain.

7.

(25+25=50)

- (a) The Protection of Civil Rights Act, 1955, made several human rights violations by non-state actors a penal offence. Discuss how far the legislation is successful in eradicating discriminatory or exploitative practices.
- (b) Critically evaluate the impact of the Prevention of Corruption Act, 1988 and analyse how far is it able to combat the menace of corruption in India.

8.

(20+15+15=50)

- (a) Discuss the role of Police in enforcement of Intellectual Property Rights as enshrined in different statutes in India.
 - (b) How far 'Volenti Non Fit Injuria', is a defence in an action in Tort? Explain with illustration.
 - (c) How far Section 89 of the Code of Civil Procedure can be useful in utilizing Alternative Dispute Resolution Mechanism in civil cases pending before different courts in India?
-

Total No. of Printed Pages-4]

Roll No. _____

CC(M)
MANAGEMENT
(OPTIONAL)
PAPER - II
[35]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION - A

Describe the following in about 150 word each:

(5×10=50)

1. a) What is Central Limit Theorem? **(10)**
b) Outline the prevalent inventory control techniques. **(10)**
c) What are flexibility and agility in manufacturing? **(10)**
d) Discuss environmental responsibilities of business. **(10)**
e) Briefly outline recent trends in Information Technology. **(10)**

2. a) What is forecasting? What is the importance of forecasting in business? Discuss any four forecasting methods. **(20)**
b) A grocery receives its weekly supply of bread every Thursday morning. This shipment must last until the following Thursday when a new shipment is received. Any bread left unsold by Thursday are destroyed. Bread sell for Rs. 10 and cost Rs. 8. The weekly demand for bread at this grocery varies from week to week. From past experience, the following probability distribution is assigned to weekly demand:

Events (bread demanded)	Probability
10	0.1
11	0.2
12	0.4
13	0.2
14	0.1

This pattern of demand remains stable throughout the year the demand for bread is not seasonal, and the trend is flat. How many bread should be ordered for delivery every Thursday? Make a payoff table showing the possible alternatives, the possible events, the probabilities of these events, and the associated consequences. **(15)**

- c) What is Inferential Statistics? How is it different from Descriptive Statistics? **(15)**
3. a) Write short notes on **(4×5=20)**
(i) Plant Maintenance
(ii) ISO 14000
(ii) Quality Circles
(iv) Six Sigma
b) What do you understand by Material Management? Briefly discuss the Principles of Material Management. **(15)**

- c) A toy manufacturing company finds that while it costs Rs. 6.25 to make a component, the same component is available in the market at Rs. 5.75 each with an assurance of continued supply. The breakdown of the cost is:

Materials	Rs. 2.75 each
Labour	Rs. 1.75 each
Other variables	Rs. 0.50 each
Depreciation and other Fixed costs	<u>Rs. 1.25 each</u>
	Rs. 6.25

Should you make or buy the component? What would be your decision if the supplier offered the component at Rs. 4.85 each? (7)

- d) Lion equipment company estimates its carrying cost at 15% and its ordering cost at Rs. 9 per order. The estimated annual requirement is 48,000 units at a price of Rs. 4 per unit. You are required to find:
- Most economical number of units to order.
 - How many orders should be placed in a year?
 - How often should an order be placed? (4+2+2=8)
4. a) What is e-governance? What are its major types? Briefly outline some e-governance initiatives which have been hailed as transformational? (20)
- b) Discuss the importance of user involvement in system development. (15)
- c) What is Enterprise Resource Planning (ERP)? Discuss challenges in implementing ERP. (15)

SECTION - B

5. Describe the following in about 150 words each: (5×10=50)
- Briefly discuss rights of a consumer under Consumer Protection Act, 2019. (10)
 - Write short note on SWOT analysis. (10)
 - Elucidate the use of BCG matrix in strategic decision making. (10)
 - Elucidate the concept of experience curve. How is it different from learning curve? (10)
 - Discuss sources of finance available to international traders. (10)
6. a) What is a backward area? How does government ensure development of a backward area? (20)
- b) What is cybercrime? What are the various types of cybercrimes? (15)
- c) Discuss the importance of Public distribution system (PDS) in Indian food Security System. What are the challenges of PDS system in India? (15)

7. a) What do you understand by Growth Strategy? Describe any four prevalent Growth Strategies. (20)
- b) Explain the idea of Core Competency of business. Why do Core competencies matter? What are the types of Core Competencies of a business? (15)
- c) Briefly explain turnaround management. What are the steps in turnaround management? (15)
8. a) Elucidate the concept of Country Risk Analysis (CRA). What are its components? (20)
- b) Distinguish between Foreign Direct Investment and Foreign Portfolio Investment. (15)
- c) What is Foreign Trade Agreement (FTA)? Discuss types of FTA. (15)
-

Total No. of Printed Pages-4]

Roll No. _____

CC(M)
MATHEMATICS
(OPTIONAL)
PAPER - II
[37]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

1. a) Show that the set $\{4, 8, 12, 16\}$ is a cyclic group under multiplication modulo 20. Find all of its generators. (10)

- b) Test the convergence or divergence of the infinite series:

$$1^p + \left(\frac{1}{2}\right)^p + \left(\frac{1.3}{2.4}\right)^p + \left(\frac{1.3.5}{2.4.6}\right)^p + \dots \quad (10)$$

- c) Show that the function $f(z) = 2\{\operatorname{Re}(z)\}^2 - i\{z - \{\operatorname{Im}(z)\}^2\}$ is nowhere analytic, although, the Cauchy-Riemann equations are satisfied at the origin. (10)

- d) Find all basic feasible solutions of the set of equations:

$$2x_1 + 3x_2 - x_3 + 4x_4 = 8$$

$$-x_1 + 2x_2 - 6x_3 + 7x_4 = 3$$

Identify the basic and non-basic variables in each case. (10)

- e) Verify that the function $u(x, y) = \phi(xy) + x\psi\left(\frac{y}{x}\right)$

is the general solution of the partial differential equation $x^2 u_{xx} - y^2 u_{yy} = 0$, where ϕ and ψ are arbitrary twice differentiable functions. (10)

2. a) Prove that the set $H = \{\sigma^2 : \sigma \in S_3\}$ is a normal subgroup of the symmetric group S_3 , the set of all permutations of $\{1, 2, 3\}$. (20)

- b) Evaluate $\oint_C \frac{z+1}{z^4+4z^3} dz$, where C is the circle $|z|=1$. (15)

- c) Prove that $\int_0^{\pi/2} e^{-R \sin x} dx < \frac{\pi}{2R}(1 - e^{-R})$, $R > 0$ (15)

3. a) Prove that the series $\frac{x}{x+1} + \frac{x}{(x+1)(2x+1)} + \frac{x}{(2x+1)(3x+1)} + \dots$

is non-uniformly convergent on $0 \leq x \leq 1$, but it can still be integrated term by term. (20)

- b) For any prime p , show that the polynomial $f(x) = x^{p-1} - x^{p-2} + x^{p-3} - \dots + x^2 - x + 1$ is irreducible over the set of rational numbers $\mathbb{Q}$. (15)

- c) Expand $f(z) = \frac{1}{z(z-1)}$ in a Laurent series valid for the annular domain

$$1 < |z-2| < 2. \quad (15)$$

4. a) Using contour integration, evaluate $\int_{-\infty}^{\infty} \frac{1}{(x^2 + 1)(x^2 + 9)} dx$ (20)

b) Solve, by Gauss-Jordan method, the system of linear equations.

$$x + 2y + z = 8$$

$$2x + 3y + 4z = 20$$

$$4x + 3y + 2z = 16$$

(15)

c) Prove that $\frac{F[x]}{\langle x^2 + 1 \rangle}$ and $\frac{F[x]}{\langle x^2 + x + 4 \rangle}$ are isomorphic fields each having 121 elements, where F is the field of integers modulo 11. (15)

SECTION - B

5. a) Find the optimal assignment with minimum cost from the following cost matrix:

		Machines				
		I	II	III	IV	V
Operators	A	24	29	18	32	19
	B	17	26	34	22	---
	C	27	16	---	17	25
	D	22	18	28	30	24
	E	28	16	31	24	27

Given that the operator B cannot be allowed to operate the fifth machine and similarly the operator C cannot be allowed to operate the third machine. (10)

b) Find the solution of the Cauchy problem.

$$2xy \frac{\partial z}{\partial x} + (x^2 + y^2) \frac{\partial z}{\partial y} = 0 \text{ with } z = \exp\left(\frac{x}{x-y}\right) \text{ on } x + y = 1. \quad (10)$$

c) Using Newton-Raphson method, find the root of the equation $\sin x = 1 + x^3$ upto three decimal places. (10)

d) Find the general solution of the partial differential equation.

$$(D^2 - 6DD' + 9D'^2)z = \tan(y + 3x), \text{ where } D \equiv \frac{\partial}{\partial x} \text{ and } D' \equiv \frac{\partial}{\partial y} \quad (10)$$

e) Prove that the liquid motion is possible when velocity at (x, y, z) is given by

$$\left(\frac{3x^2 - r^2}{r^5}, \frac{3xy}{r^5}, \frac{3xz}{r^5} \right) \text{ where } r^2 = x^2 + y^2 + z^2. \text{ Also determine the streamlines.}$$

(10)

6. a) Show that the improper integral

$$\int_0^{\pi/2} \sin x \log \sin x dx$$

converges and has value $\log 2 - 1$. (20)

- b) By means of Lagrange's interpolation formula, prove that

$$y_1 = y_3 - 0.3(y_5 - y_{-3}) + 0.2(y_{-3} - y_{-5}) \text{ (approximately).} \quad (15)$$

- c) Solve the following linear programming problem

$$\text{minimize } z = 3x_1 + x_2$$

Subject to

$$2x_1 + x_2 \geq 14$$

$$x_1 - x_2 \geq 4$$

$$x_1, x_2 \geq 0$$

by solving its dual problem using simplex method. (15)

7. a) The velocity v of a particle at distance s from a point on its path is given in table:

$s(\text{ft})$	0	10	20	30	40	50	60
$v(\text{ft/sec})$	47	58	64	65	61	52	38

Estimate the time taken in seconds to travel 60ft using Simpson's 1/3 rule. (20)

- b) A particle of unit mass is constrained to move on the plane $xy = c$ under the action of gravity. Show, by setting up the Lagrange's equation, that

$$(x^5 + c^2 x) \ddot{x} + 2c^2 \dot{x}^2 - gcx^3 = 0. \quad (15)$$

- c) Using Cauchy's residue theorem, evaluate the integral

$$\int_0^{2\pi} \frac{1}{(2 + \cos \theta)^2} d\theta \quad (15)$$

8. a) Show that the equations

$$xp - yq = x, \quad x^2 p + q = xz$$

are compatible and find their solution. (20)

- b) Show that the equation of the momental ellipsoid at the corner of a cube of mass M and side $2a$, referred to its principal axes, is given by $2x^2 + 11(y^2 + z^2) = \text{constant}$. (15)

- c) Using Runge-Kutta method of fourth order, solve for $y(0.1)$ and $y(0.2)$ given that

$$\frac{dy}{dx} = x + y^2, \quad y(0) = 1 \quad (15)$$

CC(M)
MECHANICAL ENGINEERING
(OPTIONAL)
PAPER - II
(39)

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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- i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in all. Questions **No.1** and **5** are compulsory and out of the remaining, any **Three** are to be attempted choosing at least **One** question from each Section. The number of marks carried by a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer(QCA) Booklet in the space provided.
- ii) Your answer should be precise and coherent.
- iii) If you encounter any typographical error, please read it as it appears in the text book.
- iv) Diagrams/Figures, wherever required shall be drawn in the space provided for answering the question itself.
- v) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.
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- vii) No blank page should be left in between answers to various questions.
- viii) Non Programmable Calculators are allowed.

SECTION - A

1. a) An isolated system of total mass m is formed by mixing two equal masses of the same liquid initially at the temperatures T_1 and T_2 , respectively. Eventually, the system attains an equilibrium state. Each mass is incompressible with constant specific heat C .
- Show that the amount of entropy produced () is
 - Demonstrate that S_{gen} must be positive. (10)
- b) Show Fanno and Rayleigh lines only by means of a neat sketch in $h-s$ plot and indicate clearly the following in the same plot:
- Shock wave
 - Zones of sub-sonic, sonic and supersonic flow. (10)
- c) Write short notes on the following:
- Emission control in diesel engines.
 - Turbocharging (10)
- d) Write the chemical formula for the following refrigerants:
- R134a
 - R744

Also discuss the desirable thermodynamic, physical, and chemical properties of an ideal refrigerant highlighting their significance. (10)

- e) A four-stroke, single-cylinder petrol engine with a cylinder diameter of 300 mm and stroke of 500 mm is tested at the engine speed of 200 R.P.M. During the test, the average area of the indicator diagram was found to be 800 mm² and the length of the indicator diagram was found to be 85 mm. The indicator spring scale was 5.0.

Determine the following:

- The mean effective pressure
- I.H.P. (10)

2. a) An insulated rigid tank having 5 kg of air at 3 bar and 30° C is connected to an air supply line at 8 bar and 50° C through a valve. The valve is now slowly opened to allow the air from the supply line to flow into the tank until the tank pressure reaches 8 bar, and then valve is closed. Considering air as an ideal gas ($\gamma = 1.41$), determine:

- The final temperature of the air in the tank, and
- The amount of air added to the tank. (20)

- b) A Brayton cycle generates a net power output of 10 MW. The minimum and maximum temperatures in the cycle are 300 K and 1500 K, respectively. The inlet air pressure is 100 kPa and the compressor pressure ratio is 15. The compressor and the turbine both have an isentropic efficiency of 90 %. Determine:

- The mass flow rate of the working fluid.
- Thermal efficiency of the cycle.

Assume the specific heat of air C_p as 1000 J/kg.K and the ratio of specific heats is . (15)

- c) The following data corresponds to a single effect $\text{H}_2\text{O-LiBr}$ absorption refrigeration system.

Absorber and condenser temperature = 45°C ; Generator temperature = 100°C ;
Evaporator temperature = 5°C

Solution concentration: at the exit of absorber = 60%, at the exit of generator = 65%
Enthalpy of solution/refrigerant: absorber exit = -152 kJ/kg , generator exit (solution) = -44 kJ/kg , generator exit (refrigerant) = 2688 kJ/kg , condenser exit = 188 kJ/kg , evaporator exit = 2510 kJ/kg .

The pump work can be considered to be negligible.

Draw the schematic diagram showing the various state points, and for 1 ton of refrigerating effect (TR), determine:

- Mass flow rates of the refrigerant, and the solution at absorber and generator exits,
- Heat transfer rates in the generator and the absorber,
- Heat rejected in the condenser,
- COP.

(15)

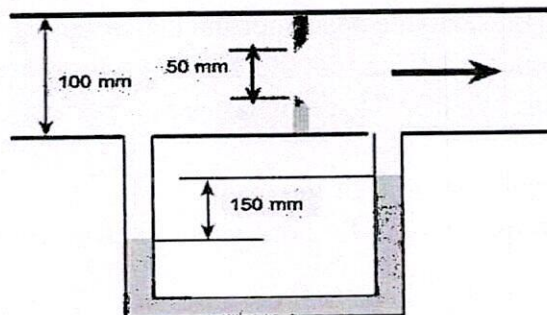
3. a) In a simple gas turbine cycle with a regenerator, air enters the compressor at 100 kPa and 300 K. The pressure of air leaving the compressor is 800 kPa, and the maximum temperature in the cycle is 1500 K. The regenerator efficiency is 75 %. Draw the schematic diagram of the cycle and show the process on T-s diagram, and hence determine

- Pressure and temperature at each point in the cycle.
- Compressor and Turbine work.
- Thermal efficiency of the cycle.

Assume the specific heat of air C_p as 1000 J/kg.K and the ratio of specific heats .(20)

- b) An orifice with a 50 mm diameter opening is used to measure the mass flow rate of water at 15°C ($\rho = 1000 \text{ kg/m}^3$ and $\mu = 1.121 \times 10^{-3} \text{ N-s/m}^2$) through a horizontal 10 cm diameter pipe. A mercury manometer is used to measure the pressure difference across the orifice. If the differential height of the mercury in manometer is 15 cm, determine

- Pressure drop across the orifice,
- Volume flow-rate through pipe,
- The average velocity, and
- The head loss between the two measuring sections.



Assume density of mercury 13600 kg/m^3 and discharge coefficient of orifice meter is 0.61.

(15)

- c) In a steam power plant producing 250 MW of electricity, the boiler supplies steam at 150 bar, 550°C ($h = 3449$ kJ/kg). The condenser pressure is 0.05 bar, and the enthalpy of steam at condenser inlet is 1987 kJ/kg. The turbine, mechanical, and generator efficiencies are 88%, 98%, and 99%, respectively. The boiler consumes coal as fuel of calorific value 25.7 MJ/kg. The boiler efficiency is 90%. The feedwater enters the boiler at 160°C ($h = 676$ kJ/kg). The steam generator has risers in the furnace wall 50 m high and unheated downcomers. The quality of steam at the top of the risers is 10% with a specific volume of 0.00253 m³/kg, and a minimum exit velocity of mixture leaving the riser and entering the drum is required to be 1.5 m/s. The risers have 60 mm outer diameter and 3 mm wall thickness. The latent heat of evaporation of water at 150 bar is 1000 kJ/kg. Neglecting any pressure drop and heat loss, determine the following:

- Steam generation rate.
- Fuel burning rate.
- Number of risers required.
- Heat absorption rate per unit projected area of the riser. (15)

4. a) For a two-row velocity-compounded impulse wheel, the steam velocity at nozzle exit is 600 m/s. The nozzle angle is 16°. The exit angles of the first row moving blades, the fixed guide blades, and the second row moving blades are 18°, 22° and 36°, respectively. The mean blade velocity is 120 m/s, and the blade friction coefficient is 0.85. The steam flow rate is 5 kg/s. Determine the following:

- Tangential thrust,
- Axial thrust,
- Power developed,
- Diagram efficiency. (20)

- b) One kilogram of air initially at 1 bar and 25°C ($s_1 = 1.69528$ kJ/kg-K) is heated at constant pressure with no internal irreversibilities to a final temperature of 177°C ($s_2 = 2.11161$ kJ/kg-K). Employing the ideal gas model, determine the work, the heat transfer, and the amounts of exergy transfer accompanying work and heat transfer, each in kJ.

Let $T_0 = 298$ K, $p_0 = 1$ bar.

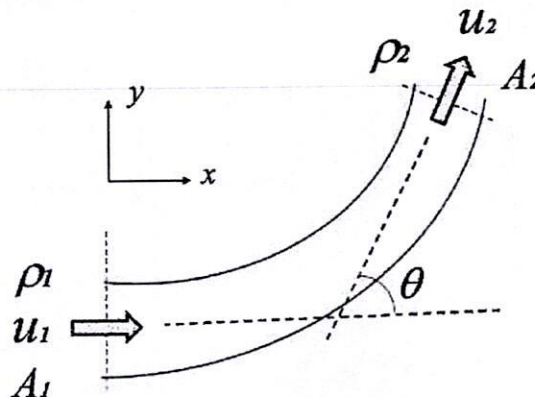
Consider the properties of air as $c_v = 0.717$ kJ/kg-K, $R_{air} = 0.287$ kJ/kg-K. (15)

- c) An air-standard diesel cycle has a thermal efficiency of 60 %. The cut-off ratio of the cycle is 2.9. Preheated air enters the cycle at a pressure of 100 kPa. The maximum cycle temperature is 3000 K. Air behaves as a perfect gas with a specific heat ratio. Calculate

- The compression ratio of the cycle.
- The inlet temperature of working fluid before compression (15)

SECTION - B

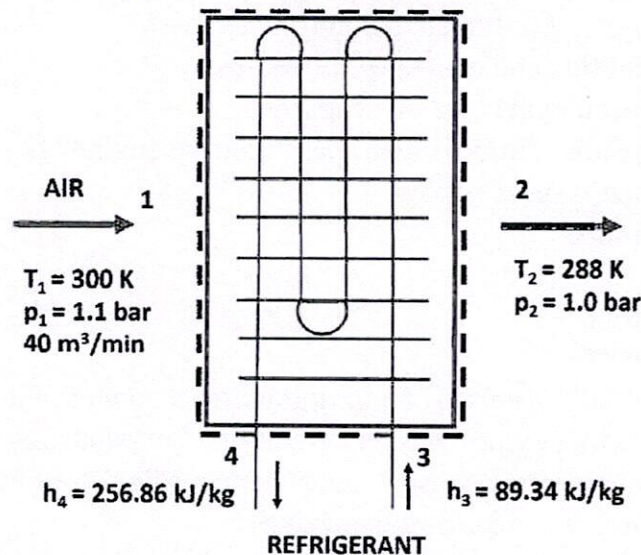
5. a) A steam pipe is wrapped with insulation of inner and outer radii, r_i and r_o , respectively. At a particular instant, the temperature distribution in the insulation is known to be of the form . Determine:
- Whether steady state or transient conditions exist?
 - Variation of heat flux and heat rate with radius?
- Assume 1-D conduction with constant properties. (10)
- b) Explain the phenomenon of knocking in spark ignition engine? Discuss the effect of the following parameters on knocking:
- Compression ratio
 - Spark timing
 - Fuel octane rating
 - Engine Turbulence
- (10)
- c) Steam at 20 bar and 300°C ($v = 0.1255 \text{ m}^3/\text{kg}$) enters a convergent-divergent nozzle at a rate of 0.3 kg/s with negligible inlet velocity and expands into a space at 3 bar. Assuming that the steam expands isentropically according to a law $pv^{1.3} = \text{constant}$, estimate the throat and exit areas of the nozzle. (10)
- d) The Sun emits maximum energy at a wavelength of $0.5 \mu\text{m}$, and its temperature may be assumed to be uniform and constant as 5400 K . Determine the wavelength at which maximum energy is emitted by the Earth. The temperature of the Earth may be assumed as 300 K . (10)
- e) Show that in a 50% reaction steam turbine stage, the maximum stage efficiency is expressed as $2 \cos^2 \alpha / (1 + \cos^2 \alpha)$, where α is the nozzle angle. (10)
6. a) A reducing bend having an angle 45° (θ) in a horizontal x-y plane (as shown in figure), with an upstream section diameter 0.6 m and downstream section diameter 0.3 m , has water flowing through it at the rate of $0.45 \text{ m}^3/\text{s}$ under a pressure of 1.45 bar at the entry section. Neglecting any loss in head due to friction, calculate the net force exerted by the water on the bend, and its line of application.



Symbols have their usual meanings.

(20)

- b) Air and refrigerant pass through a heat exchanger as two separate streams. The data is given at the inlet and exit of the two streams and is shown in the figure. Determine the mass flow rate of refrigerant, air, and the rate of energy transfer from the air to the refrigerant. Assume that air behaves as a perfect gas with gas constant 287 J/kg.K , specific heat C_p as 1000 J/kg.K , and the ratio of specific heats. (15)



- c) In a refrigeration system working on vapour compression cycle, the evaporator temperature is -10°C and the condenser outlet temperature is 35°C . Assume that dry compression starts with saturated vapour at the exit of evaporator, and liquid at the outlet of the condenser to be saturated. The refrigerating capacity of the system is 10 Tons of Refrigeration (TR). The isentropic efficiency of the compressor is 80%. The refrigerant used is R134a. Determine the following: (15)
- Mass flow rate of the refrigerant,
 - Power input to the compressor,
 - Rate of heat rejection in the condenser,
 - Volume of suction vapour (compressor inlet),
 - COP.

The properties of R134a can be referred from the tables below.

Temperature	Pressure	h_f	h_g	s_f	s_g	v_g
$^\circ\text{C}$	bar	kJ/kg	kJ/kg	kJ/kg-K	kJ/kg-K	m^3/kg
-10	2.0052	38.53	244.55	0.15496	0.93782	0.09960
35	8.871	100.88	269.1	0.37145	0.91726	0.02305

Superheated vapour (8.871 bar)

Temperature	h	s	v
$^\circ\text{C}$	kJ/kg	kJ/kg-K	m^3/kg
40	274.48	0.93477	0.02385
50	285.04	0.96793	0.02529

7. a) A simple single-pass shell-and-tube heat exchanger is used to heat water (specific heat $4180 \text{ J/kg}\cdot\text{K}$, 1000) from 30 to 50 . On the tube side, the mass flow rate of water is 5.0 kg/s . On the shell side, oil (specific heat $8360 \text{ J/kg}\cdot\text{K}$) is used as heating fluid with a single pass and mass flow rate of 2.0 kg/s . The inlet temperature of the oil is 100 . The overall heat transfer coefficient is $1500 \text{ W/m}^2\cdot\text{K}$. The diameter of the tube is 20 mm and the average velocity of water in the tube is about 0.5 m/s . Calculate
- The exit temperature of the oil.
 - The number of tubes.
 - Length of each tube
 - The corrected average velocity of water in the tube. (20)
- b) For a pure 1-D, steady, incompressible, fully developed, laminar flow between two parallel plates (distance $2h$ apart), write the Navier-Stokes equations in x , y and z coordinates, and hence derive the expressions for
- The velocity profile,
 - The volume flow-rate between the plates, and
 - The ratio of the maximum velocity to average velocity.
- Assume property variations of the fluid to be negligible. (15)
- c) A power plant operates on a regenerative Rankine cycle with one open feedwater heater. Steam enters the first turbine stage with enthalpy 3445 kJ/kg and expands to a state having enthalpy 2712 kJ/kg , where some of the steam is extracted and diverted to the open feedwater heater. The remaining steam expands through the second turbine stage and enters the condenser with enthalpy 1982 kJ/kg . The enthalpy of saturated liquid at the condenser exit is 152 kJ/kg , and its specific volume is $0.001006 \text{ m}^3/\text{kg}$. The enthalpy of saturated liquid at the feedwater heater exit is 762 kJ/kg , and its specific volume is $0.001127 \text{ m}^3/\text{kg}$. The boiler, feedwater heater, and condenser pressures are 180 bar , 10 bar , and 0.06 bar , respectively. Assume isentropic processes in the turbines and pumps. Determine the following:
- Net work, in kJ per kg of steam entering the first turbine stage,
 - Thermal efficiency,
 - Heat rejected in the condenser, in kJ per kg of steam entering the first turbine stage. (15)
8. a) In a summer air-conditioning system, the room sensible heat load is 160 kW and the room latent heat load is 35 kW . The conditions inside the air-conditioned space are 25°C and $50\% \text{ RH}$. The ventilation requirement is such that the outdoor air mass flow rate is 20% of the supply air. The outdoor air is at 45°C , $30\% \text{ RH}$. The bypass factor of the cooling coil is 0.15 . Determine the following:
- Apparatus Dew Point (ADP) of Coil,
 - Supply air state in terms of temperature and moisture content,
 - Mass flow rate of supply air,
 - Total outside air load,
 - Net load on the cooling coil.
- The barometric pressure is 1.0 atm .
Please refer to the psychrometric chart available at the end of the question paper. (20)

- b) For flow of a liquid metal through a circular tube, the velocity and temperature profiles at a particular axial location may be approximated as being uniform and parabolic, respectively, and are expressed as,

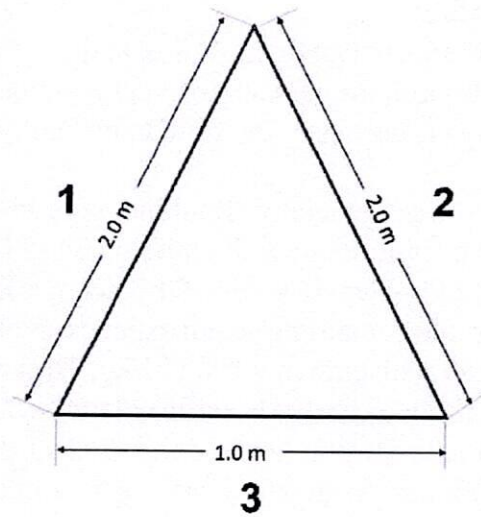
$$u(r) = C_1, \text{ and}$$

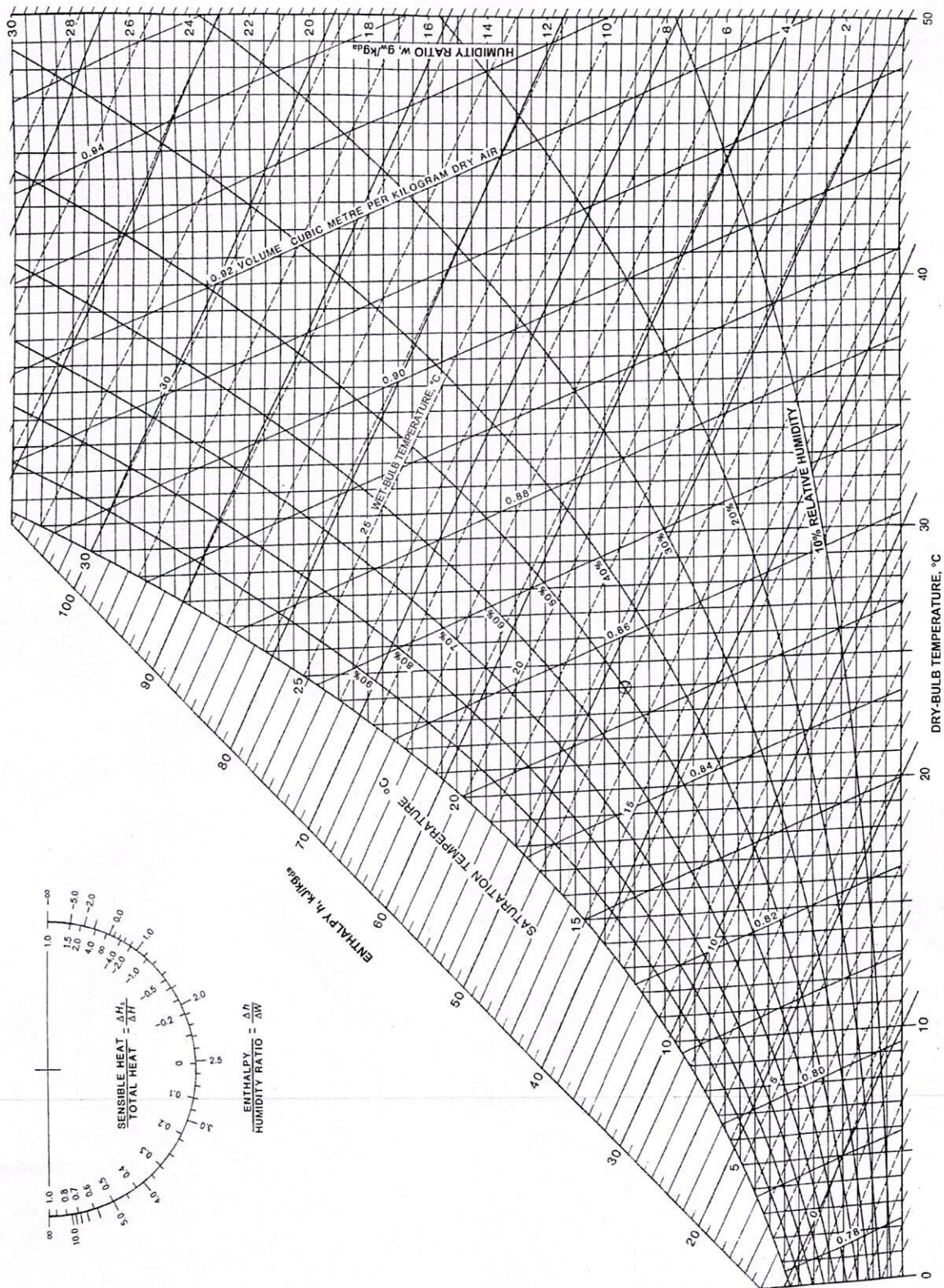
$$T(r) - T_s = C_2[1 - (r/r_o)^2],$$

Where C_1 and C_2 are constants, T_s is the surface temperature of the tube, and r_o is the radius of the tube.

Considering the flow to be incompressible with constant properties, determine the value of the Nusselt number, Nu_D at this location? (15)

- c) A black enclosure of a triangular cross-section is made of three plates perpendicular to the plane as shown in the figure. All plates have finite widths and infinite lengths. Determine the value of the view factor F_{12} . (15)





Psychrometric Chart

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
PHILOSOPHY
(OPTIONAL)
PAPER - II
[43]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instructions carefully before attempting the paper.

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SECTION-A

1.
 - a) Do you think social equality is sufficient to establish a just society? Give reasons. (10)
 - b) Discuss the main differences between positive liberty and negative liberty in reference to Isaiah Berlin's *Two Concepts of Liberty*. (10)
 - c) What are the social and issues involved with female feticide in India? Explain. (10)
 - d) Does corruption adversely affect growth of a country? How? (10)
 - e) Can capital punishment be a good deterrent to heinous crimes like rape, terrorism and murder? Share your views. (10)
2.
 - a) Critically comment on John Rawls' claim that "*An important feature of a conception of justice is that it should generate its own support. Its principles should be such that when they are embodied in the basic structure of society, people tend to acquire the corresponding sense of justice and develop a desire to act in accordance with its principles.*" (20)
 - b) What are the seven limb-like elements of sovereignty, according to Kautilya? Discuss. (15)
 - c) Do you agree that "*Democracy concerns collective decision making, by which we mean decisions that are made for groups and are meant to be binding on all the members of the group.*" Justify your position. (15)
3.
 - a) What do you think about Gandhi's position on the Caste System in India when he writes that "*[I] t (caste) was harmful both to the spiritual and to the national growth.*" (20)
 - b) Compare the views of John Locke and Thomas Hobbes on the legitimacy of private property rights. (15)
 - c) What are the key characteristics of India's multiculturalism? Elaborate. (15)
4.
 - a) Reflect with reasons on how "[E]quitable distribution of available resources and national income is vital to the promotion of social progress." (20)
 - b) Does Robert Nozick actually advocate *anarchism* when he talks about the minimal state? Answer with reasons. (15)
 - c) Present a critical account of Amartya Sen's views on secularism in India. (15)

SECTION - B

5. a) Discuss the idea of *Īś var a* (God) as described in the Yoga aphorism of . (10)
kleśa – karma – vipāka – āśayaiḥ aparāmrṣṭaḥ puruṣa – viśeṣa Īś var aḥ.
- b) Highlights the usage (uses) and significance of religious language in worship and prayer. (10)
- c) Why is the Purva Mīmāṃsā school not interested in the existence of God? Explain. (10)
- d) Illustrate the difference between *sadyo-mukti* (jivan-mukti) and *krama-mukti*, as discussed in the Vedanta school. (10)
- e) Comment on this statement: “*I have therefore found it necessary to deny knowledge in order to make room for faith.*” (10)
6. a) Discuss G.W. Leibniz’s position on the problem of evil in the world. (20)
- b) Give the detailed philosophical account of why Sāṅkhya school does not hold the theory of rebirth or transmigration of the soul. (15)
- c) Do you agree that “*the notion of revelation in the specific sense of a divine self-communication is more apparent in Western than in Eastern religions.*”? Explain. (15)
7. a) Can there be morality without religion and God? How? Answer with reasons. (20)
- b) “*Religious diversity is not possible without religious tolerance.*” Discuss in the context of Jainism. (15)
- c) What is religious experience? Discuss in reference to William James’ statement that “*These (original) experiences we can only find in individuals for whom religion exists not as a dull habit, but as an acute fever rather.*” (15)
8. a) What kind of philosophical issues are associated with the No-self theory (*anātmavāda*) of Buddhism and its concept of Nirvāṇa ? Illustrate. (20)
- b) What are the five arguments proposed by Thomas Aquinas as demonstrations of the existence of God? Are these arguments similar to those of Nyāya-Vaiśeṣika philosophy? Discuss. (15)
- c) Do you agree that Faith and Reason are compatible with one another as is Religion and Science? Explain with reasons? (15)

Total No. of Printed Pages-4]

Roll No. _____

CC(M)
PHYSICS
(OPTIONAL)
PAPER - II
[45]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

1.
 - a) Describe the uncertainty principle. If the position of an electron is measured with an accuracy of 0.05 nm, then determine the uncertainty in the momentum of the electron. (10)
 - b) Describe the de-Broglie wave length. Discuss how the wave-particle duality is exploited in electron microscopy to increase the resolution. (10)
 - c) For a given free electron wave function $\psi(x,t) = \sin(kx - \omega t)$, determine the de-Broglie wave length for $k = 50 \text{ nm}^{-1}$. (10)
 - d) What is superconductivity? Describe the Meissner effect. (10)
 - e) Derive the Bragg's law? Discuss the application of Bragg's law with respect to x-ray diffraction. (10)
2.
 - a) Using the uncertainty principle show the non-existence of electrons in the nucleus of atom. (20)
 - b) A metal is found to be in body centered lattice structure with lattice constant $3.31 \text{ \AA}$ and density 16.6 g/cm^3 . Determine the atomic weight of the element. (15)
 - c) What is Raman effect? Describe Raman shift. Discuss the working principle of Raman spectrometer. (15)
3.
 - a) Describe the scanning electron microscopy. What is the difference between back-scattered electron image and secondary electron image? (10)
 - b) A beam of x-ray of wave length 0.071 nm is diffracted by (110) plane of a face centered cubic (fcc) lattice with lattice constant of 0.28 nm . Find the glancing angle for the second order diffraction. (15)
 - c) What is shell model of nucleus. Using the single-particle shell model, predict the ground state spin, moment and parity of ${}_{13}\text{Al}^{27}$. (15)
 - d) An npn transistor is connected in common emitter mode in which collector supply is 8 V and the voltage drop across resistance R_c connected in collector circuit is 0.5 V . The value of R_c is $800 \text{ } \Omega$. If $\alpha = 0.96$, then determine i) collector-emitter voltage V_{CE} , and ii) base current I_B . (10)
4.
 - a) What is quark? Discuss different types of quarks and their properties. (10)
 - b) In a region of space, a particle with mass m and with zero energy has a time independent wave function $\psi(x) = Ax \exp(-x^2 / L^2)$ where A and L are the constants. Describe the potential $U(x)$ of the particle. (20)
 - c) Copper has mass density 8.95 g/cm^3 near room temperature. Calculate
 - i) number of free electrons per unit volume and
 - ii) Fermi energy of copper. (Atomic mass of copper is 63.5 g/mol). (20)

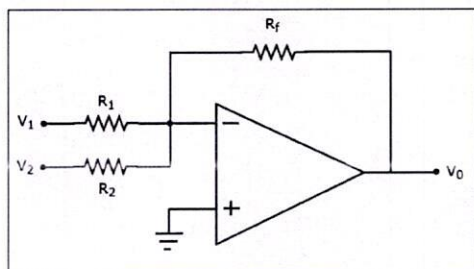
SECTION - B

5. a) What is Curie-Weiss law? Discuss the application of Curie-Weiss law in paramagnetic to ferromagnetic transition. (10)
- b) Assume that a molecule undergoes spectroscopic transition from ground state to an excited state where its lifetime is 10^{-6} s. Calculate approximate uncertainty in excited state energy level and width of the spectra line in Hz. (10)
- c) What is dc and ac Josephson effect? Suppose in a Josephson junction, a dc voltage of $1 \mu\text{V}$ is applied. What would be the current following through the junction? (15)
- d) What is mass defect and nuclear binding energy? Find the binding energy of alpha particle. Take mass of helium nucleus = 4.00126 amu, mass of proton $m_p = 1.00727$ amu and mass of neutron $m_n = 1.00866$ amu. (15)
6. a) Derive the expression for specific heat of solid following classical theory (Dulong Petit's law). (10)
- b) According to Debye's theory of solid, the specific heat is given as,

$$C_v = 9Nk_B \left(\frac{T}{\theta_D} \right)^3 \int_0^{x_m} \frac{x^4 e^x}{(e^x - 1)^2} dx \text{ with } x = \frac{h\nu}{k_B T}, x_m = \frac{h\nu_m}{k_B T} \text{ and } \theta_D = \frac{h\nu}{k_B}$$

is the Debye temperature. Show that in high temperature limit ($\theta_D / T \ll 1$), Debye theory of specific heat gives value equal to Dulong Petit's law. (15)

- c) Discuss the working principle of nuclear magnetic resonance. (10)
- d) Describe the characteristic feature of operational amplifier. For the following operational amplifier circuit, find out the output voltage for $V_1 = 2 \text{ V}$, $V_2 = 3 \text{ V}$, $R_1 = 4 \Omega$, $R_2 = 8 \Omega$ and $R_f = 8 \Omega$. (15)



7. a) Discuss the Mossbauer effect. Discuss the role of nuclear recoil energy in Mossbauer spectroscopy. (15)
- b) What is the packing fraction in crystal lattice system? Determine the packing fraction for body centered cubic (bcc) lattice with lattice parameter a . (15)
- c) Convert the decimal number 14959 into a hexadecimal number. (10)
- d) What is Miller indices crystal plane? Find the Miller indices of a crystal plane which make intercepts 3 and 4 on X and Y axes, respectively and is parallel to Z-axis. (10)

8. a) Discuss the Stern-Gerlach experiment describing its working principle and experimental results. (15)
- b) What is density of states? Discuss the modification of density of states in 1D, 2D and 3D with diagram. (15)
- c) Suppose a particle with energy E is tunnelling through potential barrier V_0 having thickness d ($E < V_0$). Derive an expression for transmission coefficient of the particle. Discuss also the effect of thickness on the transmission coefficient. (20)

Useful Data

Velocity of light in vacuum c	=	$3 \times 10^8 \text{ m/s}$
Mass of electron m_e	=	$9.11 \times 10^{-31} \text{ kg}$
Charge of electron e	=	$1.602 \times 10^{-19} \text{ C}$
Specific charge of electron e/m_e	=	$1.76 \times 10^{11} \text{ C/kg}$
$1 \text{ u} = 1 \text{ amu}$	=	$1.660566 \times 10^{-27} \text{ kg} = 931.5 \text{ MeV}/c^2$
Rest mass energy of electron $m_e c^2$	=	0.511 MeV
Permittivity in free space ϵ_0	=	$8.8542 \times 10^{-12} \text{ C}^2/\text{N/m}^2$
Permeability of free space μ_0	=	$4\pi \times 10^{-7} \text{ N/A}^2$
Gas constant R	=	8.314 J/mol/K
Boltzman constant k_B	=	$1.381 \times 10^{-23} \text{ J/K}$
Planck constant h	=	$6.626 \times 10^{-34} \text{ Js}$
$\hbar$	=	$1.0546 \times 10^{-34} \text{ Js}$
Bohr magneton μ_B	=	$9.274 \times 10^{-24} \text{ J/T}$
Nuclear magneton μ_N	=	$5.051 \times 10^{-27} \text{ J/T}$
Fine structure constant α	=	$1/137.03599$
Mass of proton M_p	=	$1.0072766 \text{ u} = 1.6726 \times 10^{-27} \text{ kg} = 938.3 \text{ MeV}$
Mass of neutron M_n	=	$1.0086652 \text{ u} = 1.6749 \times 10^{-27} \text{ kg} = 939.6 \text{ MeV}$
Mass of deuteron M_d	=	2.013553 u
Mass of α - particle M_α	=	4.001506 u
Mass of $^{12}_6\text{C}$	=	12.0000000 u
Stefan - Boltzmann constant σ	=	$5.7 \times 10^{-8} \text{ Watt/m}^2/\text{K}^4$
Mass of sun M_s	=	$1.99 \times 10^{30} \text{ kg}$
Radius of sun R_s	=	$6.96 \times 10^8 \text{ m}$
Gravitational constant G	=	$6.673 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

CC(M)

POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

(OPTIONAL)

PAPER - II

[47]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

Answer the following in about 150 words each:

(5×10=50)

1.
 - a) Examine the Political Economy Approach to the study of Comparative Politics (10)
 - b) How successful have been social movements in establishing link between government and society? (10)
 - c) Which approach is best suited for analysing international relations in post-cold war? (10)
 - d) India's policy-makers publicly stated that the country sought to pursue a strategy of 'minimum credible deterrence'. Does India's nuclear programs and deployments justify this? (10)
 - e) Discuss the relevance of Soft Power in contemporary world politics. (10)
2.
 - a) Suggest measures to improve the effectiveness of IMF and World Bank in Global Governance. (20)
 - b) 'Political participation has strengthened the spirit of inclusiveness in Indian democracy'. Justify this statement. (15)
 - c) Discuss the impact of globalisation on the state and economies of the developing societies. (15)
3.
 - a) In what ways, do you think the Marxist theory of hegemony helps in enriching understanding of the dynamics of international politics? (20)
 - b) Critically examine the hindrances for an effective functioning of the UN and discuss its future role as a World Environmental Organisation. (15)
 - c) The National Human Rights Commission (NHRC) is an embodiment of India's concern for promotion and protection of Human Rights. How far NHRC has been successful is realising it's mandate? (15)
4.
 - a) India's growth trajectory aligns with APEC's agenda of enhancing regional integration through trade and investment liberalization across the Asia-Pacific. As India looks to engage even more with the East through its Act East policy, explain how APEC membership for India can improve this engagement? (20)
 - b) Do you think the North-South ideological divide impacts the on-going debates on international environmental politics? Discuss with suitable examples? (15)
 - c) Gunnar Myrdal, in his book, 'Asian Drama', called India a 'soft state'. In the light of this statement examine the significant shifts in India's Foreign Policy in the past one decade? (15)

SECTION-B

Answer the following in about 150 words each:

(5×10=50)

5. a) What constitutes the specific elements of India's Indo-Pacific approach? (10)
- b) 'The recent US national security strategy issued by the Joe Biden Administration and the Chinese Communist Party's 20th Congress promised to reshape the geopolitics of Asia'. Discuss. (10)
- c) Discuss the major impediments in India's way to a permanent seat in United Nations Security Council? (10)
- d) Considering the complementarities of capacities and convergence of interests among India, Japan and Russia, discuss the potential areas of cooperation in the Russian Far-East to boost their partnership in the Indo-Pacific region. (10)
- e) Examine the reasons that have led to India making a renewed push for pursuing trade liberalisation in WTO through Preferential Trade Agreement route? (10)
6. a) 'A well -functioning Free Trade Area would create a more prosperous South Asia'. Examine the impact of South Asian Free Trade Area (SAFTA) on India.? (20)
- b) Analyse the Indian multilateral strategies at the UN on International security and development? (15)
- c) 'The Western liberal model of society is dying and a new world order (led by Russia, China and India) is taking its place'. Give your reasoned opinion on this citing suitable instances. (15)
7. a) 'India and Africa share a rich history of cultural, economic and political interactions, rooted in the spirit of developing together as equals'. How can the ties between the two redefine the contours of international order and become a true symbol of South-South Cooperation? (20)
- b) 'India seeks partnerships with all the relevant actors in the world and believes in forging de-hyphenated relations among rival countries and strategic groupings, even in the most conflict-ridden regions of the world such as West Asia'. Discuss. (15)
- c) 'India—EU relations have progressively developed and evolved into a strategic partnership in the 21st century'. Comment. (15)

8. a) Examine the Indian perspective on reviving the World Trade Organisation towards a Sustainable Development Goal-oriented trade negotiation? (20)
- b) Discuss with examples the ethnic conflicts affecting the development, progress, security and social fabric of societies impeding the regional cooperation in South Asia. (15)
- c) Examine the increasing significance of maritime security in India's foreign Policy? (15)
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Total No. of Printed Pages-3]

Roll No. _____

CC(M)
PSYCHOLOGY
(OPTIONAL)
PAPER - II
[49]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

Answer the following questions in about 150 words each.

(5×10=50)

1.
 - a) How can a principle of operant conditioning explain why some people check their cell phones so often?
 - b) What role can mental imagery play in enhancing the performance of sportspersons?
 - c) What do you understand by Management by Objectives?
 - d) Examine the link between consumption and happiness.
 - e) What is 'relative deprivation'? How does it explain why women compare themselves mostly with other working women and not with working men?
2.
 - a) Describe interventions based on the behaviourist and cognitive perspective that a psychologist may use to change prejudices. (20)
 - b) What are the different challenges to the leadership construct? Discuss this with special reference to self-leadership. (15)
 - c) What are the defining characteristics of a social dilemma? Briefly explain the different types of social dilemmas. (15)
3.
 - a) Are there any benefits of diversity in educational institutions? Discuss in the light of available literature. (20)
 - b) Many do not interpret climate change and its impacts as a threat and do not feel worried about it. Provide psychological explanations why this may be the case. (15)
 - c) Discuss how the Big Five Personality Theory can explain the hoarding behaviour seen during the pandemic. (15)
4.
 - a) How can Self-Regulated Learning be used to Support Students with Learning Disabilities in Classrooms? (20)
 - b) Imagine that your workplace asks you to develop a campaign to reduce the number of cigarette butts littering the ground. Identify two strategies that would be effective and two strategies that would be ineffective. (15)
 - c) Discuss how the social distancing required by the pandemic thwarts crucial human needs for belongingness. (15)

SECTION - B

Answer the following questions in about 150 words each.

(5×10=50)

5.
 - a) What is the meaning of the tragedy of the commons? How does it relate to the current ecological crisis?
 - b) Discuss the effects of internet addiction among adolescents. Suggest some strategies to deal with this issue.
 - c) What psychological principles can be used to enhance the effectiveness of poverty eradication programs in India?
 - d) Design a training program for defence personnel operating in low-intensity conflict areas.
 - e) Discuss the advantages of the role of small groups in social actions and community handling of social problems.
6.
 - a) Can engagement in environmentally-friendly behaviour increase well-Being? Discuss in light of research evidence. (20)
 - b) Describe strategies for creating a classroom environment conducive to academic achievement and students personal well-being. (15)
 - c) Give relevant examples to explain what you understand by the term criterion and predictor in reference to the selection of employees. (15)
7.
 - a) Discuss the theories in psychology that can apply to AIDS Prevention. (20)
 - b) Social inequality is a crucial factor in environmental risk perception. Discuss this statement in light of relevant research evidence. (15)
 - c) Countries around the world are dealing with different facets of population growth. Suggest strategies that can help navigate this social dilemma. (15)
8.
 - a) Discuss the role of spatial-physical dimensions of the residential environment in influencing the psychological well-being and the overall quality of life of the elderly population. (20)
 - b) Discuss the differences between Jungian Psychotherapy and Adlerian Psychotherapy. (15)
 - c) Describe the clinical picture of Avoidant Personality Disorder. (15)

CC(M)
PUBLIC ADMINISTRATION
(OPTIONAL)
PAPER - II
[51]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

Answer the following questions in roughly 150 words each:

(5×10=50)

1.
 - a) Briefly evaluate Kautilya's contribution to the evolution of public administration and administrative structures. (10)
 - b) Discuss the evolution of Public Administration in India since the British times. Do you agree that the philosophy of administration today has moved away from its colonial legacy. Comment. (10)
 - c) Trace the evolving trajectory of the District Administration in contemporary times and highlight the changing nature and function of the District Collector. (10)
 - d) What are the different elements of good governance? Briefly examine the steps taken to ensure good governance in contemporary times. (10)
 - e) 'Liberalisation and privatisation brought about catalytic changes in the manner Public Administration was viewed in the post globalisation period'. Comment. (10)
2.
 - a) Briefly analyse the need for a sound budgeting system and examine the economic and social implications of budget. (20)
 - b) How does administration reconcile the Rural-Urban divide to mitigate the issue of Lop-Sided Development? Discuss. (15)
 - c) 'Citizens' participation in local governance is essential for the success of decentralization'. Discuss. (15)
3.
 - a) Discuss the strength and weaknesses of administration in the implementation of rural development programs. (20)
 - b) Examine the role of finance commission with reference to the measures of financial accountability adopted by it. (15)
 - c) How have the Panchayati Raj Institutions strengthened participatory democracy? Evaluate their role and performance at the grassroots level. (15)
4.
 - a) What are the major areas of administration, where Administrative Reforms Commission (ARC) has made recommendations for improvement? Discuss. (20)
 - b) What is the significance of National Human Rights Commission? Evaluate its performance since its inception. (15)
 - c) 'Legislative control over the executive is one of the basic tenets of democratic government'. Discuss some of the major forms of legislative control. (15)

SECTION - B

Answer the following questions in roughly 150 words each:

(5×10=50)

5.
 - a) What is a disaster? Briefly examine the various mechanisms to address disaster in India. (10)
 - b) "Maintenance of law and order being a state subject is faced with new challenges in the present times". Discuss the changing nature and scope of law enforcement, involving the Center and State. (10)
 - c) What do you understand by district administration? Briefly outline the various functions of the district administration. (10)
 - d) What are the constitutional provisions that are intended to make the office of Comptroller and Auditor General, independent and impartial? Elaborate. (10)
 - e) Neutrality is an instrument of the bureaucracy for good governance. Comment on the above statement in the light of the debate on committed bureaucracy. (10)
6.
 - a) How is the idea of good governance impeded by political corruption? Give your answer with reference to criminalization of politics. (20)
 - b) What are the good governance strategies adopted in India for bringing about administrative development? Examine. (15)
 - c) 'Public sector undertakings [PSUs] are the most overfed part of the undernourished economy'. In the light of the above statement suggest how PSUs can improve their functioning. (15)
7.
 - a) Discuss the nature of centre and state administrative relations in India during the last two decades. (20)
 - b) How does administration cope with the challenges of globalization? With reference to these challenges, discuss the various dimensions of the local-global debate. (15)
 - c) 'Parliamentary democracy needs effective coordination and communication between the executive and legislature'. Critically examine the above statement in the light of declining role and credibility of legislative organs in the executive decision making and other functions of the state. (15)
8.
 - a) What are the problems in the structure and functioning of the state administration in India? What are your suggestions to tackle them? Discuss. (20)
 - b) 'The 73rd and 74th constitutional amendment Acts have revitalized the local administration in the rural and the urban areas'. Discuss. (15)
 - c) 'National Development Council [NDC] is one of the key organizations of the comprehensive planning system in India.' In the light of the above statement, examine the role and relevance of the NDC. (15)

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
SOCIOLOGY
(OPTIONAL)
PAPER - II
[53]

Time Allowed - Three Hours

Maximum Marks-250

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SECTION - A

Answer the following questions in about 150 words each.

(5×10=50)

1. a) Jajmani system has been a paradoxical economic relationship consisting of both exploitative and protective elements, Discuss. (10)
b) Illustrate G. S Ghurye's idea on *Sadhus*. (10)
c) Critically analyze M.N Srinivas' idea of *sanskritization* and *westernisation*. (10)
d) *Darsan*, seeing the deity is the high point of Hindu rituals, Illustrate (10)
e) What is *Bongaism* ? (10)
2. a) What is the significance of Dormitories in primitive societies? (20)
b) What is *classificatory* and *descriptive systems* of kinship terms? (15)
c) Critically discuss caste among Muslims in India. (15)
3. a) Food constitutes a critical element in the ritual idiom of purity and pollution. Discuss with suitable examples. (20)
b) Discuss backward class movements in India with suitable examples. (15)
c) What is Little and Great Traditions? Discuss with the examples from Indian studies. (15)
4. a) Indian villages are changing in respect of economic institutions, power structures and inter-caste relationships. Discuss with suitable examples. (20)
b) Critically discuss the family in the east and the west. (15)
c) Critically discuss social impact of early industrialization in India. (15)

SECTION - B

Answer the following questions in about 150 words each.

(5×10=50)

5. a) What is Polygamy? (10)
b) Discuss the concept of leisure in present day situation. (10)
c) What is Bombay plan? (10)
d) What is Perinatal mortality rate? (10)
e) Sociological narrative on increasing child abuse in India. (10)

6. a) “Jati is a breeding unit as well as unit of social reproduction”, Illustrate (20)
- b) Green revolution has created new rural power elite. Discuss and elaborate your answer. (15)
- c) What is Appiko movement? Discuss (15)
7. a) Critically discuss the issue of displacement of Tribes in India (20)
- b) Critically analyse the role of caste in Indian democracy and its implications on electoral politics. (15)
- c) Covid 19 crisis impacted domestic workers the most. Discuss with reasoned arguments and examples. (15)
8. a) Women do not identify tormentors at workplace easily even today, the POSH Act notwithstanding. Explain with examples. (20)
- b) Is it true that persistent poverty undermines educational mobility in India? Illustrate with examples. (15)
- c) What are the socio-economic implications of digital education in India? Elaborate your answer. (15)
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Total No. of Printed Pages-3]

Roll No. _____

CC(M)
ZOOLOGY
(OPTIONAL)
PAPER - II
[57]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION -A

Answer the following in about **150** words each:

1.
 - a) Write a note on IVF and embryo transfer. (10)
 - b) Explain the types and functions of salivary glands in mammals. (10)
 - c) Compare the transport of small and large molecules across plasma membrane. (10)
 - d) Explain enzyme kinetics with the help of suitable examples. (10)
 - e) Write a note on protective and warning mimicry. (10)

2.
 - a) Explain, with help of a diagram, the processing and presentation of endogenous and exogenous antigens. (20)
 - b) Describe the sex determination in *Drosophila*. Add a note on polyploidy and gynandromorphism in *Drosophila*. (15)
 - c) Describe the changes undergone by mammalian sperm in the female reproductive tract. Explain how polyspermy is avoided in humans. (15)

3.
 - a) Give an account of the process of transcription, explaining the initiation complex and events leading to mRNA formation in eukaryotes. (20)
 - b) Give a neat, labelled diagram to explain Krebs' cycle. (15)
 - c) What are fate maps? Elaborate the different techniques to make fate maps. Draw the fate map of frog. (15)

4.
 - a) Define hormones. Differentiate between Steroid and Peptide hormones by giving examples. Add a note on the mechanism of action of Steroid and Peptide hormones. (20)
 - b) What is hemophilia? How is it genetically inherited? Add a note on its symptoms and treatment. (15)
 - c) Discuss the concept of cladistics, its various types and role in biology. What are its disadvantages? (15)

SECTION-B

Answer the following in about **150** words each:

5.
 - a) Differentiate between sympatric and allopatric speciation. (10)
 - b) Explain what are DNA binding motifs and their significance? (10)
 - c) Explain internal ear of mammal with the help of a well labelled diagram. (10)
 - d) Give an account of the hormones secreted by the pituitary gland. (10)
 - e) What is neoteny? Explain with suitable examples. (10)

6.
 - a) Explain with suitable diagrams the molecular mechanism of skeletal muscle contraction. Add a note on the bioenergetics of muscle contraction and causes of muscle cramps. (20)
 - b) Discuss recombinant DNA technology, its basic principle and major applications in research. (15)
 - c) What are fossils? Explain the process of fossilization. Discuss the evolution of elephant with the help of suitable diagrams. (15)

7.
 - a) Explain 'C-value' paradox. Discuss the ultrastructure of chromatin, with special emphasis on nucleosome and solenoid model of chromatin. (20)
 - b) Give an account of the process of initiation of blood coagulation, explaining the role of different factors. (15)
 - c) What are caspases? Explain their role in programmed cell death. (15)

8.
 - a) What is a synapse? Explain different types of synapses. Add a note on various kinds of neurotransmitters and their importance in synaptic transmission. (20)
 - b) Explain with suitable examples, the role of adaptive radiation in the evolution of aquatic and terrestrial animals. (15)
 - c) State and explain the three Mendel's laws of inheritance. Give an account of various deviations from Mendel's findings using appropriate examples. (15)

Total No. of Printed Pages-3]

Roll No. _____

CC(M)

DOGRI

PAPER - II

[26]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instruction carefully before attempting questions.

- i) There are **EIGHT** questions divided in two Sections and printed in **Dogri**.
- ii) Candidate has to attempt **Six** questions in all.
- iii) Questions No. 1 and 5 are compulsory and out of the remaining, **FOUR** are to be attempted choosing at least **Two** question from each Section.
- iv) The number of marks carried by a question/part is indicated against it.
- v) Answers must be written in the medium authorized in the Admission Certificate which must be stated clearly on the cover of this Question-cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in a medium other than the authorized one.
- vi) Word limit in questions, wherever specified, should be adhered to.
- vii) Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

SECTION - A

हृदायत - सुआल नं. 1 जरुरी ऐ। बाकी त्र'अं सुआलें (2,3 ते 4) आ कोई दो सुआल करो।

1. (अ) अज़ादी पैहले दी डोगरी कविता बारै विचार प्रकट करदे होई देवी दित्ता ते परमानंद अलमस्त दी कविता बारै तनकीदी चर्चा करो। (30)

(ब) अज़ादी बाद दी डोगरी कविता च हास्य-व्यंग दी प्रवृत्ति दा जिकर करदे होई तारा स्मैलपुरी जां प्रकाश प्रेमी दी कविता दियां चेचगियां हवाले देइयै स्पष्ट करो। (25)

(जां/OR)

(अ) “चंदै दी चाननी चंदै कनै कविता जीवन दे बहुमुखी पक्खें दी तर्जमानी करदी ऐ” इस तत्थ दी पुष्टी च कविता दे प्रमुख पैहलुएं दी चर्चा करो। (30)

(ब) मधुकर कवि दी ‘शीशा’ जां ‘कोहलू’ कविता दे आधार उपर उसदियें भावगत ते शिल्पगत विशेषताएं पर रोशनी पाओ। (25)

2. रामायण महाकाव्य दे ‘बालकांड’ दे आधार उपर राम जी दे बालरूप चित्रण बारै कवि दे काव्यगत विशेषताएं दा उल्लेख करो। (35)

3. डोगरी गज़ल दे खेतरा च रामलाल शर्मा जां वीरेंद्र केसर दी गज़लगोई बारै विस्तार च लिखो। (35)

4. पदमा सचदेव दी काव्य रचना दे हवाले कनै स्पष्ट करो जे कवित्री दे भाव-छुआले डुगार धरती कनै अथाह लगाव प्रकट करदे न। (35)

SECTION - B

हिदायत - सुआल नं. 5 जरुरी ऐ। बाकी त्र'ऊं सुआलें (6,7 ते 8) चा कोई दो सुआल करो।

5. “डोगरी कहानी दा स्तर भारत दियें दूइयें भाशाएं दी कहानी कन्नै पूरी चाल्ली बरोबरी करदा ऐ।” इस कथन दी पुष्टी च प्रमुख कहानीकारें दे हवाले कन्नै अपने विचार प्रकट करो। (55)

(जां/OR)

हेठ दित्ती दियें पुस्तकें चा कु'ने पं'जें दे बारै उं'दी साहित्यक म्हत्ता बारै सारगर्भत जानकारी देओ।
(5×11=55)

(क) नीला अंबर काले बदल

(ख) चीड़ ते चनार

(ग) जमीन

(घ) बर्फ

(ङ) चाननी दे सेक

(च) न्हैरे दा समुंदर

(छ) चाननी रात

(ज) टनकोर

(झ) खुशी दे अत्थरुं

(ञ) चेता

6. ‘केही’ उपन्यास दे आधार उप्पर डुगार दे ग्राई-पहाड़ी समाज च नारी जीवन दियें दुश्वारियें बारै अपने विचार प्रकट करो। (35)

7. ‘सक्के अजनवी’ जां ‘रिसर्च स्कालर’ एकांकी दी साहित्यक समीक्षा करो। (35)

8. विश्वानाथ खजूरिया जां श्यामलाल शर्मा हुंदे निबंधें बारै विस्तार च चर्चा करो। (35)

Total No. of Printed Pages-4]

Roll No. _____

CC(M)
ENGLISH LITERATURE
(OPTIONAL)
PAPER - II
[25]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instructions carefully before attempting the paper.

- i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in All. Questions **No.1** and **5** are compulsory and out of the remaining, any **Three** are to be attempted choosing at least **One** question from each Section. The number of marks carried by a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer (QCA) Booklet in the space provided.
- ii) Your answer should be precise and coherent.
- iii) If you encounter any typographical error, please read it as it appears in the text book.
- iv) Candidates are in their Own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.
- v) No continuation sheets shall be provided to any candidate under any circumstances.
- vi) No blank page should be left in between answers to various questions.

SECTION-A

1. Critically comment on the following passages in about 150 words each. (5×10=50)

- I) Being so caught up,
So mastered by the brute blood of the air,
Did she put on his knowledge with his power
Before the indifferent beak could let her drop? (W.B.Yeats) (10)
- II) Time present and time past
Are both perhaps present in time future,
And time future contained in time past.
If all time is eternally present
All time is unredeemable. (T.S.Eliot) (10)
- III) All I have is a voice
To undo the folded lie,
The romantic lie in the brain
Of the sensual man-in-the-street
And the lie of Authority
Whose buildings grope the sky:
There is no such thing as the State
And no one exists alone;
Hunger allows no choice
To the citizen or the police;
We must love one another or die. (W.H.Auden) (10)
- IV) That how we live measures our own nature,
And at his age having no more to show
Than one hired box should make him pretty sure.
He warranted no better, I don't know. (Philip Larkin) (10)
- V) In the transverse midnight gossip
of cousins' reunions among
brandy fumes, cashews and the Absences
of grandparents, you suddenly grow
nostalgic for my past and I
envy you your village dog-ride
and the mythology
of the server crazy aunts. (A.K. Ramanujan) (10)

2. a) Write an essay on W.B.Yeats's "Easter 1916" as a postcolonial poem. (20)
 b) Critically discuss John Osborne's play *Look Back in Anger* as a representative work of the Angry Young Man group in England. (15)
 c) How does the form of dramatic monologue enable the movement of the speaking voice's consciousness through time and city space in T.S.Eliot's "Love Song of J. Alfred Prufrock?" (15)
3. a) Write an essay on A.K.Ramanujan's use of Indian cultural resources for motifs in his poetry. (20)
 b) How do the tramps in Samuel Becket's *Waiting for Godot*, Vladimir and Estragon, represent two aspects of the human quest to find existential meaning in the Post World War European society? (15)
 c) Write a critical note on the use of common speech in the poetry of Philip Larkin. (15)
4. a) Write an essay on Becket's experimental use of language in *Waiting for Godot*. (20)
 b) How does W.B.Yeats use his concept of gyres to represent his understanding of Western civilizational history and its apocalypse in his "The Second coming?" (15)
 c) Write a critical note on T.S.Eliot's philosophy of time and consciousness in his "Burnt Norton." (15)

SECTION - B

Write a brief note on the following in about 150 words each. (5×10= 50)

5. a) Epiphany in James Joyce's *A Portrait of the Artist as a Young Man*. (10)
 b) Ending of Joseph Conrad's *Lord Jim*. (10)
 c) Time in modernist novel. (10)
 d) Psychoanalysis and D.H.Lawrence's *Sons and Lovers*. (10)
 e) Raja Rao's *Kanthapura* as a *Sthala Purana*. (10)
6. a) Analyse the language and style of Raja Rao's *Kanthapura* in light of the author's "Forward" to the novel. (20)
 b) Write a critical note on the narrative technique in Joseph Conrad's *Lord Jim*. (15)
 c) How does Virginia Woolf employ the stream of consciousness technique in *Mrs. Dalloway*. (15)
7. a) Critically examine V. S. Naipaul's *A House for Mr. Biswas* as a postcolonial novel. (20)
 b) Write a critical analysis of the symbolic imagery and its relation with the subconscious state of mind of the characters in D.H.Lawrence's *Sons and Lovers*. (15)
 c) Critically comment on threefold division of E.M.Forster's *A Passage to India* as "Mosque," "Caves" and "Temple". (15)

8. a) Critically discuss Stephen Dedalus positions on nation, religion, art and language in James Joyce's *A Portrait of the Artist as a Young Man*. (20)
- b) In what way does Naipaul use irony as a narrative mode in *A House for Mr. Biswas*? (15)
- c) Is it appropriate to call Raja Rao's *Kanthapura* a Gandhian novel? Give a reasoned answer. (15)
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CC(M)

HINDI

PAPER - II

[28]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instruction carefully before attempting questions.

- i) There are **EIGHT** questions divided in two Sections and printed in **HINDI**.
- ii) Candidate has to attempt **FIVE** questions in all.
- iii) Questions No. 1 and 5 are compulsory and out of the remaining, **THREE** are to be attempted choosing at least **ONE** question from each Section.
- iv) The number of marks carried by a question/part is indicated against it.
- v) Answers must be written in the medium authorized in the Admission Certificate which must be stated clearly on the cover of this Question-cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in a medium other than the authorized one.
- vi) Word limit in questions, wherever specified, should be adhered to.
- vii) Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

1. किन्ही दो अवतरणों की सप्रसंग व्याख्या कीजिए-

(2×25=50)

(क) कौन हो तुम बसंत के दूत,

विरस पतझड़ में अति सुकुमार।

घनतिमिर में चपला की रेख-

तपन में शीतल मंद बयार।

(ख) बंधु भए का दीन के, को तारयो रघुराइ।

तूठे तूठे फिरत हों, झूठे बिरद कहाइ॥

थोरे ही गुन रीझते, बिसराइ वह बानि।

तुमहु, कान्ह, मनौ भए आज काल्हि के दानि॥

(ग) जोग ठगौरी ब्रज न बिकैहै

यह व्योपार तिहारो ऊधौ। ऐसोई फिरि जैहै

जापै लै आए हौ मधुकर ताके उर न समैहै

दाख छांड़ि कै कटुक निबौरी को अपने मुख खैहै

मूरी के पातन कै केना को मुक्ताहल दैहै

सूरदास प्रभु गुनहि छांड़ि कै, को निर्गुन निर्बैहै।

(घ) है अमानिशा उगलता गगन घन अन्धकार

खो रहा दिशा का ज्ञान, स्तब्ध है पवन चार

अप्रतिहत गरज रहा पीछे अम्बुधि विशाल

भूधर ज्यों ध्यान मग्न, केवल जलती मशाल।

2. (क) भाव और विचार की दृष्टि से कबीर और तुलसी की कविता में क्या साम्यता है। विश्लेषित कीजिए। (20)

(ख) कामायनी के आधार पर जयशंकर प्रसाद की सौन्दर्य चेतना पर प्रकाश डालिए। (15)

(ग) 'हरिजन गाथा' कविता के आधार पर नागार्जुन की जनवादी काव्य संवेदना की समीक्षा कीजिए। (15)

3. (क) भाषा, भाव एवं विचार की दृष्टि से निराला की कुकुरमुत्ता कविता का मूल्यांकन कीजिए। (20)
- (ख) बिहारी की समाहार शक्ति पर विचार कीजिए। (15)
- (ग) “दिनकर युग चेता कवि है”-कुरुक्षेत्र के माध्यम से विश्लेषित कीजिए। (15)
4. (क) “कबीर कथनी करनी की एकता पर बल देने वाले कवि थे, उन्होंने बाहरी सत्ता को ही चुनौती नहीं दी अपने संस्कारों को भी चुनौती दी”- इस कथन के आधार पर कबीर का मूल्यांकन कीजिए। (20)
- (ख) “जायसी का उद्देश्य विरही हृदय की वेदना से साक्षात्कार कराना है, न कि काव्य चमत्कार उत्पन्न करना”- इस कथन के अलोक में नागमती के वियोग वर्णन का विश्लेषण कीजिए। (15)
- (ग) “सूरदास का काव्य दुःख से पीड़ित हृदयों को आशा और उल्लास से भर देने वाला काव्य है।”- इस कथन के आधार पर सूरदास की काव्य संवेदना का मूल्यांकन कीजिए। (15)

खंड - 2

5. किन्हीं दो अवतरणों की सप्रसंग व्याख्या कीजिए- (2×25=50)

- (क) कौन कहता है, जीवन संग्राम में वह हारा है। यह उल्लास, यह गर्व, यह पुलक क्या हार के लक्षण हैं? इन्हीं हारों में उसकी विजय है। उसके टूटे-फूटे अस्त्र उसकी विजय पताकाएं हैं। उसकी छाती फूल उठी है, मुख पर तेज आ गया है।
- (ख) सुख और दुःख अन्योन्याश्रय हैं। उनका अस्तित्व केवल विचार और अनुभूति के विश्वास में है। इच्छा ही सर्वावस्था में दुःख का मूल है। एक इच्छा की पूर्ति दूसरी इच्छा को जन्म देती है। वास्तविक सुख इच्छा की पूर्ति में नहीं, इच्छा से निवृत्ति में है।
- (ग) कविता ही मनुष्य के हृदय को स्वार्थ-संबंधों के संकुचित मंडल से ऊपर उठाकर लोक सामान्य भाव भूमि पर ले जाती है, जहाँ जगत की नाना गतियों के मार्मिक स्वरूप का साक्षात्कार और शुद्ध अनुभूतियों का संचार होता है, इस भूमि पर पहुंचे हुए मनुष्य को कुछ काल के लिए अपना पता नहीं रहता। वह अपनी सत्ता को लोक सत्ता में लीन किए रहता है। उसकी अनुभूति सबकी अनुभूति होती है या हो सकती है। इस अनुभूति योग के अभ्यास से हमारे मनोविकार का परिष्कार तथा शेष सृष्टि के साथ हमारे रागात्मक सम्बन्ध की रक्षा और निर्वाह होता है।
- (घ) राष्ट्रनीति, दार्शनिकता और कल्पना का लोक नहीं है। इस कठोर प्रत्यक्षवाद की समस्या बड़ी कठिन होती है। गुप्त साम्राज्य की उत्तरोत्तर वृद्धि के साथ उसका दायित्व भी बढ़ गया है पर उस बोझ को उठाने के लिए गुप्त कुल के शासक प्रस्तुत नहीं, क्यों कि साम्राज्य- लक्ष्मी को वे अब अनायास और अवश्य अपनी शरण आने वाली समझने लगे हैं।

6. (क) “‘गोदान’ किसान जीवन का मार्मिक आख्यान है” विश्लेषित कीजिए। (20)
- (ख) मैला आंचल की राजनीतिक चेतना पर प्रकाश डालिए। (15)
- (ग) ‘टूटना’ कहानी की कथा संवेदना पर प्रकाश डालिए। (15)

7. (क) “‘भारत दुर्दशा’ अतीत गौरव की चमकदार स्मृति, आँसू भरा वर्तमान है और भविष्य निर्माण की भव्य प्रेरणा है”-इस कथन की विवेचना कीजिए। (20)
- (ख) पठित निबंध के आधार पर आचार्य शुक्ल की निबंध शैली की विशेषताएं बताइए। (15)
- (ग) जयशंकर प्रसाद के नाटक स्कंदगुप्त में व्यक्त राष्ट्रीय चेतना पर प्रकाश डालिए। (15)
8. (क) “‘दिव्य ऐतिहासिक पृष्ठ भूमि में व्यक्ति और समाज की प्रवृत्ति और गति का चित्र है’-इस कथन की आलोचनात्मक विवेचना कीजिए। (20)
- (ख) ‘भोलाराम का जीव’ कहानी के माध्यम से हरिशंकर परसाई की व्यंग्य चेतना पर प्रकाश डालिए। (15)
- (ग) आषाढ़ का एक दिन नाटक के माध्यम से मोहन राकेश के नाट्य कर्म की समीक्षा कीजिए। (15)
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Total No. of Printed Pages-4]

Roll No. _____

CC(M)
MEDICAL SCIENCE
(OPTIONAL)
PAPER - II
[41]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following instructions carefully before attempting the paper.

- i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in all. Question No.1 and 5 are compulsory and out of the remaining, any **Three** are to be attempted choosing at least **One** question from each Section. The number of marks carried by a Question/Part are indicated against it. Answers must be written in English in Question-Cum-Answer(QCA) Booklet in the space provided.
- ii) Your answer should be precise and coherent.
- iii) If you encounter any typographical error, please read it as it appears in the text book.
- iv) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.
- v) No continuation sheets shall be provided to any candidate under any circumstances.
- vi) No blank page should be left in between answers to various questions.

SECTION - A

1. a) Discuss etiology, clinical features and management of kernicterus in a 36 hours old neonate. (5+5+10)
b) Discuss the anatomical variations, clinical features, complications and management of Transposition of Great vessels. (5+5+5+5)
c) Discuss the assessment and management as per IMNCI protocol of a 4 year old child with fever, cough and rapid breathing for last 4 days. (5+5)
2. a) Write short Notes on: (4×5=20)
 - i) Perianal abscess
 - ii) Mastalgia
 - iii) Cholelithiasis
 - iv) Traumatic Pneumothorax
b) Write short Notes on: (4×5=20)
 - i) Weekly Iron and folic acid Supplementation (WIFS) Programme
 - ii) Status of Under-five mortality rate in India
 - iii) Sample Registration System (SRS)
 - iv) T Test
c) Describe the Financial Support Available under NHM for TB Related Activities by AB-HWCs (10)
3. a) Describe the clinical features and basic principles of management of a case of Stevan Johnson Syndrome (5+15=20)
b) Describe the epidemiology, pathogenesis, clinical manifestations and treatment of Kala-azar. (5+5+5+5)
c) Discuss Bronchial Asthma under following headings: (3+4+3=10)
 - i) Etiology
 - ii) Diagnosis
 - iii) Treatment

4. a) Write short Notes on: (4×5=20)
i) Covid-19 Vaccine
ii) ASHA Workers
iii) Electroconvulsive Therapy
iv) MTP Act 2021
b) Describe esophageal Tumours. Discuss clinical features, diagnosis and management of carcinoma of lower end of oesophagus. (5+5+10)
c) Discuss in Brief: (5+5)
i) Cocainism
ii) Othello Syndrome

SECTION - B

5. a) A 45-year-old male patient presented to emergency room with complaint of pain in right upper abdomen for 3 days. There is history of high-grade fever with chills. (5+10)
i) What are differential diagnoses?
ii) How will you investigate and treat this patient?
b) A 25-year-old G3P2L2 with previous one LSCS presented to the emergency 34 weeks pregnancy with complains of painless bleeding per vaginal bleeding. What is the probable cause of this bleeding and what is the differential diagnosis for antepartum hemorrhage in pregnancy? How will you manage this case during antenatal period? What are the anticipated problems during caesarean delivery of this patient and how can they be managed? (5+10+5)
c) Describe the etiopathogenesis, diagnostic approach and treatment of a case of Hepatic encephalopathy. (5+5+5)
6. a) Discuss in detail the guidelines of biomedical waste management. (30)
b) Discuss the provisions of Rashtriya Aarogya Nidhi(RAN) (20)
7. a) 40 year old male presented with hematemesis. There is mild enlargement of liver.
i) What are the differential diagnosis?
ii) Discuss Portal Hypertension
iii) Discuss Management of Hemetemesis. (3+3+4=10)
b) A 15-year-old girl visits the OPD accompanied by her mother, with the complaint that she has not had her menarche. What is the definition and classification of Amenorrhea? What are the components of history, examination, and essential investigations for evaluation in relation to the possible causes of this condition (5+15=20)

c) Write short notes on: (4×5=20)

- i) Triage
- ii) Clinical features and Diagnosis of Nephrotic Syndrome
- iii) Stroke
- iv) Mucormycosis

8. a) Enumerate important points in history taking of a patient suspected to have airborne contact dermatitis to parthenium. Describe the relevance of patch testing in the diagnosis for the same. (10+10)
- b) Describe in brief: (10+10)
- i) Causes and Management of Dysmenorrhea
 - ii) Active management of third stage of Labour
- c) What is a case control study? What are the important aspects in selection of controls. What are the advantages and disadvantages of a case control study. (2+4+4)
-

Total No. of Printed Pages-3]

Roll No. _____

CC(M)

PUNJABI

PAPER - II

[34]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instructions carefully before attempting the paper

- i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in all. Questions **No.1** and **5** are compulsory and out of the remaining, any **Three** are to be attempted choosing at least One question from each Section. The number of marks carried by a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer(QCA) Booklet in the space provided.
- ii) Your answer should be precise and coherent.
- iii) If you encounter any typographical error, please read it as it appears in the text book.
- iv) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.
- v) No continuation sheets shall be provided to any candidate under any circumstances.
- vi) No blank page should be left in between answers to various questions.

SECTION - A

ਪ੍ਰਸ਼ਨ 1 :-

- (ੳ) ਬਾਬਾ ਫ਼ਰੀਦ ਦੀ ਬਾਣੀ ਵਿੱਚੋਂ ਉਨ੍ਹਾਂ ਦੇ ਜੀਵਨ ਦੀ ਨੈਤਿਕਤਾ ਸੰਬੰਧੀ ਵਿਚਾਰ ਉਦਾਹਰਣਾਂ ਸਹਿਤ ਦਿਉ। (10)
- (ਅ) ਸਿੱਧ ਕਰੋ ਕਿ 'ਮੂਲ ਮੰਤਰ' ਗੁਰਮਤਿ ਧਾਰਾ ਦਾ ਨਿਚੋੜ ਹੈ। (10)
- (ੲ) 'ਆਸਾ ਦੀ ਵਾਰ' ਵਿਚ ਪੇਸ਼ ਸਮਾਜਕ ਜੀਵਨ 'ਤੇ ਨੋਟ ਲਿਖੋ। (10)
- (ਸ) ਬੁੱਲ੍ਹੇ ਸ਼ਾਹ ਦੀਆਂ ਕਾਫ਼ੀਆਂ ਦੇ ਆਧਾਰ 'ਤੇ ਉਸਦੀ ਵਿਚਾਰਧਾਰਾ 'ਤੇ ਨੋਟ ਲਿਖੋ। (10)
- (ਹ) ਵਾਰਿਸ 'ਹੀਰ' ਦੇ ਹੁਸਨ ਦਾ ਜ਼ਿਕਰ ਕਿਹੜੇ ਸ਼ਬਦਾਂ ਵਿਚ ਕਰਦਾ ਹੈ। ਉਦਾਹਰਣਾਂ ਸਹਿਤ ਦੱਸੋ। 10

ਪ੍ਰਸ਼ਨ 2 :-

- (ੳ) ਫ਼ਰੀਦ ਬਾਣੀ ਦੀਆਂ ਕਾਵਿਕ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਬਾਰੇ ਚਰਚਾ ਕਰੋ। (20)
- (ਅ) ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ ਦੀ ਰਚਨਾ 'ਜਪੁਜੀ ਸਾਹਿਬ' ਵਿਚ ਨਾਮ ਸੁਣਨ ਅਤੇ ਮੰਨਣ ਉੱਪਰ ਵਿਸ਼ੇਸ਼ ਬਲ ਹੈ, ਚਰਚਾ ਕਰੋ। (15)
- (ੲ) ਹੀਰ ਦੇ ਕਿੱਸੇ ਰਾਹੀਂ ਵਾਰਿਸ ਆਪਣੇ ਵੇਲੇ ਦੇ ਸਮਾਜ ਦੀ ਤਸਵੀਰ ਉਲੀਕਦਾ ਹੈ। ਉਦਾਹਰਣਾਂ ਨਾਲ ਸਿੱਧ ਕਰੋ। (15)

ਪ੍ਰਸ਼ਨ 3 :-

- (ੳ) ਕੀ ਬੁੱਲ੍ਹੇ ਸ਼ਾਹ ਦੀ ਰਚਨਾ ਨੂੰ ਪੰਜਾਬੀ ਸੂਫ਼ੀ ਕਾਵਿ ਪਰੰਪਰਾ ਦਾ ਸਿਖਰ ਮੰਨਿਆ ਜਾ ਸਕਦਾ ਹੈ? ਚਰਚਾ ਕਰੋ। (20)
- (ਅ) 'ਬਾਰਹਮਾਹ ਤੁਖ਼ਾਰੀ' ਅਧਿਆਤਮਕ ਬਿਰਹੇ ਦੀ ਉੱਤਮ ਰਚਨਾ ਹੈ। ਸਪੱਸ਼ਟ ਕਰੋ। (15)
- (ੲ) ਹੀਰ ਵਾਰਿਸ ਅੰਦਰਲੇ ਕਾਵਿ ਗੁਣਾਂ ਉੱਪਰ ਵਿਚਾਰ ਚਰਚਾ ਕਰੋ। (15)

ਪ੍ਰਸ਼ਨ 4 :-

- (ੳ) ਕਿੱਸਾ ਹੀਰ ਵਾਰਿਸ ਵਿਚ 'ਕੈਦੋਂ' ਦੀ ਪਾਤਰ ਉਸਾਰੀ ਕਿਹੋ ਜਿਹੀ ਹੋਈ ਹੈ? ਚਰਚਾ ਕਰੋ। (15)
- (ਅ) ਬੁੱਲ੍ਹੇ ਸ਼ਾਹ ਦੀਆਂ ਕਾਫ਼ੀਆਂ ਦੇ ਆਧਾਰ 'ਤੇ ਉਸਦੀ ਵਿਚਾਰਧਾਰਾ 'ਤੇ ਨੋਟ ਲਿਖੋ। (15)
- (ੲ) ਬਾਬਾ ਫ਼ਰੀਦ ਦੀ ਬਾਣੀ ਵਿਚ ਪ੍ਰਾਪਤ 'ਮੌਤ ਦੇ ਸੰਕਲਪ' ਬਾਰੇ ਵਿਸਥਾਰ ਚਰਚਾ ਕਰੋ। (20)

SECTION - B

ਪ੍ਰਸ਼ਨ 5 :-

- (ੳ) ਚਾਤ੍ਰਿਕ ਦੇ ਕਾਵਿ ਸੰਗ੍ਰਹਿ 'ਚੰਦਨਵਾੜੀ' ਵਿਚ ਮਿਲਦੀ ਰਹੱਸਵਾਦੀ ਪ੍ਰਵਿਰਤੀ ਬਾਰੇ ਚਰਚਾ ਕਰੋ। (10)
- (ਅ) ਨਾਵਲ 'ਇਕ ਮਿਆਨ ਦੇ ਤਲਵਾਰਾਂ' ਦੇ ਇਤਿਹਾਸਕ ਪਰਿਪੇਖ ਦੀ ਚਰਚਾ ਕਰੋ। (10)
- (ੲ) ਗੁਰਬਖਸ਼ ਸਿੰਘ ਦੀ ਪੁਸਤਕ 'ਨਵਾਂ ਸ਼ਿਵਾਲਾ' ਵਿਚ ਸ਼ਾਮਿਲ ਨਿਬੰਧ 'ਸੁੰਦਰਤਾ' ਦਾ ਸਾਰ ਆਪਣੇ ਸ਼ਬਦਾਂ ਵਿਚ ਲਿਖੋ। (10)
- (ਸ) ਗਾਰਗੀ ਦੇ ਨਾਟਕ 'ਧੂਈ ਦੀ ਅੱਗ' ਨੂੰ ਰੰਗ ਮੰਚ ਦੀ ਦ੍ਰਿਸ਼ਟੀ ਤੋਂ ਪਰਖੋ। (10)
- (ਹ) ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ ਦੀ ਪੁਸਤਕ 'ਪੰਜਾਬੀ ਕਾਵਿ ਸ਼ਿਰੋਮਣੀ' ਵਿਚ ਸ਼ਾਮਿਲ ਲੇਖ 'ਗੁਰੂ ਅਰਜਨ ਦੇਵ ਜੀ ਦੀ ਰਚਨਾ' ਸੰਬੰਧੀ ਪ੍ਰਿ. ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ ਦੇ ਵਿਸ਼ਲੇਸ਼ਣ 'ਤੇ ਚਰਚਾ ਕਰੋ। (10)

ਪ੍ਰਸ਼ਨ 6 :-

- (ੳ) 'ਜੰਗਨਾਮਾ ਸ਼ਾਹ ਮੁਹੰਮਦ' ਦੀਆਂ ਕਾਵਿ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਉੱਤੇ ਚਾਨਣਾ ਪਾਉ। (20)
- (ਅ) ਬਲਵੰਤ ਗਾਰਗੀ ਰਚਿਤ 'ਮੇਰਾ ਰੂਸੀ ਸਫ਼ਰਨਾਮਾ' ਸੰਬੰਧੀ ਆਪਣੇ ਵਿਚਾਰ ਪੇਸ਼ ਕਰੋ। (15)
- (ੲ) ਗੁਰਬਖਸ਼ ਸਿੰਘ ਦੀ ਪੁਸਤਕ 'ਮੇਰੀਆਂ ਅਭੁੱਲ ਯਾਦਾਂ' ਬਾਰੇ ਜਾਣਕਾਰੀ ਦੇਂਦੇ ਹੋਏ 'ਸ਼ਾਲਾਮਾਰ ਵਿਚ ਡੇਲੀਆਂ' ਲੇਖ ਦਾ ਸਾਰ ਲਿਖੋ। (15)

ਪ੍ਰਸ਼ਨ 7 :-

- (ੳ) 'ਚਿੱਟਾ ਲਹੂ' ਨਾਵਲ ਵਿਚ ਨਾਨਕ ਸਿੰਘ ਨੇ ਕਿਹੜੀਆਂ ਕਿਹੜੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਲਿਆ ਹੈ ਅਤੇ ਉਹ ਕਿੰਨਾ ਕੁ ਸਫ਼ਲ ਕਿਹਾ ਜਾ ਸਕਦਾ ਹੈ। (20)
- (ਅ) 'ਨਵਾਂ ਜਹਾਨ' ਪੁਸਤਕ ਬਾਰੇ ਜਾਣਕਾਰੀ ਦੇਂਦੇ ਹੋਏ ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ ਦੁਆਰਾ ਲਿਖੇ ਗਏ ਇਸ ਦੇ ਮੁੱਖ ਬੰਦ ਦੀ ਚਰਚਾ ਕਰੋ। (15)
- (ੲ) ਬਲਰਾਜ ਸਾਹਨੀ ਰਚਿਤ 'ਮੇਰਾ ਪਾਕਿਸਤਾਨੀ ਸਫ਼ਰਨਾਮਾ' ਨੂੰ ਸਫ਼ਰਨਾਮੇ ਦੇ ਤੌਰ 'ਤੇ ਪਰਖੋ। (15)

ਪ੍ਰਸ਼ਨ 8 :-

- (ੳ) ਪ੍ਰਿ. ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ ਦੁਆਰਾ ਲਿਖੀ ਪੁਸਤਕ 'ਸਾਹਿਤਘਾਰਥ' ਨਾਲ ਸੰਖੇਪ ਜਾਣ ਪਛਾਣ ਕਰਾਉ। (20)
- (ਅ) 'ਲੋਹਾ ਕੁੱਟ' ਨਾਟਕ ਦੀ ਪ੍ਰਮੁੱਖ ਸਮੱਸਿਆ 'ਤੇ ਚਾਨਣਾ ਪਾਉ। (15)
- (ੲ) 'ਪਵਿੱਤਰ ਪਾਪੀ' ਨਾਵਲ ਦੇ ਪ੍ਰਮੁੱਖ ਪਾਤਰ ਕੇਦਾਰ ਦੇ ਚਰਿੱਤਰ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਦੀ ਚਰਚਾ ਕਰੋ। (15)

CC(M)
URDU
(OPTIONAL)
(LITERATURE)
PAPER - II

[55]

[Maximum Marks - 250]

[Time Allowed - 3 Hours]

سوالات سے متعلق خاص ہدایات

(سوالوں کے جواب تحریر کرنے سے پہلے درج ذیل ہدایات کو غور سے پڑھئے)

- ۱۔ اس پرچے میں آٹھ سوالات ہیں جو دو حصوں (سیکشن) پر مشتمل ہیں۔
- ۲۔ امیدوار کو کل پانچ سوالوں کے جواب دینے ہیں۔
- ۳۔ صرف پانچ سوالوں کے جواب لکھئے۔ سوال نمبر 1 اور 5 کے جواب لازمی ہیں۔ دونوں سیکشن کے باقی سوالات میں سے صرف تین سوالوں کے جواب دینے ہیں لیکن ہر سیکشن کے سوالات میں سے کم از کم ایک سوال کا انتخاب ضروری ہے۔
- ۴۔ ہر سوال یا سوال کے حصے کے نمبر اس کے سامنے درج کر دیئے گئے ہیں۔
- ۵۔ جوابات اردو میں ہی مطلوب ہیں۔
- ۶۔ سوالات کے جوابات کے لئے الفاظ کی جو تعداد مقرر کی گئی ہے اس کی پابندی لازمی ہے۔
- ۷۔ سوالات کے جوابات کو ترتیب وار اہمیت دی جائے گی۔ جب تک کوئی جواب یا اس کا حصہ کاٹ کر مسترد نہ کر دیا گیا ہو سوال کا جواب تصور کیا جائے گا اگرچہ جواب جزوی طور پر ہی حل کرنے کی کوشش کی گئی ہو۔ کوئی صفحہ یا صفحے کا کوئی حصہ اگر چھوڑا جائے تو اس کو کاٹنا ضروری ہے۔

SECTION - A

1. درج ذیل سوالوں کے جوابات دی گئی ہدایات کے مطابق تحریر کیجئے۔ (20+15+15=50)

(الف) مندرجہ ذیل اقتباس کی تشریح سیاق و سباق کے حوالے سے (200 الفاظ میں) کیجئے۔ (20)

”اُس بادشاہ کے عمل میں ہزاروں شہرتھے اور کئی سلطان نعل بندی دیتے۔ ایسی بڑی سلطنت پر ایک ساعت اپنے دل کو خُدا کی یاد اور بندگی سے غافل نہ کرتا۔ آرام دُنیا کا جو چاہئے سب موجود تھا؛ لیکن فرزند (کہ زندگی کا پھل ہے) اُس کی قسمت کے باغ میں نہ تھا۔ اس خاطر اکثر فکر مند رہتا اور پانچوں وقت کی نماز کے بعد اپنے کریم سے کہتا کہ اے اللہ! مجھ عاجز کو تو نے اپنی عنایت سے سب کچھ دیا، لیکن اس اُندھیرے گھر کا دِیا نہ دیا۔ یہی اُردمان جی میں باقی ہے کہ میرا نام لیوا اور پانی دیوا کوئی نہیں۔ اور تیرے خزانہ غیب میں سب کچھ موجود ہے؛ ایک بیٹا جیتا جاگتا مجھے دے، تو میرا نام اور اس سلطنت کا نشان قائم رہے۔

اسی اُمید میں بادشاہ کی عمر چالیس برس کی ہو گئی۔ ایک دن شیش محل میں نماز ادا کر کر و طیفہ پڑھ رہے تھے؛ ایک بار گی آئینے کی طرف خیال جو کرتے ہیں، تو ایک سفید بال موچھوں میں نظر آیا کہ مانند تارِ مَقْنَس کے چمک رہا ہے۔ بادشاہ دیکھ کر آب دیدہ ہوئے اور ٹھنڈی سانس بھری۔ پھر دل میں اپنے سوچ کیا کہ افسوس! تو نے اتنی عمر ناحق برباد کی اور اس دُنیا کی حرص میں ایک عالم کو زیورِ بر کیا۔ اتنا ملک جو لیا، اب تیرے کس کام آئے گا! آخر یہ سارا مال و اسباب کوئی دوسرا اڑا دے گا۔ تجھے تو پیغام موت کا اچکا۔ اگر کوئی دن جیسے بھی تو بدن کی طاقت کم ہوگی؛ اس سے یہ معلوم ہو گیا ہے کہ میری تقدیر میں نہیں لکھا کہ وارث چھتر اور تخت کا پیدا ہوا آخر ایک روز مرنا ہے۔ اور سب کچھ چھوڑ جانا ہے اس سے یہی بہتر ہے کہ میں ہی اے چھوڑ دوں اور باقی زندگی اپنے خالق کے یاد میں کاٹوں۔“

(ب) غالب کی مکتوب نگاری کی خصوصیات (150 الفاظ میں) (15)

(ج) پریم چند کی ناول نگاری میں ’گودان‘ کی اہمیت (15)

2. درج ذیل پر تنقیدی نوٹ لکھئے۔ (20+15+15=50)

(الف) ’نیرنگ خیال‘ کی زبان (200 الفاظ میں) (20)

(ب) غبارِ خاطر کی ادبی اہمیت (150 الفاظ میں) (15)

(ج) افسانہ اپنے دکھ مجھے دے دو کا مرکزی خیال (150 الفاظ میں) (15)

3. درج ذیل پر تنقیدی مضمون لکھئے۔
(20+15+15=50)

(الف) اردو نثر میں غالب کا مقام و مرتبہ (200 الفاظ میں) (20)

(ب) 'باغ و بہار' کی نثر کے امتیازات (150 الفاظ میں) (15)

(ج) مولانا ابوالکلام آزاد بحیثیت مکتوب نگار (150 الفاظ میں) (15)

4. درج ذیل پر تنقیدی مضمون لکھئے۔
(20+15+15=50)

(الف) باغ و بہار کی تلخیص (200 الفاظ میں) (20)

(ب) گنودان کے مرکزی کردار پر تبصرہ (150 الفاظ میں) (15)

(ج) محمد حسین آزاد بحیثیت انشائیہ نگار (150 الفاظ میں) (15)

SECTION - B

درج ذیل سوالوں کے جوابات دی گئی ہدایات کے مطابق تحریر کیجئے۔

5. درج ذیل اشعار کی تشریح مع سیاق و سباق کیجئے۔
(5×10=50)

(الف) اُس کے فروغ حسن سے جھمکے ہے سب میں نور (100 الفاظ میں) (10)

شمع حرم ہو یا کہ دیا سومات کا

(ب) نقش فریادی ہے کس کی شوخی تحریر کا (100 الفاظ میں) (10)

کاغذی ہے پیر ہن ہر پیکر تصویر کا

(ج) مقام شوق تیرے قدسیوں کے بس کا نہیں (100 الفاظ میں) (10)

انہیں کا کام ہے یہ جن کے حوصلے ہیں زیاد

(د) آدمیوں سے بھری ہے یہ بھری دنیا مگر (100 الفاظ میں) (10)

آدمی کو آدمی ہوتا نہیں ہے دستیاب

(ه) وہ بات سارے فسانے میں جس کا ذکر نہ تھا (100 الفاظ میں) (10)

وہ بات اُن کو بہت ناگوار گزری ہے

6. درج ذیل پر تنقیدی مضمون لکھئے (20+15+15=50)

(الف) اختر الایمان کی نظم نگاری (’بنت لمحات‘ کی روشنی میں) (200 الفاظ میں) (20)

(ب) میر حسن کی مثنوی نگاری (’سحرالبیان‘ کی روشنی میں) (150 الفاظ میں) (15)

(ج) اقبال کی شاعری کے فکری امتیازات (’بال جبریل‘ کی روشنی میں) (150 الفاظ میں) (15)

7. مندرجہ ذیل پر تنقیدی تبصرہ کیجئے۔ (20+15+15=50)

(الف) مثنوی ’سحرالبیان‘ کے شعری محاسن (200 الفاظ میں) (20)

(ب) اردو شاعری میں فراق کا مقام و مرتبہ (150 الفاظ میں) (15)

(ج) غالب کی غزل گوئی (150 الفاظ میں) (15)

8. مندرجہ ذیل پر تنقیدی نوٹ لکھئے۔ (20+15+15=50)

(الف) فیض بحیثیت ترقی پسند شاعر (’دستِ صبا‘ کی روشنی میں) (200 الفاظ میں) (20)

(ب) فراق کی غزل گوئی (’گلِ نغمہ‘ کی روشنی میں) (150 الفاظ میں) (15)

(ج) نظم ’بنت لمحات‘ کا تجزیہ (150 الفاظ میں) (15)

Total No. of Printed Pages-3]

Roll No. _____

CC(M)
COMMERCE AND ACCOUNTANCY
(OPTIONAL)
PAPER - II
[19]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

Please read each of the following Instructions carefully before attempting the paper.

- i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt Five questions in all. Question No.1 and 5 are compulsory and out of the remaining, any Three are to be attempted choosing at least **One** question from each Section. The number of marks carried by a question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer(QCA) Booklet in the space provided.
- ii) Your answer should be precise and coherent.
- iii) If you encounter any typographical error, please read it as it appears in the text book.
- iv) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.
- v) No continuation sheets shall be provided to any candidate under any circumstances.
- vi) No blank page should be left in between answers to various questions.

SECTION - A

Write short notes on the following:

(5×10=50)

1.
 - a) Interpersonal skills (10)
 - b) Informal group (10)
 - c) Line function (10)
 - d) Collective bargaining (10)
 - e) Halo effect (10)
2.
 - a) What is workforce diversity? How do organizations manage diversity effectively? (20)
 - b) Discuss system approach of organization. (15)
 - c) Discuss the implications of change in technology on managing people in organizations. (15)
3.
 - a) What is job description? How does it differ from job specification? (20)
 - b) What is organization structure? Discuss different types of organization structure. (15)
 - c) What is personality? What factors determine personality? (15)
4.
 - a) Describe the advantages and disadvantages of internal and external sources of recruitment. (20)
 - b) What is power? How is leadership different from power? (15)
 - c) What is perception, and what factors influence our perception? (15)

SECTION - B

Write short notes on following.

(5×10=50)

5.
 - a) Expectancy theory (10)
 - b) Authority and Responsibility (10)
 - c) Labour turnover (10)
 - d) Transformational leadership (10)
 - e) Management By Objective (MBO) (10)
6.
 - a) What are some contemporary theories of motivation, and how do they compare to one another? (20)
 - b) The need for employee counselling arises due to problems of conflict, frustration and stress. Elaborate. (15)
 - c) Discuss a step-by-step approach for the company in identifying, designing and implementing suitable training programs needed at various levels of its employees. (15)

7. a) Examine the constructive role of trade unions in the management of industrial relations. What managerial strategies would you recommend to deal with a multi-union situation? (20)
- b) What are the behavioral implications of different organizational designs? (15)
- c) Suggest measures, techniques or approaches for improving the QWL. (15)
8. a) Describe the concept of worker's participation in management. Explain the different schemes of workers' participation in Indian industry. (20)
- b) What are the steps in the negotiation process? (15)
- c) Discuss the types and the steps of the conflict process. (15)
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