CC(M)

AGRICULTURE

(OPTIONAL)

PAPER - I

[07]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

1. Answer the following in about 150 words each: **(5×10=50)**

a) Define ecology. How does ecological balance influence food security and agricultural sustainability? Explain with examples. **(10)**

b) What is the significance of carbon markets and emissions trading under global climate agreements? **(10)**

c) Evaluate the impact of digital technologies such as blockchain, AI and big data analytics on agricultural marketing and value chain efficiency. **(10)**

d) What recent initiatives has the Government of India undertaken to enhance oilseed production and reduce the country's dependence on edible oil imports? **(10)**

e) How can AI and ML be used for precision farming and enhancing input-use efficiency in Indian agriculture? **(10)**

2. a) What are the key challenges faced by organic farmers in India in terms of certification, marketing, and input availability? How can organic agriculture contribute to achieving various Sustainable Development Goals (SDGs)? **(20)**

b) How does climate change exacerbate environmental pollution? What are the integrated approaches to tackle both? **(15)**

c) Identify the socio-economic and ecological drivers of deforestation in India. How can community participation help in forest conservation? **(15)**

3. a) What are the major challenges in managing crop-bound weeds? Suggest strategies for integrated weed management in major legume-cereal intercropping systems of drylands? **(20)**

b) Examine the impact of organic amendments (e.g., compost, biochar) and mycorrhiza on improving plant nutrient availability and efficiency in soil of semi-arid ecologies. **(15)**

c) Explain the concept of soil profile and how horizons within soils formed from similar parent materials differ in nutrient content and fertility. **(15)**

4. a) What is deficit irrigation? Discuss the importance of soil moisture sensors and ICT tools in real-time water management and irrigation scheduling under water-limited agro-ecologies. **(20)**

b) How can watershed management contribute to drought-proofing and climate-resilient agriculture? **(10)**

c) Critically examine the role of Minimum Support Price (MSP) in ensuring income security for farmers and its limitations. **(10)**

d) What is the significance of public-private partnerships, SHGs and Farmer Producer Organizations (FPOs) in strengthening agricultural extension delivery in India? **(10)**

SECTION - B

5. Answer the following in about 150 words each: **(5×10=50)**

a) Evaluate the applications of UAVs (drones) in agricultural mapping, pest surveillance, and input management. **(10)**

b) What are the key factors responsible for the low productivity of pulses in India? Evaluate how crop diversification and intercropping can help improve pulse production in the country. **(10)**

c) What are the economic and ecological roles of non-timber forest products (NTFPs) in tribal and forest-dependent communities? **(10)**

d) How do biofertilizers contribute to nutrient cycling and improve soil microbial health? **(10)**

e) Why is farm management and planning crucial in agriculture? How do tools like resource budgeting, risk assessment, and cost-benefit analysis support effective farm decision-making. **(10)**

6. a) Compare regenerative agriculture and conservation agriculture. How does conservation agriculture contribute to improving soil health, addressing climate change, and increasing farm income? **(20)**

b) What are the major challenges of rainfed farming? Discuss the role of water harvesting, contingency crop planning and moisture conservation techniques in enhancing resilience in rainfed-drylands. **(20)**

c) What is the current extent of land degradation in India? Identify the major types of soil degradation and explain their impact on agricultural productivity. **(10)**

7. a) What are the challenges of weed management in organic farming? Critically analyse diverse non-chemical weed management approaches, including the role of allelopathy in sustainable weed management? **(20)**

b) Explain the concept of conjunctive use of surface and groundwater. How can it enhance water quality and availability for irrigation? **(15)**

c) Analyse the potential of agri-horti systems, agroforestry and climate-smart villages in strengthening income diversification and livelihood security of farmers? **(15)**

8. a) Evaluate the challenges faced by agricultural cooperatives in India. Explain how cooperatives can support agro-processing, storage, and marketing infrastructure development in rural areas. **(20)**

b) What are the key features of the Pradhan Mantri Fasal Bima Yojana (PMFBY)? Evaluate its effectiveness in mitigating crop loss risks. **(15)**

c) What are the major barriers to effective agricultural extension in India? How can participatory and farmer-led extension approaches improve the relevance and adoption of agricultural technologies? **(15)**

Total No. of Printed Pages-3]

CC(M)
ANIMAL HUSBANDRY AND VETERINARY SCIENCE
(OPTIONAL)
PAPER - I
[08]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

1. a) Compare dairy farming practices in India with those in advanced countries, focusing on efficiency, technology adoption and economic sustainability. What strategies can Indian dairy farmers adopt to bridge these gaps? **(20)**

b) Methane inhibitors, probiotics and enzymes are increasingly used in livestock diets. Discuss their mechanisms of action, benefits and limitations. How do these additives contribute to sustainable animal production and climate change mitigation? **(10)**

c) Define cardiac cycle. Discuss its various phases. **(10)**

d) Define anestrus. What are the predisposing factors that may lead to anovulatory anestrus? **(10)**

2. a) What is selection? How it affects the gene frequencies and genetic parameters? Describe and compare different methods of selection for economical traits in livestock. **(20)**

b) Describe the factors affecting the effectiveness of technology transfer and its adoption among rural communities. **(10)**

c) Compare the following: **(2×5=10)**

i) Silage making and hay making with key factors determining the success of each method.

ii) Direct and indirect calorimetry methods with challenges faced for their applicability in nutritional studies.

d) What is heterosis? What are the reasons for heterosis? Describe in detail the methods for utilization of heterosis in livestock. **(10)**

3. a) Define semen. Discuss the characteristics and components of semen in bull, ram, stallion and boar? **(20)**

b) Discuss the importance of maintaining an optimal dietary calcium-to-phosphorus ratio in ruminant nutrition. Explain how calcium, phosphorus, and vitamin D interact to regulate mineral balance and support skeletal health. **(10)**

c) Discuss the following : **(2×5=10)**

i) Role of oxytocin in milk ejection.

ii) Role of pituitary gonadotrophins in reproduction in buffalo.

d) Explain various animal husbandry programmes implemented by the Government of India for rural development. **(10)**

4. a) Discuss in detail synthesis and release of pancreatic enzymes and explain their role in digestion of carbohydrate, protein and fat in small intestine. **(20)**

b) Explain the term 'semen extender'. What are the properties and composition of an ideal semen preservation media? **(10)**

c) Describe the partitioning of phenotypic variance to its components. Define each component of variance in brief with its importance. **(10)**

d) Describe the neural regulation of respiration in mammals. **(10)**

SECTION - B

5. a) Discuss the socio-economic challenges and opportunities associated with commercial meat, egg and wool production in developing countries. How can these ventures be made economically viable for small-scale farmers? **(20)**

b) Formulate a cost-effective finisher ration for broilers and a lactation ration for dairy cows, justifying the inclusion of specific ingredients. **(10)**

c) Explain in detail the deep freezing of bull semen. **(10)**

d) What is Linkage? What are the reasons of linkage and its disappearance? Describe its effects and uses. **(10)**

6. a) Describe the physiological characteristics of granulocytes and agranulocytes. Explain the origin, development and function of B and T lymphocytes. **(20)**

b) Discuss management strategies for feeding and maintaining livestock during drought and flood conditions. What emergency measures can be adopted to minimize mortality and production losses during such calamities. **(10)**

c) Write note on the following: **(2×5=10)**

i) Optimal timing of artificial insemination in cattle

ii) Endocrine treatment for better conception rate in buffaloes.

d) Discuss the hormonal development of mammary glands after puberty. **(10)**

7. a) What is Progeny Testing? Write down its advantages and limitations. Frame a progeny testing scheme for selecting 2 bulls out of 20 bulls by mating with 1000 cows. **(20)**

b) Discuss the process of budgeting the cost of milk production on a dairy farm. How do pricing policies influence the profitability and long-term sustainability of dairy operations? **(10)**

c) Discuss the following: **(2×5=10)**

i) Process of erythropoiesis and fate of erythrocyte.

ii) Physiological responses to cold in homeotherm mammals.

d) Explain campaign. Discuss steps to organize a rural awareness campaign on animal vaccination to ensure maximum reach and farmer involvement? **(10)**

8. a) Discuss the brooding and rearing management practices crucial for optimizing broiler chicken performance. How environmental, nutritional and managerial factors influence growth rate, feed conversion efficiency, and overall flock health? **(20)**

b) Explain the role of buffers, lungs and kidneys in regulation of acid base balance.**(10)**

c) Explain the following: **(2×5=10)**

i) Heritability and its types.

ii) Detailed composition of any two semen diluents.

d) What are chromosomal aberrations? How are they detected? Describe with example different types of chromosomal aberrations in animals. **(10)**

Total No. of Printed Pages-3]

CC(M)

ANTHROPOLOGY

(OPTIONAL)

PAPER - I

[09]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION-A

1. Write notes on the following in about 150 words each:

a) Significance of Australopithecus *garhi* **(10)**

b) E.B.Tylor **(10)**

c) Genome-Wide Association Study (GWAS) **(10)**

d) Sapir-Whorf Hypothesis **(10)**

e) Liminality and Communitas **(10)**

2. a) Elucidate the origin, nature and development of Anthropology. Discuss how it is relevant in the 21st-century world. **(20)**

b) Critically discuss different approaches to the study of Religion. **(15)**

c) Discuss the formalist and substantivist approaches in Economic Anthropology. **(15)**

3. a) What is Kinship? How have Assisted Reproductive Technologies (ARTs) broadened the understanding and practice of Kinship? **(20)**

b) Critically evaluate the impact of urbanization and globalization on marriage. **(15)**

c) Discuss the nature of Law and Justice in simple societies with the help of ethnographic examples. **(15)**

4. a) What is the primary goal of Linguistic Anthropology? Does Culture influence the structure and content of language? **(20)**

b) Describe Structuralism as propounded by Claude Levi-Strauss? How did Edmund Leach critique the French anthropologist's analysis? **(15)**

c) Describe quantitative methods of data collection in anthropology. What are the common strategies for the analysis of quantitative data? **(15)**

SECTION - B

5. Write notes on the following in about 150 words each:

a) Mesolithic Art in India **(10)**

b) Cro-Magnon **(10)**

c) Race and Ethnicity **(10)**

d) Epidemiological Transition **(10)**

e) Endangered Primates **(10)**

6. a) What are the anatomical and behavioural changes associated with bipedalism and erect posture? Discuss. **(20)**

b) Discuss the social behaviour of non-human primates. **(15)**

c) What factors are responsible for influencing the distribution of genes and altering gene frequency in a population? Discuss. **(15)**

7. a) Give an overview of the Hardy-Weinberg principle and explain its genetic implications. **(20)**

b) Give an account of structural abnormalities of human chromosomes with suitable examples. **(15)**

c) Describe the lower Palaeolithic culture in India. **(15)**

8. a) What is Demography? Critically examine Demographic Transition Theory. **(20)**

b) Delineate the nature and regional characteristics of Chalcolithic culture in India. **(15)**

c) What is Kinanthropometry? Discuss applications of Kinanthropometry. **(15)**

Total No. of Printed Pages-3]

CC(M)

BOTANY

(OPTIONAL)

PAPER - I

[10]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. Write short notes on: **(5×10=50)**

a) Discuss the concept of stelar evolution in pteridophytes. **(10)**

b) What do you mean by energy plantations? Explain their role in sustainable energy production and environmental conservation. **(10)**

c) Explain the role of trichomes in plant defence. **(10)**

d) Write a note on Ginkgoales. **(10)**

e) Describe the techniques used in disease forecasting. Add a note on the importance of disease forecasting in plant disease management. **(10)**

2. a) Discuss the different theories related to origin of angiosperms. In your opinion which is the most convincing and why? **(20)**

b) Bryophytes show a diverse variation in their reproductive structures. Elaborate upon the statement. Support your answer with diagrams. **(15)**

c) 'Microbes play a crucial role in mitigating soil and water pollution'. Justify the statement with relevant examples. **(15)**

3. a) Discuss in detail the cause and anatomy of anomalous secondary growth in angiosperms. Support your answer with well labelled diagrams. **(20)**

b) Describe the Vavilov's centres of plant origin. **(15)**

c) Differentiate between: **(15)**

i. Somaclonal variations and somatic hybrids

ii. Gums and resins

iii. Multiplication strategies of viruses and viroids

4. a) Understanding the physiological and molecular mechanism of host parasite interaction may be beneficial for designing disease resistant varieties. Justify the statement with suitable examples. **(20)**

b) Enlist the salient features of Gymnosperms. Discuss their economic importance. **(15)**

c) Define pollination. Describe different mechanisms adapted by plants for successful pollination. **(15)**

SECTION - B

5. Write short notes on:

a) Explain palynology and discuss its major applications. **(10)**

b) What is embryo rescue? How it is helpful in hybrid seed production? **(10)**

c) Explain the role of algae in mitigating climate change. **(10)**

d) Explain ethnobotany and discuss its importance in preserving traditional knowledge, medicinal plants, and the culture of tribal communities in India. **(10)**

e) Write a note on Typification in taxonomy. **(10)**

6. a) 'Endosperm in angiosperms is not always triploid.' Justify the statement with relevant examples and diagrams. **(20)**

b) Give the salient features, merits and demerits of the Bentham and Hookers' system of classification. **(15)**

c) Trace the evolution of hexaploid wheat. What is the significance of D genome. **(15)**

7. a) How is apomixis different from amphimixis. Discuss different types of apomixis. Comment upon its significance in plant conservation. **(20)**

b) Elaborate upon the different mechanisms used by bacteria to reproduce. **(15)**

c) Enlist the salient features, floral formulae and diagram of each of the following families: **(15)**

i. Apiaceae

ii. Orchidaceae

iii. Brassicaceae

8. a) How do wheat and maize differ in their use of carbon dioxide? What are the anatomical adaptations that facilitate CO_2 utilization in each of them. **(20)**

b) Discuss the morphological and anatomical features of Gnetales. How do their reproductive strategies reflect both gymnospermous and angiospermous characteristics? **(15)**

c) Discuss the significance and applications of totipotency in conservation of plants. Give suitable examples to support your answer. **(15)**

Total No. of Printed Pages-4]

CC(M)
CHEMISTRY
(OPTIONAL)
PAPER - I
[11]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. (a) Derive the expression for the coefficient of viscosity of a gas in terms of average speed, mean free path and number of molecules per unit volume. **(15)**

(b) Assume a Carnot engine operating between 500°C and 0°C using 1.0 mol of an ideal monoatomic gas. If V_1 is 0.0100 m^3 and V_2 is 0.1000 m^3, then calculate (i) V_3 and V_4 (ii) q, w and ΔU for each step for this engine. **(15)**

(c) Explain the following:

i) First law of crystallography

ii) Law of rational indices **(10)**

(d) The value of Joule -Thomson coefficient, μ_{JT} for air at 0°C is 0.246 K/bar at 20 bar and 0.263 K/bar at 1 bar. What will be the approximate cooling observed as the gas undergoes this expansion? **(10)**

2. (a) Draw the Born Haber cycle and calculate lattice energy of cesium oxide using the following experimental data:

Enthalpy of sublimation of Cs = +78 kJ/mol

First ionisation energy of Cs = +375 kJ/mol

Enthalpy of formation of cesium oxide = -233 kJ/mol

Enthalpy of dissociation of O_2 = +494 kJ/mol

First electron affinity of oxygen = -141 kJ/mol

Second electron affinity of oxygen = +845 kJ/mol **(15)**

(b) Find an expression for $(\partial V/\partial S)_{P,n}$ for an ideal gas with constant heat capacity. **(15)**

(c) The maximum absorption of light occurs at 480 nm for a conjugated hydrocarbon. Assuming that the transition involves n = 9 to n = 10, deduce the approximate length of the molecule. **(10)**

(d) What is interfacial tension? At 20°C, $\gamma_{AB} = 8.5\times10^{-3}$N/m between water and n-octyl alcohol and at this temperature, $\gamma/(10^{-3}\text{N/m}) = 27.53$ for alcohol and 72.75 for water. Predict whether wetting occurs or not if a drop of alcohol comes in contact with a pool of water. **(10)**

3. (a) How do you study the kinetics of fast reactions experimentally by flow techniques? Explain. **(15)**

(b) The photodecomposition of HI takes place in the following steps:

Primary process: $HI \xrightarrow{h\nu} H + I$

Secondary processes: $H + HI \xrightarrow{k2} H_2 + I$

$$I + I \xrightarrow{k3} I_2$$

$$H + I_2 \xrightarrow{k4} HI + I$$

Prove that : $\phi = \dfrac{2}{1+\{k_4[I_2]/k_2[HI]}$ **(15)**

(c) Calculate ΔS (system) for the reversible heating of 1.0 mol of ethane from 298 K to 1500 K at constant pressure. Assume that
$Cp = 5.351+177.669\times10^{-3}T - 687.01\times10^{-7}T^2 + 8.514\times10^{-9}T^3$ **(10)**

(d) The rate constant for the following reaction is 0.73 $M^{-1}s^{-1}$ at 600 K. How long will it take for one - tenth of a sample of NO_2 (g) at 402 mm of Hg and 603 K to decompose?
$2NO_2 \rightarrow 2NO + O_2$ **(10)**

4. (a) The heat of combustion of $H_2(g)$ to form $H_2O(\ell)$ under constant pressure conditions is -285.83kJ/mol at 25°C.If the water is formed at 1.0 bar and has a density of 1.0×10^3 kg/m^3, calculate ΔU for this reaction. **(15)**

(b) Differentiate between Langmuir and Freundlich adsorption isotherm. **(15)**

(c) Calculate EMF of the following cell:
$Ag|AgBr(s)|Br^-(a = 0.34), Fe^{3+}(a = 0.1), Fe^{2+}(a = 0.02)|Pt$
Given that the standard half cell reduction potentials are 0.0713 V for AgBr|Ag and 0.771 V for $Fe^{3+}|Fe^{2+}$ **(10)**

(d) Define the lowest consulate temperature. Give an example of such a system and draw its labelled phase diagram. **(10)**

SECTION - B

5. (a) In the crystal structure of CuF_2, the Cu^{2+} ion is six coordinated with four F^- ions at a distance of 1.93 Å and two F^- ions at 2.27 Å. Explain the distortion in the geometry. **(15)**

(b) What are ferredoxins? What are their different types? Explain their function. **(15)**

(c) On the basis of 18 electron rule, identify the first row transition metal in the following:
i) $[M(CO)_7]^+$
ii) $[(\eta^4\text{-}C_4H_4)(\eta^5\text{-}C_5H_5)M]^+$
iii) $[H_3CM(CO)_5]$
iv) $[M(CO)_2(CS)(PPh_3)Br]$ **(10)**

(d) Explain why stable and readily isolable carbonyl complexes are unknown for the lanthanoids? **(10)**

6. (a) Explain the structure and bonding in ferrocene. **(15)**

(b) Put the following complexes in increasing order in terms of rate of substitution by H_2O and justify your answer.
$[Co(NH_3)_6]^{3+}$, $[Rh(NH_3)_6]^{3+}$, $[Ir(NH_3)_6]^{3+}$ **(15)**

(c) Identify the products in the following reactions:

i) $Cl_2 + F_2$ (equal volumes) $\longrightarrow$?

ii) $I_2 + Cl_2$ (excess) $\longrightarrow$?

iii) $ClF + SF_4 \longrightarrow$?

iv) $2ClF_3 + U \longrightarrow$? + ? **(10)**

(d) Give the IUPAC name of the following complexes:

i) $[Fe(CN)_2(CH_3NC)_4]$

ii) $[Co(NH_3)_5(N_3)]SO_4$

iii) $[Co(en)_3]\,[Cr(CN)_6]$

iv) $[CuCl_2(CH_3NH_2)_2]$

v) $Rb[AgF_4]$ **(10)**

7. (a) Give the structural type and describe the structures of B_4H_{10} and B_5H_9. **(15)**

(b) Sketch all the possible isomers and indicate each pair of enantiomers for the following:

i) $[Co(NH_3)_2(H_2O)_2Cl_2]^+$

ii) $[Cr\,(H_2O)_3\,Br\,Cl\,I]$ **(15)**

(c) Identify the xenon compounds in the following reactions:

i) $XeO_3 + NaOH \longrightarrow$?

ii) $XeF_2 + MeBF_2 \longrightarrow$?

iii) $Xe + F_2$ (1:5 mixture) $\longrightarrow$?

iv) XeF_6 (g) $+ H_2O \longrightarrow$?

v) $XeO_3 + 2XeF_6 \longrightarrow$?

(10)

(d) Name one sulphur-nitrogen compound. Describe its structure and one method of synthesising it. **(10)**

8. (a) Draw the structures of six different types of silicates and give the name and formula of one example of each type. **(15)**

(b) Explain the effect of π - donor and π - acceptor ligands on Δ_o of octahedral complexes on the basis of ligand field theory. **(15)**

(c) Why are iron - porphyrin complexes unable to bind with oxygen reversibly? **(10)**

(d) Explain the different modes by which NO ligand can coordinate in its metal complexes citing relevant examples. **(10)**

Total No. of Printed Pages-7]

CC(M)

CIVIL ENGINEERING

(OPTIONAL)

PAPER - I

[12]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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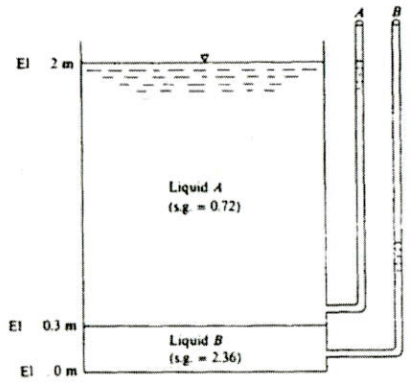
vii) *No blank page should be left in between answers to various questions.*

viii) *Non Programmable Calculators are allowed.*

SECTION - A

1. a) A retaining wall 6m high supports earth with its face vertical. The earth is cohesionless with particle specific gravity 2.69, angle of internal friction 35° and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the earth thrust and its line of action on the wall if the earth is water logged to level 2.5m below the top surface. Neglect wall friction. Draw the pressure diagrams.

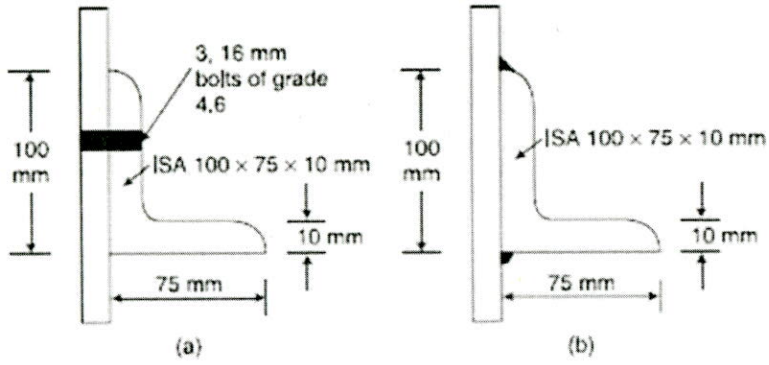
b) For a open tank, with piezometers attached on the code, containing 2 different immiscible liquids, as shown in the figure, find the (i) elevation of the liquid in Piezometer A, (ii) Elevation of the liquid surface in piezometer B, and (iii) Total pressure at the bottom of the tank.



c) What is water hammer pressure, physical cause and its detrimental effect on penstocks. Discuss how a surge tank functions to mitigate such harmful pressure surges (including a neat sketch).

d) What are the dimensions of the strongest (i.e., having the maximum strength or area) rectangular cross-section that can be cut from a circular log of diameter D?

e) Determine the effective net area for the section shown in a and b. The angles are connected as shown in the figure. The steel is of grade Fe 410. The bolt holes have been punched. **(10+10+10+10+10)**



2. a) A liquid flows turbulently in a horizontal pipe with a pressure gradient of 3kPa/m. The wall shear stress developed is 112.5 N/m^2. If the laminar shear stress is 10 N/m^2 at the radius of 35 mm, then find the turbulent shear stress at this radius.

b) If you are in-charge of subsoil exploration of important structures, how would you decide the depth of exploration? List out the factors you will consider and their importance.

c) The resisting force F acting on a ship as it moves through water is assumed to depend on the following variables: Length of the ship (L), Velocity of the ship (v), Acceleration due to gravity (g), Density of the fluid (ρ) and Dynamic viscosity of the fluid (μ). Using the Buckingham Pi theorem, express the relationship between these variables in a dimensionless form.

d) Describe any four common types of bolts used in steel construction. For each type, provide:

- A brief description of its shape or features.
- One typical application. **(10+10+20+10)**

3. a) A saturated specimen of cohesionless sand was tested under drained conditions in a triaxial compression test apparatus and the sample failed at a deviator stress of 482 kN/m^2 and the plane of failure made an angle of 60° with the horizontal. Find the magnitudes of the principal stresses. What would be the magnitudes of the deviator stress and the major principal stress at failure for another identical specimen of sand if it is tested under a cell pressure of 200 kN/m^2.

b) A horizontal venturi meter which has an inlet diameter of 120 mm and throat diameter of 60 mm is connected to a pipeline. The coefficient of discharge is 0.95. The inlet pressure is 10 kPa (gauge) and local atmospheric pressure is 96 kPa (absolute). Determine the maximum discharge of water that can be allowed without causing cavitation. Assume vapour pressure of water as 4 kPa.

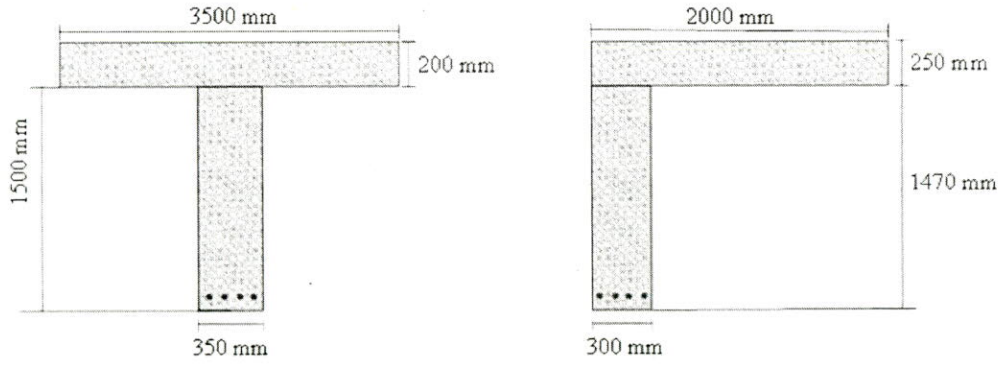
c) Three parallel strip footings 3m wide each and 5m apart center to center transmit contact pressure of 200, 150, 100 kN/m^2 respectively. Calculate the vertical stress due to combined load beneath the center of each footing at a depth of 3m below the base. Assume the footings are placed at a depth of 2m below the ground surface. Use Boussineq's method for line loads.

d) Compare the Working Stress Method (WSM) and the Limit State Method (LSM) for reinforced concrete design. Address their assumptions, safety philosophies, and the treatment of serviceability, advantages and disadvantages.

e) What are the assumptions made in Euler's formula for calculating the critical buckling load of a column?

f) A steel wire of 20 mm diameter is bent into a circular shape with a radius of 10 meters. If the modulus of elasticity is $2\times10\text{^}5N/mm^2$, what is the maximum bending stress induced in the wire? **(10+10+10+10+5+5)**

4. a) Calculate the effective width of flange for the following RC T and L sections as shown in figures. Consider 40 mm clear cover and distance between points of zero moments is 10 m.



b) While designing a concrete mix, if 5% of the results are allowed to fall below the characteristic strength and if the assumed standard deviation is 4.5 Mpa, then what will be the target mean strength of M50 grade of concrete?

c) Draw a neat sketch of a vane shear apparatus. Also, derive the relationship between undrained shear strength, C_u and torque, T.

d) Water flows at 6 m/s through a penstock of 5.5 m diameter into a Francis turbine that develops a shaft power of 83.5 MW. The static pressure head in the penstock measured just before entry to the runner is 59 m, with the point of measurement being 4.6 m above the tail race level. If the velocity of water in the tail race level is 8 m/s, then find the overall efficiency of the turbine.

e) Explain how the following factors affect the strength of tension members in steel structures:
- Ductility factor
- Method of fabrication of holes
- Geometry factor
- Shear lag factor

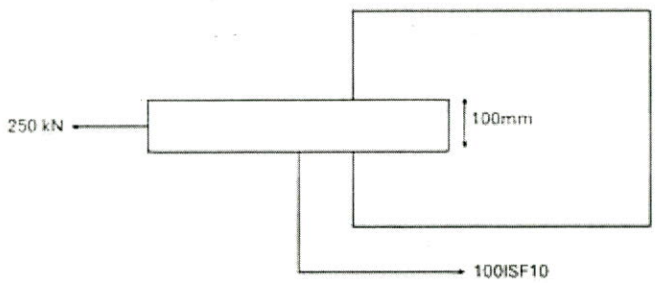
f) Under a certain loading, a layer of clay is expected to undergo full settlement of 18 cm. Also, it is expected to settle by 5 cm in the period of the first 2 months of loading. Find the time required for the clay layer to settle by 10 cm.

(5+5+10+10+10+10)

SECTION -B

5. a) A constant head permeability test was conducted on a soil sample using a cylindrical permeameter with an internal diameter of 7.5 cm. The following data were recorded: Length of soil sample (L): 20 cm; Head loss (h): 26 cm; Weight of water collected in 1 minute (W): 6.18 N; Porosity (n): 40% and Temperature during the test: 25°C. Find the following: (i) The coefficient of permeability of the soil at 25°C in cm/sec and (ii) The permeability of the same soil at 20°C for a porosity of 35%. (Viscosity of water at 25°C = 0.9 times the viscosity at 20°C)

b) A fillet weld lap joint is designed to transmit a factored load of 250 kN. The yield strength and ultimate tensile strength of both the weld and the base steel material are 250 MPa and 410 MPa, respectively. Assume workshop welding with a safety factor of 1.25. The width of the plate is 100 mm. Determine: (i) The required size (leg length) of the fillet weld, and (ii) The required overlap (length of the weld) between the plates.



c) A metallic ball of diameter 5 mm drops in a fluid of density 800 kg/m^3 and viscosity 3N-s/m^2. The specific gravity of the metallic ball is 9.0. Find the terminal fall velocity of the ball, and the drag experienced by the ball.

d) The velocity distribution in a stream is generally governed by one by seventh law, i.e.,

$V/V_0 = (Y/Y_0)^{1/7}$,

where V and V_0 are point velocities at height Y and Y_0 from the stream bed. Show that point velocity at 0.6 depth from the free surface is equal to average velocity.

e) 1. Explain shear and tension failure of bolts with diagram.

2. Which is stronger: a longitudinal or transverse fillet weld, and why?

3. What is the maximum value of effective slenderness ratio for following tension members as per IS 800.

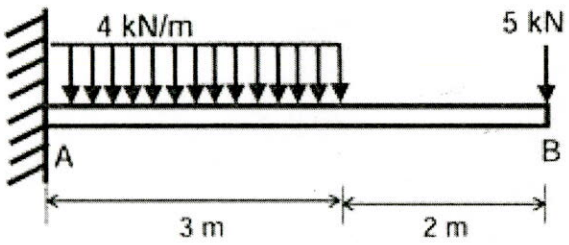
4. What is shear lag? **(10+10+5+5+20)**

6. a) Derive Darcy-Weisbach equation for the head loss due to friction in the circular pipe. Assume flow is steady and incompressible.

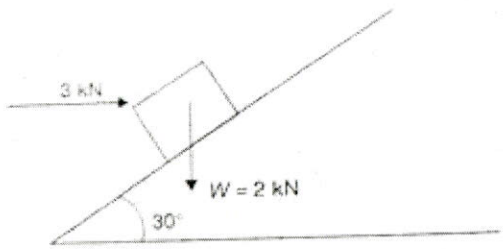
b) How does the moment capacity of a square flat plate change when it is rotated such that one of its diagonals becomes horizontal?

c) What are the differences between the Consolidated Drained (CD) Test, Unconsolidated Undrained (UU) Test, and Consolidated Undrained (CU) Test in soil mechanics? Also, why is the Unconsolidated Drained (UD) Test not performed in practice?

d) Calculate the Shear force and Bending moment for the beam subjected to the loads as shown in the figure, then draw the SFD and BMD



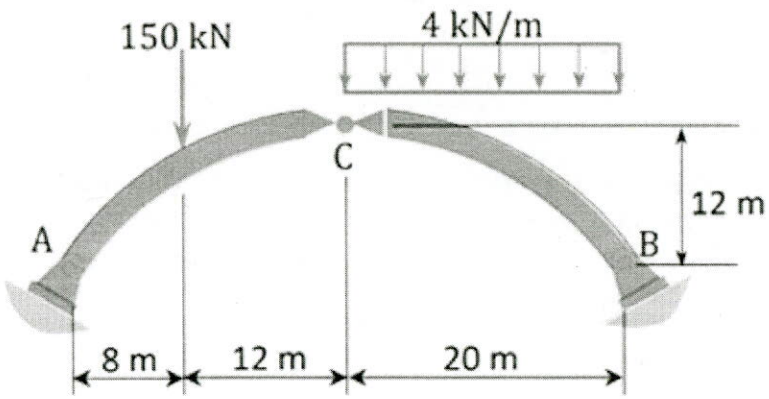
e) A rigid block of weight 2 kN rests on a horizontal surface. A horizontal force of 3 kN is applied to the block. The coefficient of static friction between the block and the surface is $\mu_s = 0.3$. Calculate the maximum static frictional force available. Also, determine whether the applied 3 kN force is sufficient to overcome static friction and set the block in motion, or if the block remains in equilibrium.



(10+10+10+15+5)

7. a) Explain the phenomenon of prying action in bolted steel connections. Illustrate with a neat sketch how prying forces develop in a flange-plate connection.

b) A parabolic arch with supports at the same level is subjected to the combined loading shown in the Figure. Determine the support reactions and the normal thrust and radial shear at a point just to the left of the 150 kN concentrated load.



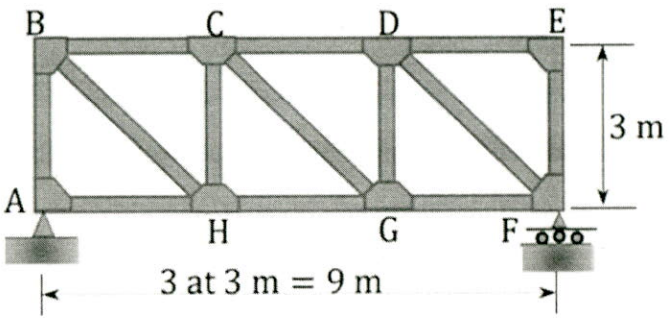
c) A sand layer found at the seafloor under 20 m water depth is characterized with a relative density equal to 40%. The maximum void ratio is 1, and the minimum void ratio is 0.5. The specific gravity of soil solids (Gs) is 2.67. Assume the specific gravity of seawater is 1.03, and the unit weight of freshwater is 9.81 kN/m^3. What is the effective stress at 30 m depth into the sand layer. What would be the change in effective stress at 30 m depth in a sand layer if the seawater level rises by 2 meters?

$\gamma_b = (G_s + S.e.G_{sw})\frac{\gamma_w}{(1+e)}$ Where, G_{sw} is the specific gravity of seawater.

d) A body performing simple harmonic motion has a velocity of 12 m/s when its displacement from the mean position is 50 mm, and a velocity of 3 m/s when the displacement is 200 mm. Calculate the frequency of the motion. Also, determine the acceleration when the displacement is 75 mm.

e) Demonstrate the quick sand condition with a neat sketch and derive the expression for critical hydraulic gradient. **(5+15+10+10+10)**

8. a) Draw the influence lines for the force in member CH as a unit load moves across the top of the truss, as shown in Figure.



b) A square group of nine piles was installed in clay. Each pile has a diameter of 30 cm and a length of 9 m. The unconfined compressive strength of the clay is 90 kN/m^2 upto pile tip, and below pile tip the undrained shear strength is 50 kN/m^2. The center-to-center pile spacing is three times the pile diameter. The adhesion factor is 0.75, and the factor of safety is 2.5. What is the safe load-carrying capacity of the pile group?

c) A solid circular steel shaft with shear modulus G = 45 GPa, length L = 0.75 m, and diameter d = 40 mm, is subjected to pure torsion due to a torque T applied at both ends. Calculate the strain energy stored in the shaft when the maximum shear stress is 32MPa. Also, determine the angle of twist using the strain energy.

d) A 7.5 m wide rectangular channel conveys 12 m^3 /s of water with a velocity of 1.5 m/s. What is the specific energy head of the flow? **(20+15+10+5)**

CC(M)

COMMERCE AND ACCOUNTANCY

(OPTIONAL)

PAPER - I

[13]

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

1. Answer the following questions (in not more than 200 words each): (5×10=50)

a) Explain the salient features of a Company Audit. **(10)**

b) What are rights shares? Explain some of the reasons for issuing such shares. **(10)**

c) Explain the concept of 'Person' under the Income Tax Act, 1961 and its significance. **(10)**

d) What is cost control? Describe the various types of cost control techniques. **(10)**

e) What is job costing? Discuss some of the key features of job costing. **(10)**

2. a) Mrs. Sinha is a Marketing Manager in a company in Mumbai. She has furnished the following details of her income for the financial year 2023-24:

i) Basic Salary Rs. 90,000 p.m.
ii) Dearness Allowance @ 40% of basic salary (out of which, 50% enters into retirement benefits).
iii) Commission on sales 2% of turnover of Rs.12,00,000.
iv) House Rent Allowance Rs.12,600 p.m. She has been paying Rs.13,600 p.m. as house rent.
v) Education allowance for two children at Rs.250 p.m. per child.
vi) Travelling allowance for her official tours Rs.45,000. The entire amount is incurred for official purposes.
vii) Entertainment allowance Rs.800 p.m.
viii) She has been provided with a motor car of 1.9 litre engine capacity for her official as well as personal use. The running and maintenance costs are borne by the company.
ix) Employer's contribution to her Recognized Provident Fund (R.P.F.) amounted to Rs. 2,00,000 and the interest credited to her fund @ 13% amounted to Rs. 19,500.
x) Her own contribution to her R.P.F. amounted to Rs.2,00,000.

You are required to compute her taxable income under the head salary for the assessment year 2024- 25, assuming that Mrs. Sinha:

(A) Opts to be taxed under section 115BAC.
(B) Does not opt to be taxed under Section 115BAC. **(30)**

b) KM Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 2023 are as follows:

Opening stock of materials	Rs.2,50,000
Closing stock of materials	Rs. 4,00,000
Purchase of materials	Rs. 16,50,000
Direct Labour	Rs. 8,75,000
Factory overheads	Rs. 3,50,000
Administrative overheads	Rs. 2,18,000

During 2024, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be Rs.8,00,000 and Rs.4,80,000 respectively. KM Auto Ltd. charges factory overheads as a percentage of direct labour and administrative overheads as a percentage of factory cost based on previous year's cost. Cost of delivery of the components at customer's premises is estimated at Rs.45,000. You are required to:

i) Calculate the overhead recovery rates based on actual costs for 2023.

ii) Prepare a detailed cost statement for the order received in 2024 and the price to be quoted if the company wants to earn a profit of 10% on sales. **(20)**

3. a) The following balances appeared in the books of M/s Fresh Ltd. as on 31st March 2024:

Debit Balances	**Rs.**	**Credit Balances**	**Rs.**
Building at Cost	3,50,000	Equity Share Capital (Fully paid shares of Rs.10 each)	6,00,000
Purchases	5,73,090	General Reserve	4,50,000
Salaries and Wages	3,59,100	Unclaimed Dividend	6,250
Repairs to Building	26,190	Trade Payables	57,800
Miscellaneous Expenses	31,000	Sales	10,83,400
Machinery at cost	2,00,000	Provision for Depreciation	82,000
Motor Vehicle at Cost	4,50,000	Interest on Investments	8,540
Furniture at cost	45,000	Surplus in the Statement of Profit and Loss (1-4-2023)	5,16,540
Opening Stock-in-trade	1,32,000	Staff Provident Fund	37,500
Trade Receivables	2,23,050		
Investments (Long Term)	3,22,800		
Advance Payment of Tax	65,000		
Cash Balance	63,000		
Director's Fees	1,800		
	28,42,030		**28,42,030**

Additional Information:

i) Stock-in-trade as on 31st March 2024 was valued at Rs.1,50,700.

ii) Provide Rs. 20,000 for depreciation on Fixed Assets; Rs.1,800 for Directors' Fees and Rs. 6,200 for the company's contribution to Staff Provident Fund.

iii) Interest Accrued on Investment amounted to Rs. 3,750.

iv) A provision of Rs. 65,000 for taxes in respect of profit for 2023-24 is considered necessary.

v) The Board of Directors propose a final dividend @ 8% after transfer to General Reserve Rs.30,000.

vi) A claim of Rs.4,500 for Workmen's Compensation is being disputed by the company.

vii) Authorized capital of the company is 80,000 equity shares of Rs.10 each. The company had issued 60,000 shares of Rs. 10 each.

You are required to prepare the company's Statement of Profit and Loss for the year ended 31st March 2024 as well as Balance Sheet as on that date. **(30)**

(b) A Company is considering a proposal of expansion of production capacity. Fixed costs amount to Rs.10,50,000 and are expected to increase by Rs.5,00,000 when plant expansion is completed. The present capacity is 60,000 units. After the expansion, plant capacity is expected to increase by two- thirds of the present capacity. Variable costs are currently incurred @ Rs.20 per unit and are expected to go down by Rs.1 per unit with the expansion. The current selling price is Rs.50 per unit and is expected to remain unchanged. You are required to:

(i) Compute the break-even point (in terms of units and sale value) under both alternatives.

(ii) Comment which alternative is better and why. **(20)**

4. a) The Balance Sheet of B Ltd. as on 31st March 2024 is as under:

Particulars		**Note No.**	**Amount (Rs.)**
I.	**EQUITY AND LIABILITIES**		
1.	Share holder's Funds		
	a) Share Capital	1	14,00,000
	b) Reserves and Surplus	2	3,90,000
2.	Non-Current Liabilities		
	Long Term Borrowings (8% Debentures)		2,50,000
3.	Current Liabilities		
	a) Trade Payables		1,50,000
	b) Other Current Liabilities (Interest Accrued and Due on Debentures)		10,000
		Total	**22,00,000**
II.	**ASSETS**		
1.	Non-Current Assets		
	a) Property, Plant and Equipment (Tangible Assets)	3	14,00,000
	b) Intangible Assets	4	3,00,000
	c) Other-Non-Current Assets (Share Issue Expenses)		24,000
2.	Current Assets		
	a) Inventories (Stock)		2,00,000
	b) Trade Receivables		2,50,000
	c) Cash and Cash Equivalents (Cash at Bank)		20,000
	d) Other Current Assets(Share Issue Expenses)		6,000
		Total	**22,00,000**

Notes to Accounts

	Particulars	**Amount (Rs.)**
1.	**Share Capital**	
	1,00,000 Equity Shares of Rs.10 each fully paid up	10,00,000
	4,000, 9% Preference Shares of Rs.100 each fully paid up	4,00,000
		14,00,000
2.	**Reserves and Surplus**	
	Capital Reserve	2,00,000
	General Reserve	1,00,000

	Workmen Compensation Reserve (expected liability Rs.10,000)	40,000
	Surplus in the Statement of Profit and Loss	50,000
		3,90,000
3.	**Tangible Assets**	
	Land and Building	6,00,000
	Plant and Machinery	8,00,000
		14,00,000
4.	**Intangible Assets**	
	Goodwill	2,00,000
	Patents	1,00,000
		3,00,000

A Ltd. took over all assets (except cash) and liabilities (except for interest due on debentures) and paid the following amounts:

(i) Rs. 2,50,000 9% debentures of Rs. 100 each in A Ltd. for the existing debentures in B Ltd. For this purpose, each debenture of A Ltd. is to be treated as worth Rs. 105.

(ii) For each preference share in B Ltd., Rs. 10 in cash and one 10% Preference Share of Rs. 100 each in A Ltd.

(iii) For each equity share in B Ltd., Rs. 2 in cash and one equity share in A Ltd. of Rs. 10 each at the market value of Rs. 15 each.

(iv) Expenses of liquidation of B Ltd. are to be reimbursed by A Ltd. to the extent of Rs. 15,000. Actual expenses amounted to Rs 25,000.

A Ltd. valued Land and Building at Rs. 10,00,000; Plant and Machinery at Rs. 6,00,000 and Patents at Rs. 60,000. You are required to:

(A) Pass journal entries in the books of B Ltd.

(B) Prepare Realization Account and Equity Shareholders' Account in the books of B Ltd. **(30)**

4. b) ABC Private Ltd. produces a product "MAG" which passes through two processes-Process A and Process B. The details for the year ending 31st March 2025 are as follows:

Particulars	**A**	**B**
40,000 units introduced in Process A at a cost of Rs.3,60,000		
Materials consumed	Rs. 2,12,000	Rs. 2,75,000
Direct Wages	Rs. 2,73,000	Rs. 1,65,000
Manufacturing expenses	Rs. 2,11,000	Rs. 98,720
Output in units	37,000	27,000
Normal wastage of Input	5%	10%
Scrap value (per unit)	15	20
Selling price (per unit)	Rs.37	Rs.61

Additional Information:

i) 80% of the output of Process A was passed on to the next process and the balance was sold.
The entire output of Process B was sold.

ii) Indirect expenses for the year were Rs.4,48,080.

iii) It is assumed that Process A and Process B are not responsibility centres.

You are required to prepare:

a) Process A and Process B Account

b) Profit and Loss Account showing net profit or net loss for the year. **(20)**

SECTION - B

5. Answer the following questions (in not more than 200 words): (5×10=50)

a) Differences between Capital Markets and Money Markets. **(10)**

b) Powers and functions of IRDA. **(10)**

c) Determinants of Working Capital Management. **(10)**

d) Role of Credit Rating Agencies. **(10)**

e) Features of Venture Capital Funds. **(10)**

6. a) A newly formed firm has applied for a bank loan for financing its working capital requirement. From the following information, estimate the working capital requirement for the firm on cash cost basis by adding 10% to your estimate to cover any unforeseen contingencies.

Particulars	Details	Amount (Rs.)
Sales		25,00,000
Cost of Goods Sold:		
Materials used	9,60,000	
Wages and Manufacturing Expenses	6,60,000	
Depreciation	2,80,000	
Total Cost	19,00,000	
Less: Closing Stock@ 10% of Total Cost	1,90,000	17,10,000
Gross Profit	--	7,90,000
Administrative Expenses	2,10,000	--
Selling Expenses	1,50,000	3,60,000
Profit Before Tax	--	4,30,000
Provision for Tax	--	2,10,000

The information provided above relates to finished goods only, and not to work-in-progress. Goods equal to 15% of the year's production in terms of physical units are in progress on an average, requiring full material but only 60% of other expenses. The company maintains 2 months' consumption of material in stock. The desired cash balance is Rs.60,000. Average time lag in payment of expenses is 1 month; suppliers of raw materials extend 1.5 months' credit; sales are 30% for cash and the rest on 2 months' credit. 80% of corporate tax is to be paid in advance quarterly installments. **(30)**

b) M/s GG Traders commenced business on 1st January 2021, when they purchased machinery for Rs.15,00,000. They adopted a policy of (i) charging depreciation at 15% p.a. on diminishing balance basis, and (ii) charging full year's depreciation on additions made during the year. Over the years, the purchase of machinery have been as follows:

→ On 1.8.2022 for Rs.2,50,000

→ On 30.9.2024 for Rs.5,00,000

On 1st January 2024, it was decided to change the method of depreciation and the rate of depreciation to 10% p.a. on straight line basis.

Prepare Machinery Account and Provision for Depreciation Account for the year 2024. **(20)**

7. **a)** M/s OP Ltd. has the following book value capital structure:

Book Value Structure	**Rs.**
Equity Share Capital: 10,000 shares of Rs.100 each	10,00,000
12% Preference Shares of Rs.100 each	4,00,000
10% Debentures	6,00,000

The market value of the company's share is Rs.110 and it is expected that a dividend of Rs.10 per share would be declared at the end of the current year. The dividend growth rate is 6%.

i) If a company is in the 35% tax bracket, compute the weighted average cost of capital based on market weights.

ii) Assuming that in order to finance an expansion plan, the company intends to borrow funds amounting to Rs.10 lakh, bearing 12% rate of interest, what will be the company's revised weighted average cost of capital? The financing decision is expected to increase dividend from Rs.10 to Rs.12 per share. However, the market price of the equity share is expected to decline from Rs.110 to Rs.105 per share. **(30)**

(b) Mr.X furnishes the following information for the assessment year 2024-25.

Dr. Profit and Loss Account for the year ending 31st March 2024 **Cr.**

Particulars	**Amount(Rs.)**	**Particulars**	**Amount(Rs.)**
Office expenses	1,350	Gross Profits	54,00,000
Sundry expenses	9,275	Sundry Receipts	20,500
Contribution towards Employee's R.P.F	8,20,000	Interest on Government Securities	4,500
Legal Charges/expenses	3,450	Refund of Income Tax penalty	5,000
Audit fees	6,700	Interest on FDR from bank	12,065
Depreciation on plant and Machinery@15% p.a for 6 months	15,900	Bad debts recovered(not allowed as deduction earlier)	15,000
Salary to Staff :		Gift received from mother	64,000
Salary	12,09,500	Dividend(gross)from Unit Trust of India	21,000
Bonus	1,00,000		
Entertainment expenditure	6,000		
Unapproved Gratuity Fund	4,80,000		
GST	14,000		
Provision for Tax	24,500		
Net Profit	28,51,390		
	55,42,065		**55,42,065**

Additional information:

i) Admissible depreciation on Plant and Machinery as per Income Tax Rules Rs.12,365.

[Turn Over

ii) The following amounts have not been debited to the Profit and Loss Account:
* Expenses incurred on the occasion of Diwali Rs.1,000.
* Theft of cash from office Safe Rs.7,500.
* Expenses for new telephone connection in the business Rs.1,500.

You are required to compute his **gross total income** for the assessment year 2024-25 **(20)**

8. (a) A company is planning to replace a machine which is required for 4 more years. Its book value is Rs.1,60,000 and it will be fully depreciated at the end of 2 years. It will generate revenue of Rs.6,20,000 per year for 4 years and incur expenses of Rs.4,80,000 per year. Its salvage value presently is Rs.1,00,000, which will become zero after 4 years. The company plans to replace it with another machine costing Rs.4,80,000. The new machine is expected to generate revenue of Rs.10,20,000 per year and incur annual expenses of Rs.5,20,000. Additional working capital of Rs.3,00,000 will be required if new machine is purchased. Depreciation on new machine will be charged at the rate of Rs.80,000 per year to make its book value equal to its expected salvage value of Rs.1,60,000 at the end of the fourth year. The tax rate applicable on the company is 30% and the cost of capital is 15%. Advise the company as to whether or not it should proceed with the replacement plan. (Present Value Interest Factors: $PVIF_{15\%,1} = 0.8696$; $PVIF_{15\%,2} = 0.7561$; $PVIF_{15\%,3} = 0.6575$; $PVIF_{15\%,4} = 0.5718$). **(30)**

b) The Standard quantity and standard price of raw material required for one unit of product P are given below:

Material	Quantity	Price(Rs.)
A	5	12
B	10	5

The actual production and other relevant data have been provided below:
Output: 800 units of Product P

Material	Quantity(Total for 800 units of output)	Amount(Rs.)
A	5,000	75,000
B	7,000	56,000

You are required to calculate Material Cost, Price and Usage Variance. Also check whether Material Cost Variance = Material Price Variance + Material Usage Variance. **(10)**

c) The Capital structure of JK Ltd. consists of equity share capital of Rs.10,00,000 (par value of one equity share is Rs.100) and Rs.10,00,000 of 12% debentures. The unit sales increased by 50% from 1,00,000 units to 1,50,000 units. The selling price is Rs.10 per unit, the variable cost is Rs.6 per unit and fixed costs amount to Rs.2,00,000. The income tax rate is 35%. You are required to calculate:
i) The percentage increase in EPS.
ii) The degree of financial leverage at 1,00,000 units and 1,50,000 units.
iii) The operating leverage at 1,00,000 units and 1,50,000 units. **(10)**

Total No. of Printed Pages-3]

CC(M)

ECONOMICS

(OPTIONAL)

PAPER - I

[14]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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vi) *No blank page should be left in between answers to various questions.*

SECTION - A

1. Answer the following questions in about 150 words. (5×10=50)

a) Explain the alternative distribution theory of Kelecki. What were the assumption made to establish this theory?

b) A monopolistically competitive firm earns supernormal profit in the short run but not in the long run. Explain using suitable diagrams.

c) Chamberlin's duopoly model is an improvement over Cournot's model of Duopoly. Explain using proper diagrams.

d) Critically discuss the Cambridge version of Quantity Theory of Money.

e) What do you understand by disequilibrium in Balance of Payment? Describe the automatic adjustment of disequilibrium in Balance of Payment under flexible exchange rate regime.

2. a) The total cost function of a competitive firm is given as $C = (1/3)\, q^3 - 6\, q^2 + 30\, q + 20$. Calculate the profit maximising output and amount of profit if the price is set in the market at Rs.10 per unit. **(20)**

b) Discuss Pareto efficiency. What are the conditions for Pareto efficiency? Give some real-life examples of Pareto efficiency? **(15)**

c) What are the characteristics of public goods? How does free rider problem limits the supply of public goods? Answer with suitable examples. **(15)**

3. a) What are monetary management? Describe the goals of monetary management in an open economy. **(20)**

b) How is exchange rate of a foreign currency determined? Explain the implications of overshooting of exchange rate. **(15)**

c) What is government multiplier? Will a high value of government multiplier always lead to high increase in level of national income? Analyse. **(15)**

4. a) Discuss the Harrod's model of economic growth. In what sense the Solow's growth model differ from it? **(20)**

b) What is Arrow's Impossibility Theorem? How is it related to economic welfare? **(15)**

c) Explain Liquidity Trap situation. In the presence of Liquidity Trap, discuss the effectiveness of fiscal policy and monetary policy. **(15)**

SECTION - B

5. Answer the following questions in about 150 words. **(5×10=50)**

a) How does Amartya Sen's social welfare function, differ from traditional welfare economics?

b) Distinguish the characteristics of balanced and unbalanced economic growth theories.

c) Discuss the terms of trade of a country in international trade.

d) Does government borrowing always crowd out the private investment. Illustrate.

e) Explain capital account of BOP. What transactions are recorded in the capital account?

6. a) Explain the equilibrium in goods market and derive the IS curve. The slope of the IS curve is flatter when there is decrease in tax rate. Explain using proper diagrams. **(20)**

b) If $C = 50 + 0.75\ Yd$, $t = 0.2$, $I =$ Rs. 90 Crores, $G =$ Rs. 160 Crores.
Calculate the following:
i) the equilibrium level of income
ii) the value of government multiplier, and
iii) the value of budget surplus/deficit. **(15)**

c) Explain how public private partnership help in the rapid economic development of a country. **(15)**

7. a) What are the main objectives of monetary policy adopted by RBI in India? What are the instruments of monetary policy? How far has RBI been successful in achieving these objectives during last three decades? **(20)**

b) How are TRIPS and TRIMS related to WTO ? Discuss the effect of these on international trade. **(15)**

c) Compare the views of Gunnar Myrdal and Simon Kuznets on economic development and structural change in developing economies. **(15)**

8. a) Why are Multinational corporations considered as agent of modernisation and engine of economic growth? What are five main challenges being faced by Multinational Companies (MNCs) in India? **(20)**

b) How can the goal of Economic Growth be achieved along with the objective of Environmental sustainability? **(15)**

c) Simultaneously, an economy cannot maintain a fixed exchange rate, free capital movement and an independent monetary policy. Analyse the statement using suitable diagram. **(15)**

Total No. of Printed Pages-8]

CC(M)
ELECTRICAL ENGINEERING
(OPTIONAL)
PAPER - I
[15]

Time Allowed - Three Hours | ***Maximum Marks-250***

INSTRUCTIONS

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ii) *Your answer should be precise and coherent.*

iii) *For any typographical error, please read it as it appears in the question paper.*

iv) *Diagrams/ Figures, may be drawn wherever required in the space provided.*

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vii) *No blank page should be left in between answers to various questions.*

viii) *Non Programmable Calculators are allowed.*

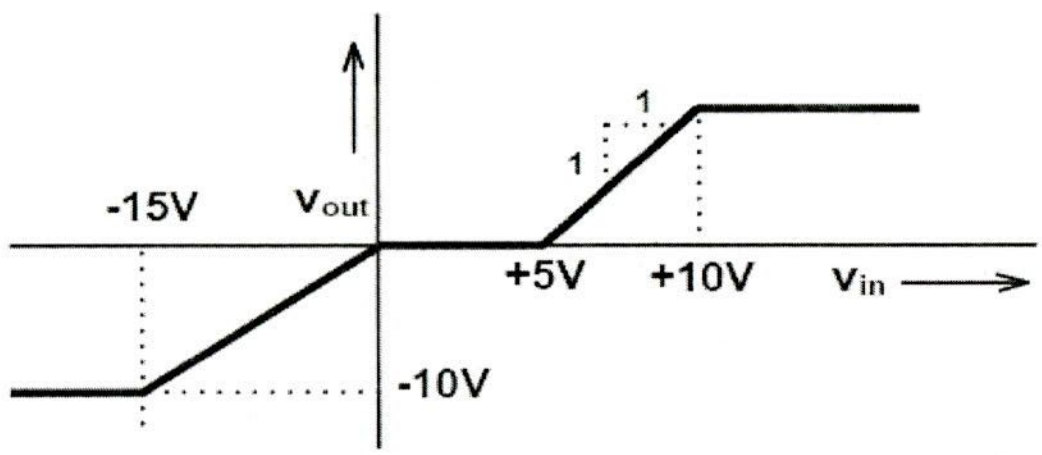
SECTION - A

1. **a)** Consider a DC series motor driving electric traction of constant power load. It is running at rated speed and rated voltage. If the speed of the traction system is to be reduced down to 0.25 per unit(pu) then find the new value of the torque in pu and supply voltage in pu. **(10)**

b) A 230V, 1000 rpm and 100A separately excited dc motor has an armature resistance of 0.05 Ω. The armature is fed from a single-phase fully controlled rectifier with a single phase source of 240V, 50Hz. The drive is operated under continuous conduction mode. Calculate the firing angle to obtain speed at 900 rpm with 80% rated torque. **(10)**

c) A lossless coaxial cable is used to delay a pulse by 100 ns. The inductance and the capacitance per meter length of the cable are 0.20 μH/m and 60 pF/m, respectively. Determine the length of the cable. **(10)**

d) Design a diode circuit whose transfer characteristic is shown in figure. Assume diodes to be ideal. Draw the output waveform of the circuit for $v_{in} = 20 \sin \omega t$. **(10)**



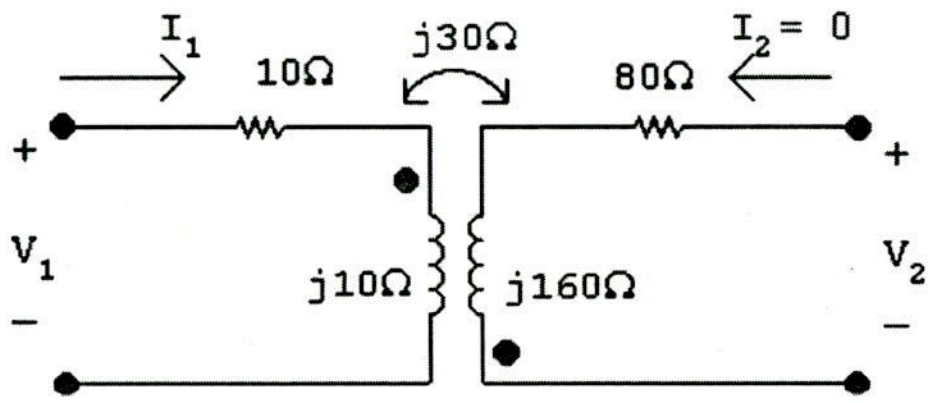
e) Consider the signal **(10)**

$x(t) = 2u(t) - u(t+1) - u(t-1)$

where *u(t)* is the unit step function. Determine and sketch the signal

$y(t) = x(-t+1)$

2. **a)** Find the transmission parameters of the coupled two-port network shown in the figure. **(20)**



b) Consider the discrete-time system whose input x[n] and output $y[n]$ are related as

$$y[n] = \sum_{k=0}^{|n|} x[k] \qquad \textbf{(20)}$$

i) Is the system causal?

ii) Is the system time invariant?

Justify your answers with explanations.

c) Implement the logic function $F = S_0 \oplus x \oplus y$ using 2×1 multiplexer, where $\oplus$ is an XOR function. **(10)**

3. a) i) Design the dual-input, balanced output differential amplifier shown in Fig.1 to meet the following requirements: (select the standard values of resistances). Input resistance $R_i \geq 5k$, Peak to peak output voltage swing $\leq 5V$. Minimum Zener current = 5 mA, $\beta = 150, V_D = 0.7, V_A = 100V$. Also determine A_c, A_d and CMRR. **(15)**

ii) The circuit shown in Fig.2 is an emitter coupled pair in which Q3 and Q4 are used to bias Q1 and Q2. Q5, Q6 and Q7 form a current repeater. All pnp transistors have $\beta = 50$; the npn transistors have $\beta = 150$. Find R so that the current relationships are satisfied. **(5)**

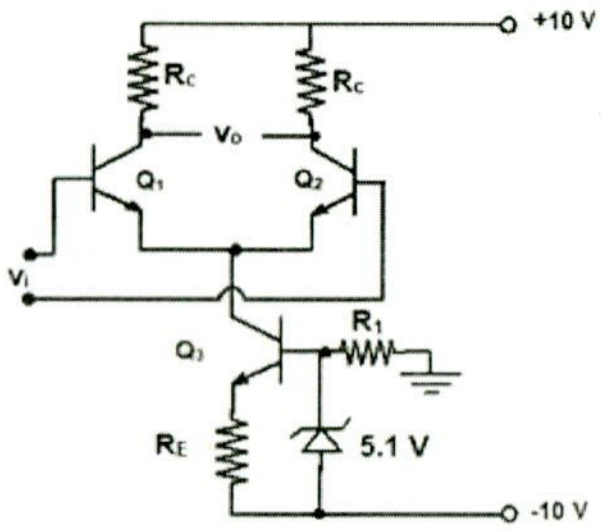


Fig. 1

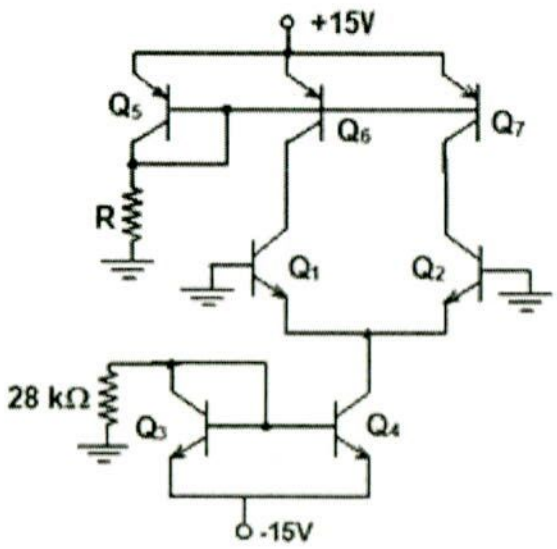


Fig. 2

b) The short circuit and open circuit tests on a 5 kVA, 220 V/400 V, 50 Hz single phase transformer produced the following results: **(20)**

Test	Input voltage(V)	Current(A)	Power(kW)
Short Circuit Test	**40**	**11.4**	**0.2**
Open Circuit Test	**220**	**2**	**0.1**

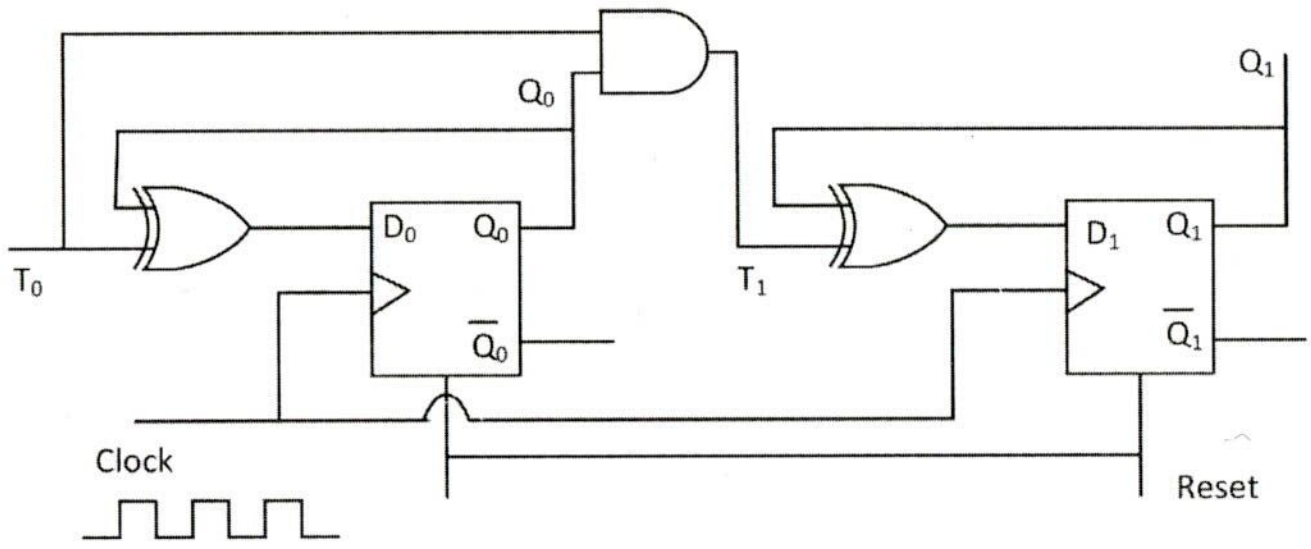
Find the full load efficiency and approximate voltage regulation if power factor is 0.9 lagging.

c) The output of an amplitude modulator is **(10)**

$s(t) = 2\cos(180\pi t) + 10\cos(200\pi t) + 2\cos(220\pi t)$

Determine the ratio of the power in the sidebands to the power in the carrier.

4. a) Draw the state diagram of the synchronous sequential circuit shown in figure. Consider Q_1Q_0 as outputs and the input is T_0. **(20)**

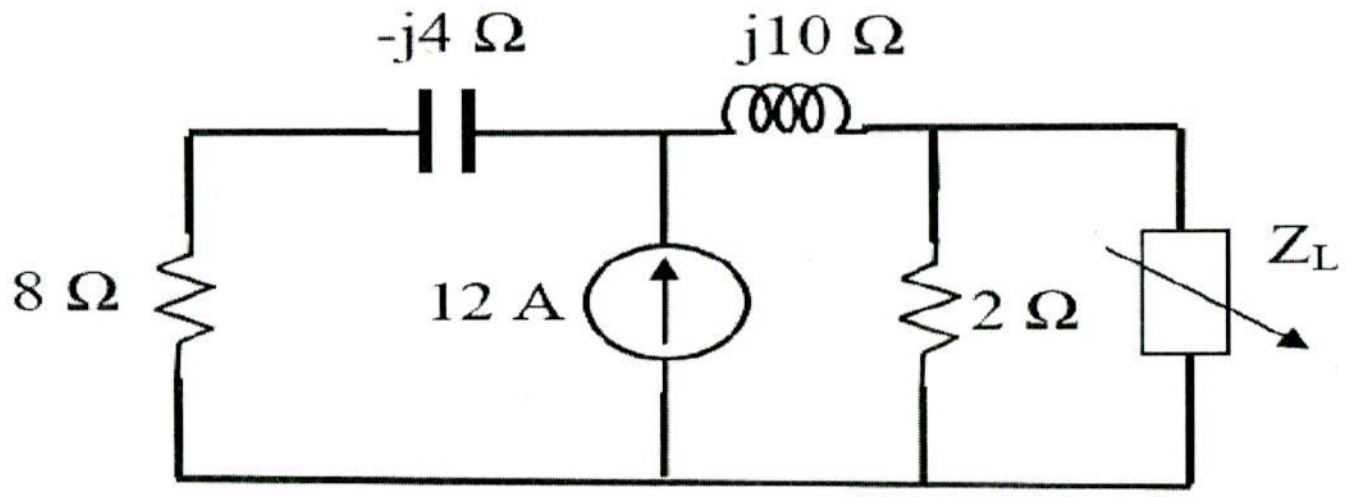


b) A three-phase, 415 V, 50 Hz mains is supplying the three-phase fully controlled rectifier. The output of the three-phase fully controlled rectifier is fed to the voltage source inverter which is supplying the three-phase, 400 V, 60 Hz, 1170 rpm, 6-pole, star connected squirrel cage induction motor operating at the constant flux. The maximum to minimum speed ratio required is 4:1. If the VSI is operated in 180 deg conduction mode (six-step mode), then calculate the following: **(20)**

i) Minimum dc input voltage of the inverter and corresponding firing angle of three phase fully controlled rectifier to obtain the required minimum dc input voltage.

ii) Maximum dc input voltage of the inverter and corresponding firing angle of three phase fully controlled rectifier to obtain the required minimum dc input voltage.

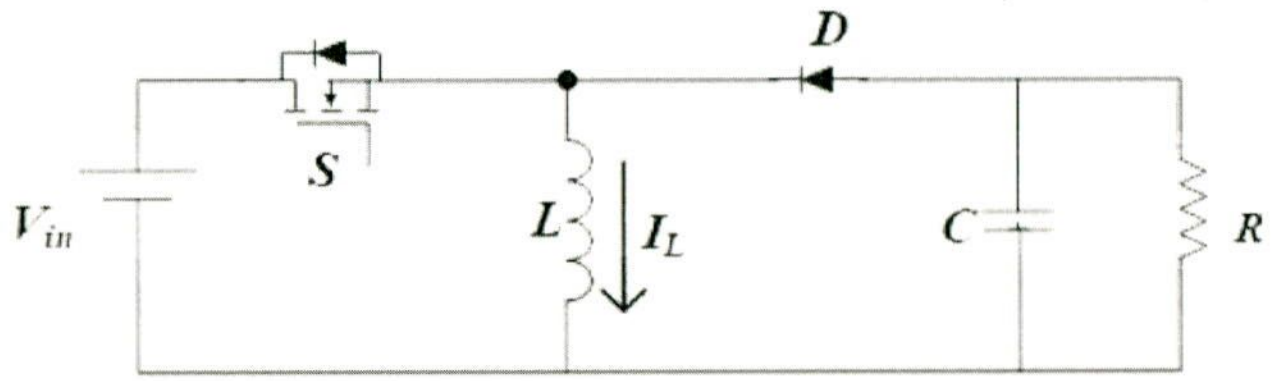
c) In the circuit shown in figure, find the load impedance Z_L that absorbs maximum power transfer. **(10)**



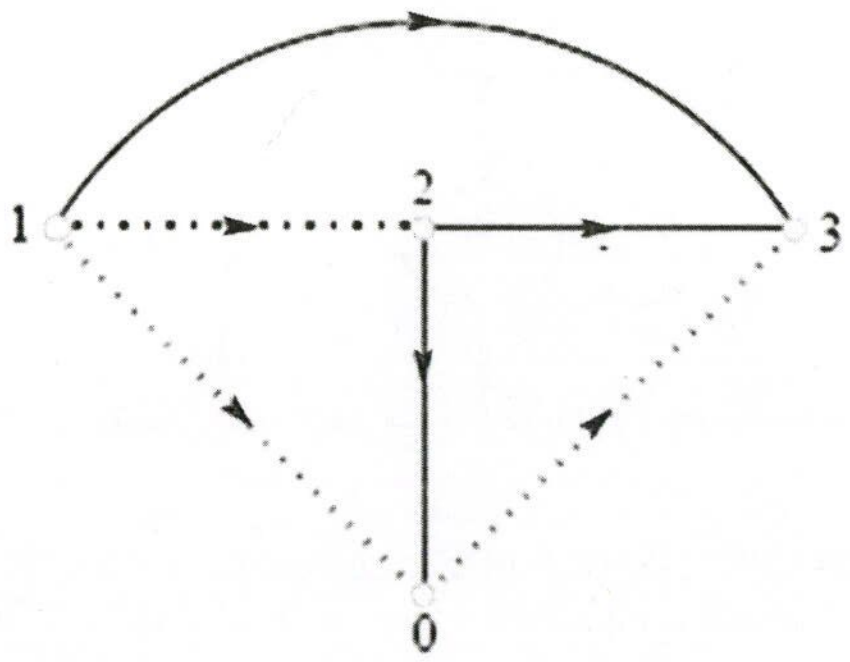
SECTION - B

5. **a)** Consider a 100 kVA, 6.6 kV, 50 Hz, three phase star connected cylindrical pole synchronous generator with synchronous reactance of 20 Ω. Neglect the armature resistance. The synchronous generator is operating at full load with unity power factor. Calculate the following: i) Induced line to line EMF ii) Power or torque angle. **(10)**

b) A DC-DC buck-boost converter shown in figure is supplying a resistive load from a 250 V DC source. Assume switch and diode are ideal, continuous conduction mode, and converter is lossless. The value of different passive components are C = 47 mF, $R = 20\Omega$, $L = 2mH$. If the duty ratio of switch 'S' is kept at 0.3, calculate the switching frequency to keep the peak to peak ripple current of the inductor (ΔI_L) at 0.5A. **(10)**



c) The graph of an electrical network is shown in figure. Obtain the fundamental cut set matrix and fundamental circuit matrix. **(10)**



d) Find the essential prime implicants of the Boolean function **(10)**

$F(w,x,y,z) = \sum(1,3,4,5,7,8,9,11,14,15)$

e) A zero-mean white Gaussian noise with power spectral density $N_0/2$ is passed through an LTI system having impulse response $h(t) = \delta(t) - \delta(t-1)$. What is the power spectral density of the output signal *y(t)?* **(10)**

6. a) Consider the frequency modulated signal **(20)**

$s(t) = 10\cos[2\pi f_c t + 2\sin(1000\pi t)]$

where the carrier signal frequency $f_c = 20\text{MHz}$.

i) Determine the average power of the modulated signal

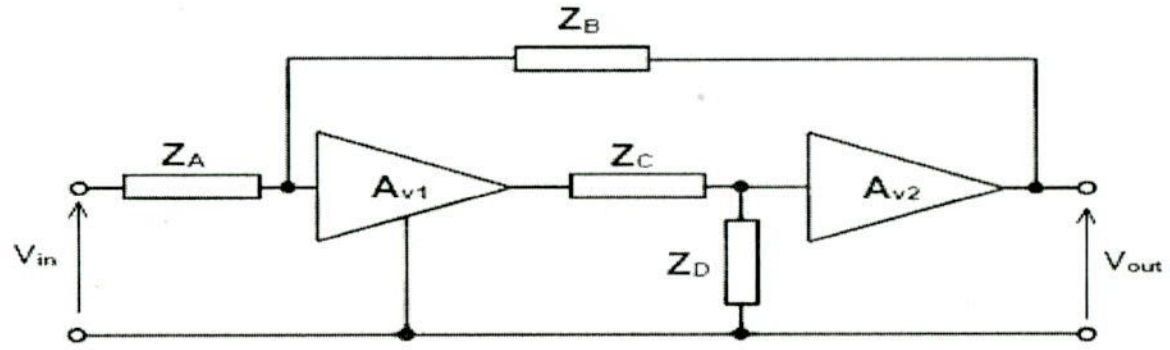
ii) Determine the peak-phase deviation

iii) Determine the peak-frequency deviation.

b) Two circular conducting plates, each of area 0.4 m^2, are separated by a lossy dielectric of thickness 5 mm. The dielectric constant and the conductivity of the medium are 4 and 0.02 S/m, respectively. If the potential difference across the plates is 141 *sin* (109t) V, determine **(20)**

i) The conduction current ii) The displacement current, and iii) The rms value of the total current in the lossy dielectric region.

c) A filter circuit is designed using two OPAMPs having finite gains A_{v1} and A_{v2} as shown in the figure. Find the transfer function of the circuit in terms of circuit parameters. Show that if Z_A and Z_D are resistances having value 'R' and Z_B and Z_C are capacitances having value 'C', the circuit behaves as Band-Pass filter. **(10)**



7. **a)** Consider a bandlimited signal *x(t)* having maximum frequency 10 kHz. Find the Nyquist rate (minimum sampling frequency) for the following signals. **(20)**

i) $2x\left(\frac{t}{2}\right)$

ii) *x(t-2)*

b) i) A 15 kW, 4 poles three phase induction machine (IM) is supplied with 400 V, 50 Hz supply and it runs at 1440 rpm at full load. What is the shaft torque at full load. **(5)**

ii) A three phase, 250 V, 50 Hz, 6 pole Induction Machine (IM) has a standstill rotor impedance of 0.12+j0.85 Ω/phase. When it is excited with the rated voltage and frequency, the motor runs with a full load speed of 960 rpm. Calculate the full load torque. Neglect the stator impedance drop and take stator to rotor turns ratio of 1:8. **(15)**

c) For the following DC-DC converter shown in Fig.1, find the output voltage V_0 for the input voltage of $V_{in} = 100$ V. **(10)**

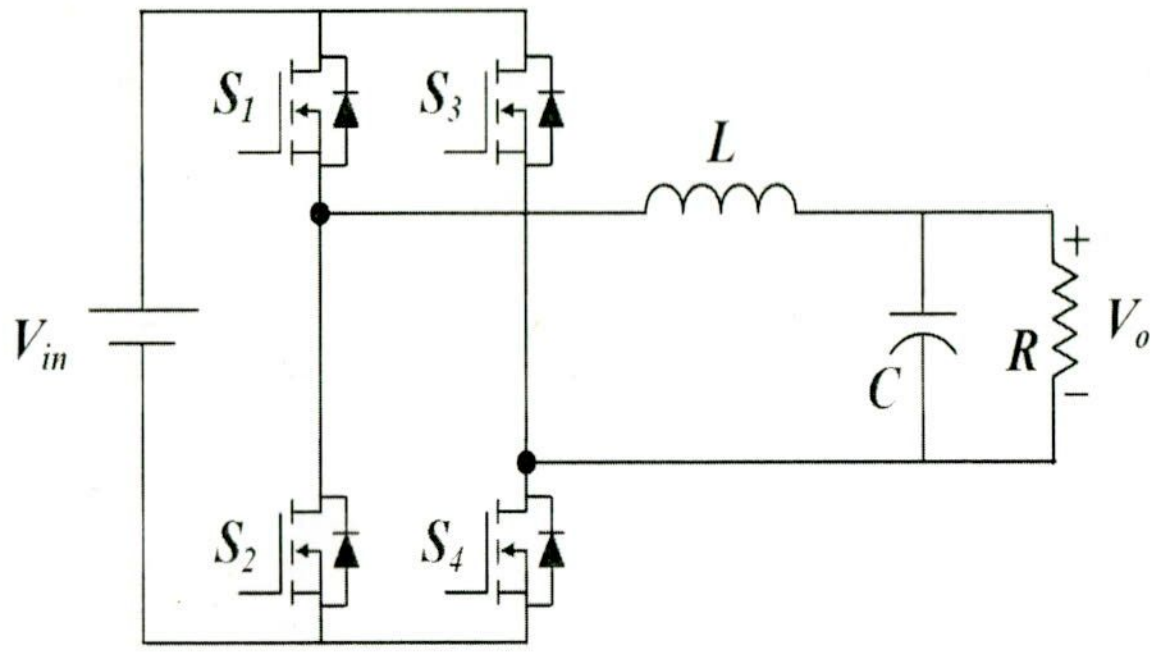
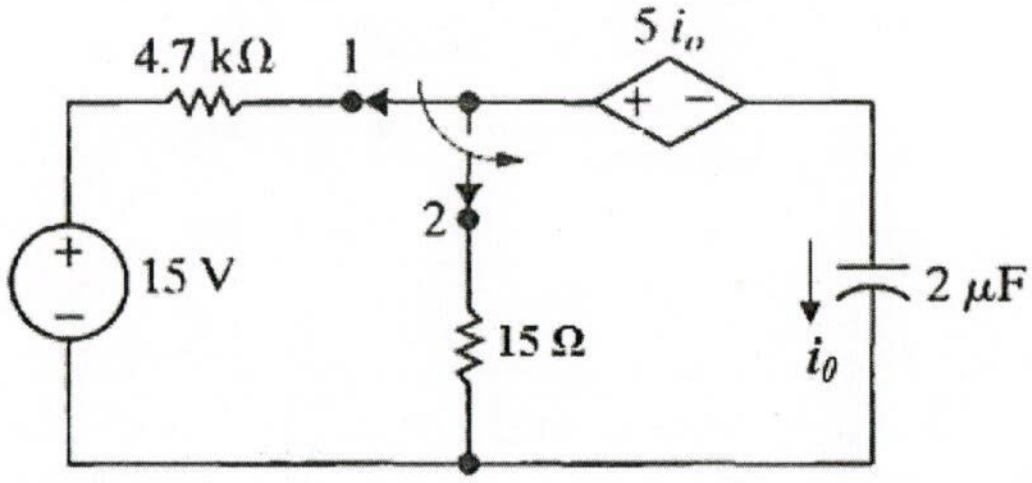


Fig. 1

The switches S_1 and S_4 are turned-on at the same time and are being in conduction for 30 μ s, while S_2 and S_3 are turned-on at the same time and are being in conduction for 10 μ s. S_1 and S_2 are switched in complementary manner; S_3 and S_4 are switched in complementary manner. The switching frequency of the switches is kept at 25 kHz. Assume the switches are ideal, ripple on C is minimal and the converter is lossless. C=10mF, R= 1000 Ω, L=500 μ H.

8. **a)** The switch in the circuit has been in position 1 for a long time before moving to position 2 at t = 0. Find the current i_o(t) for t$\geq$0. **(20)**



b) A 220 V DC shunt generator is connected to full load, which draws 196 A. The generator has shunt field winding resistance of 55 Ω and full load efficiency of 88%. If stray loss in this generator is 720 W then find the value of armature resistance and load current for maximum efficiency. **(20)**

c) The electric field intensity of a uniform plane wave in free space is given by E=94.25 $\cos(\omega t + 6z)\vec{a}_x$ V/m.

Determine i) the velocity of propagation, ii) the magnetic field intensity, and iii) the average power density in the medium. **(10)**

Total No. of Printed Pages-3]

CC(M)

ENGLISH LITERATURE

(OPTIONAL)

PAPER - I

[33]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION-A

1. Write short notes on each of the following. Each question should be answered in about 150 words. **(5×10=50)**

a) Shakespearean Tragedy **(10)**

b) Metaphysical Conceit. **(10)**

c) Comedy of Manners. **(10)**

d) Nature in Romantic Poetry. **(10)**

e) Age of Enlightenment. **(10)**

2. a) How does *The Tempest* by William Shakespeare explore notions of race and colonisation? **(20)**

b) Critically comment on title of the poem 'Ode: Intimations of Immortality from Recollections of Early Childhood' by William Wordsworth. **(15)**

c) Write a critical essay on John Milton's concept of hell in *Paradise Lost.* **(15)**

3. a) Comment on the significance of the divine in John Donne's 'The Canonisation'. **(20)**

b) In what ways does *King Lear* by William Shakespeare examine the idea of traditional heirarchies and social order. **(15)**

c) How would you analyse John Donne as a love Poet? Comment critically citing examples from his poetry. **(15)**

4. a) Contextualise Henrik Ibsen's *A Doll's House* with reference to contemporary feminist debates and theories. **(20)**

b) Alfred Tennyson's 'In Memoriam' has been described as "the concentrated diary of a man confessing himself". Discuss. **(15)**

c) Contextualise Alexander Pope's *The Rape of the Lock* as a social satire. **(15)**

SECTION-B

5. Study the following poetic stanza and answer the questions that follow. Each answer should be around 60-80 words.

Dying

Is an art, like everything else.

I do it exceptionally well.

I do it so it feels like hell.

I do it so it feels real.

I guess you could say I've a call.

It's easy enough to do it in a cell.

It's easy enough to do it and stay put.

It's the theatrical

Comeback in broad day

To the same place, the same face, the same

brute

Amused shout:

'A miracle!'

That knocks me out.

a) Critically comment on the theme of the passage. **(10)**

b) 'Dying is an art'. Elucidate. **(10)**

c) Elaborate on the idea of death in the passage. **(10)**

d) Discuss the relevance of the phrase, 'the theatrical comeback in broad day'. **(10)**

e) Write a short note on the passage's imagery. **(10)**

6. a) "All modern American literature comes from one book by Mark Twain called *Huckleberry Finn*". Comment critically. **(20)**

b) Write a critical essay on Henry Fielding's *Tom Jones* as a picaresque novel. **(15)**

c) Discuss the relationship between genre and gender in George Eliot's *The Mill on the Floss.* **(15)**

7. a) Critically comment on Charles Dicken's *Hard Times* with reference to the theme of social injustice and his relevance in today's world. **(20)**

b) Offer a critical reading of George Eliot's *The Mill on the Floss* with reference to Victorian codes of morality and honour. **(15)**

c) How does Jane Austen's *Pride and Prejudice* offer a portrayal of regency life. Comment with reference to the text. **(15)**

8. a) How does Thomas Hardy problematise the notion of Free will in *Tess of the d'urbervilles.* **(20)**

b) Analyse Jonathan Swift's *Gulliver's Travels* as a political allegory. **(15)**

c) Comment on the title *Tess of the d'urbervilles: A Pure Woman* within the context of patriarchal constructions of purity and chastity. **(15)**

Total No. of Printed Pages-3]

CC(M)

GEOGRAPHY

(OPTIONAL)

PAPER - I

[16]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. Answer the following questions in about 150 words each: (5×10=50)

a) Discuss heat budget and why it varies on the different parts of the earth.

b) With suitable diagrams describe the landforms associated with volcanic activities.

c) Explain the causes and consequences of atmospheric instability.

d) Ocean salinity is not similar in different oceans. Highlight the reasons responsible for its variations.

e) What are the causes of increasing cases of forest fires in the world? Suggest mitigation strategies.

2. a) Give an account of the distribution of soils in the world. Examine the influence of soil on living organism. **(20)**

b) With suitable diagrams discuss the endogenetic movements of the earth. **(15)**

c) What is Dipole Mode Index? Explain the impact of Indian Ocean Dipole on global climate. **(15)**

3. a) With suitable diagrams describe the bottom topography of the ocean and explain the associated temperature variation. **(20)**

b) Explain the influence of human beings on terrestrial ecosystem. **(15)**

c) Discuss the increasing cases of tropical cyclones in the world and its consequences. **(15)**

4. a) Use of clean energy is the best suitable method in the movement towards environmental sustainability. Elaborate. **(20)**

b) Give an account of the increasing cases of ocean heat waves and its consequences on marine ecosystem. **(15)**

c) What is an ecological adaptation? With suitable examples examine the human ecological adaptations in a climate change scenario. **(15)**

SECTION-B

5. Answer the following questions in about 150 words each: (5×10=50)

a) Discuss the types and methods to study Urban Morphology.

b) Discuss the issues of energy crisis in the context of increasing demand on energy consumption.

c) Explain the social well-being and quality of life in the context of Human Development Index.

d) Explain the significance of welfare approaches in Human Geography.

e) Discuss the uneven distribution of world population and its associated problems.

6. a) Climate- smart agriculture is need of the hour to increase the productivity. Comment. **(20)**

b) Briefly discuss the locational patterns and problems of industries of the world. **(15)**

c) Satellite towns are reducing the population and housing pressure of the megacity. Elucidate the statement with suitable examples from India. **(15)**

7. a) Elaborate environmental issues in regional planning and how they will help in sustainable development. **(20)**

b) Critically explain how Central Place Theory is useful for urban planning and development. **(15)**

c) Give an account of the agricultural regions of the world and their associated problems. **(15)**

8. a) Briefly explain the dichotomy and dualism in framing the principles of Human Geography. **(20)**

b) Explain the food security problems of developing countries and suggest suitable measures. **(15)**

c) Uneven distributions of natural resources create regional disparities. Elucidate. **(15)**

CC(M)

GEOLOGY

(OPTIONAL)

PAPER - I

[17]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. Answer the following in about 150 words each. **(5×10=50)**

a) Giving suitable examples from India, describe the formation and characteristics of major Karst landforms. **(10)**

b) Distinguish between GIS and GPS. **(10)**

c) Define and describe various types of moraines and a brief note on their significance. **(10)**

d) Discuss the major landscapes features along divergent and convergent plate boundaries. **(10)**

e) Draw suitable sketches to show the following parts of a fold: hinge line, inflection points, axial plane, and limbs. Describe the different types of folds based on their geometry and orientation. **(10)**

2. a) Define the difference between weathering and erosion. With suitable examples, describe physical weathering in detail including typical features associated with this weathering. **(20)**

b) What factors controls the viscosity of lava? Discuss this in context of volcanic eruptions associated with different tectonic settings. **(15)**

c) What is isostasy? Give a brief account of the geological features that necessitated the adoption of the concept of isostasy. **(15)**

3. a) Explain how rocks can undergo elastic deformation. How are Young's modulus and Poisson's ratio used together to understand rock deformation? **(20)**

b) Discuss and describe the methods useful in estimating the age of the earth. **(15)**

c) Describe the fundamentals of the geometrical fault classification. Draw neat, well-labelled diagrams in support. Mention the criteria for faulting. **(15)**

4. a) Describe the main features of Nebular Hypotheses for origin of solar system. Discuss formation of planets and planetesimals in this framework. **(20)**

b) Discuss strain ellipsoid. Describe Flinn diagram in this context. **(15)**

c) NISAR is joint Earth Observation satellite mission between ISRO and NASA. Describe its salient features and expected benefits. **(15)**

SECTION-B

5. Answer the following in about 150 words each. (5×10=50)

a) Briefly discuss the Jurassic succession of Kutch. Add a note on its paleogeographic significance. **(10)**

b) Explain the importance of microfossils and their evidence for the origins of life and the early biosphere. **(10)**

c) Briefly describe important engineering properties of rocks. **(10)**

d) Describe major geological problems associated with investigations for tunnels. **(10)**

e) Describe transmissivity and storage coefficient in context of ground water. **(10)**

6. a) Describe the different types of stratigraphic contacts and unconformities, and discuss their significance in interpreting the geological history of a region. **(20)**

b) Discuss the regional stratigraphy of the Western Dharwar Craton. **(15)**

c) Describe Darcy's law and discuss its application in groundwater flow studies. **(15)**

7. a) What do you understand by Rock Quality Designation? Describe various RQD qualifications in civil engineering projects used to evaluate the soundness of rocks. **(20)**

b) What are index fossils? Elaborate with Indian examples. **(15)**

c) Discuss the changes in flora from the Lower to Upper Gondwana Formations. **(15)**

8. a) Describe in detail the evolution of family Equidae through geologic time. **(20)**

b) Explain the various forces acting on a dam. List the requisite qualities of the dam site to ensure the stability of a dam in view of these forces. **(15)**

c) Define "Precambrian" and its division with approximate dates. Also give the list of rock representing this time period in India along with respective radiometric dates. **(15)**

CC(M)

HINDI

(OPTIONAL)

PAPER - I

[34]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

Please read each of the following Instructions 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.

खंड–1

किन्ही तीन विषय पर आलोचनात्मक टिप्पणी लिखिए। (20+15+15)

1. क) अमीर खुसरो की हिंदी

   ख) देवनागरी लिपि की विशेषताएँ

   ग) राजभाषा हिंदी के क्रियान्वयन में कठिनाईयाँ

   घ) इन्टरनेट में हिंदी की स्थिति

   च) भक्तिकालीन हिंदी

2. क) काव्यभाषा के रुप में ब्रज के विकास पर उदाहरण सहित प्रकाश डालिए। (20)

   ख) पूर्वी और पश्चिमी हिंदी के साम्य और वैषम्य पर प्रकाश डालिए। (15)

   ग) विज्ञान और तकनीकी के क्षेत्र में हिन्दी के विकास की समीक्षा कीजिए। (15)

3. क) राष्ट्र भाषा और राज भाषा के अंतर को स्पष्ट करते हुए दोनों के महत्व पर प्रकाश डालिए। (20)

   ख) आरम्भिक हिंदी के विकास में अवहट्ट का योगदान बताइए। (15)

   ग) दक्खिनी हिंदी की विशेषताओं का उल्लेख कीजिए। (15)

4. क) खड़ी बोली हिंदी के विकास के प्रमुख सोपानों पर प्रकाश डालिए। (20)

   ख) अवधी भाषा की उत्पत्ति और उसके विकास पर प्रकाश डालिए। (15)

   ग) अपभ्रंश की सामान्य विशेषताएं बताइए। (15)

खंड–2

किन्ही तीन विषय पर आलोचनात्मक टिप्पणी लिखिए। (20+15+15)

5. क) तुलसी के काव्य में समन्वय

   ख) बिहारी की काव्य कला

   ग) हिंदी सूफी काव्य का सांस्कृतिक महत्व

   घ) सिद्ध–नाथ साहित्य की विशेषताएं

   च) भारतेंदु की राष्ट्रीय चेतना

6. क) आचार्य हजारी प्रसाद द्विवेदी की आलोचना दृष्टि पर प्रकाश डालिए। (20)

   ख) हिंदी निबंध लेखन की परम्परा में ललित निबंधो के वैशिष्ट्य पर प्रकाश डालिए। (15)

   ग) आधुनिक हिंदी रंगमंच की दशा और दिशा पर प्रकाश डालिए। (15)

7. क) हिंदी कहानी के विकास में प्रेमचंद और जय शंकर प्रसाद के योगदान को रेखांकित कीजिए। **(20)**

ख) हिंदी साहित्येतिहास लेखन की परम्परा में आचार्य रामचंद्र शुक्ल के योगदान पर प्रकाश डालिए। **(15)**

ग) संस्मरण और यात्रा वृत्तान्त के स्वरुप को रेखांकित करते हुए दोनों के अंतर को स्पष्ट कीजिए। **(15)**

8. क) हिंदी नाटक के विकास में मोहन राकेश के योगदान को रेखांकित कीजिए। **(20)**

ख) ''छायावाद भारतीय नव जागरण की अभिव्यक्ति है'' – पर संक्षिप्त निबंध लिखिए। **(15)**

ग) प्रगतिवाद की विशेषताओं का उल्लेख कीजिए। **(15)**

Total No. of Printed Pages-4]

CC(M)

HISTORY

(OPTIONAL)

PAPER - I

[18]

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

1. Mark the following places on the map with a short note not exceeding 30 words. **(20×2.5=50)**

i) Birbhanpur
ii) Sannati
iii) Pandu Rajar Dhibi
iv) Rakhigarhi
v) Ter
vi) Kargil
vii) Lalitgiri
viii) Kanispur
ix) Jorwe
x) Hastinapur
xi) Muziris
xii) Inamgaon
xiii) Manda
xiv) Bodh Gaya
xv) Golconda
xvi) Dandi
xvii) Bayana
xviii) Lahuradeva
xix) Mathura
xx) Bhimbetka

2. a) "Megalithic cultures of peninsular India were not merely mortuary in purpose but reflected complex societal, economic and ritual dimensions of early Iron Age communities." Critically examine the above statement in the light of archaeological evidence, regional variations and technological transitions. **(20)**

b) "The Vedic tradition, though anchored in ritual, was never static—it evolved continuously through internal debate, social change and geographical expansion." Discuss in light of textual and archaeological sources. **(15)**

c) "The Indus Valley Civilization was not just a Bronze Age urban experiment, but a sophisticated ecological, technological and cultural achievement that defies simplistic labels." Elaborate with examples from major sites. **(15)**

3. a) What were the key factors that led to the emergence of the *Mahajanapadas* in the 6th century BCE? How did they change early Indian political and social life? **(20)**

b) "The Kushanas acted as a cultural and economic bridge between India and the wider world, while also shaping internal religious and artistic developments." Discuss with reference to their political role, trade networks and patronage activities. **(15)**

c) Why did Buddhism become popular in ancient India? Which social groups supported it and why? **(15)**

4. a) "Ancient Indian educational institutions were not only centres of learning but also hubs of cultural exchange and state patronage". Examine with reference to major institutions like Nalanda, Vikramshila and Vallabhi. **(20)**

b) Trace the development of temple architecture in ancient India with reference to its main regional styles. **(15)**

c) How did the Pallavas promote religious pluralism? Illustrate with reference to their patronage of different sects and art forms. **(15)**

SECTION- B

5. Write short notes in not more than 150 words in each of the following. (5×10=50)

a) Why is Shankaracharya seen as a key figure in reviving Hindu philosophy and uniting different traditions of his time?

b) How did the Rashtrakutas build a powerful empire from the Deccan and connect different parts of India through politics and culture?

c) Why is Kalhana's Rajatarangini considered an important step in the writing of Indian history?

d) What do Gupta coins tell us about the economy, kingship and artistic taste of that time?

e) How did the Khaljis bring new changes in the Delhi Sultanate's politics and break the control of old Turkish nobles?

6. a) "The Cholas built a powerful imperial state through strong administration, naval expansion, and temple-based economy." Discuss with examples. **(20)**

b) How did the Bhakti movement challenge ritual caste dominance and offer a more personal path to devotion in medieval India? **(15)**

c) Examine how the Vijayanagara Empire balanced decentralised military control with centralised royal authority. **(15)**

7. a) "The 13th and 14th centuries saw a significant growth in urban centres and non-agricultural production, driven by political expansion and commercial integration." Discuss. **(20)**

b) How did Zain-ul-Abidin of Kashmir strengthen a regional identity through policies of tolerance, art patronage and good governance? **(15)**

c) In what ways did the jagirdari and mansabdari systems serve the dual function of military recruitment and revenue extraction in the Mughal Empire? **(15)**

8. a) "Credit, brokerage and trust were the foundations of mercantile capitalism in pre-colonial India." Examine the role of Indian mercantile classes in the development of indigenous credit systems and their links with state and commercial networks in the 16th and 17th centuries. **(20)**

b) How did Mughal painting reflect the synthesis of Persian, Indian, and Central Asian elements, and what were its main themes and patrons? **(15)**

c) What were the major features of the Maratha financial system, and how did it support their military and administrative expansion? **(15)**

CC(M)
KASHMIRI
(OPTIONAL)
PAPER - I
[35]

Maximum Marks -250

Time Allowed - Three Hours

(Answer Must be Written in Kashmiri)

جواب دِنہٕ بزٕ وٹھہ پٔرِ وسوالن متعلق خاص ہِدایت

1. یَتھ پرچس چھِ اَٹھ سوال یم دون حِصن (سکیشن) پٹھ مشتمل چھِ۔
2. توہہِ چھِ کُل پانٛزٕن سوالن ہِندی جواب دِنی۔
3. سوال نمبر 1 (اَکھ) تہٕ سوال نمبر 5 (پانٛزٕھ) کَرِنی چھِ لازمی۔
4. دو یو سیکشنو منز چھِ باقی ترٕن سوالن ہِندی جواب دِنی۔ مگر دوٚشوٚے سیکشن کیو سوالو منز چھِ کم کھوتہٕ کم اکہِ سوالُک جواب دیُن ضرٕوری۔ پٕرتھ سوالس تہٕ سوالکِس حِصس بزٕ وٹھہ کنہِ چھِ نمبر (Marks) درج کَرنہٕ آہٕمتی۔
5. سوالن ہِندی جواب دِنہٕ باپتھ چھُ لفظن ہُنٛد تعداد مُقرر کرنہٕ آمُت۔ اچ پابندی کَرِنی چھٕے لازمی۔
6. سوالن ہِندٕ ن جواب یِیہِ ترتیب وار اہمیت دِنہٕ۔
7. اگر کُنہِ سوالُک یا تمہِ کہِ کُنہِ حِصُک لیکھنہٕ آمُت جواب تو ہی مُجرا چھونہٕ یژھان تھاوٗن، تتھ گژھِ کرٕ اس دیُن۔ نتہٕ یِیہِ سُہ جواب تصوٗر کرنہٕ۔ یوٚ دوٚے سُہ جواب اڈِلیوٚ کُے تہٕ آسہِ۔
8. کاٹھہ صفحہ یا صفحٕک حِصہٕ اگر خالی روزِ تتھ گژھِ کرٕ اس دیُن۔

SECTION - A

1. یمن پیٹھ لیکھو نوٹ۔(پڑتھ سوالک جواب گڑھ 100 لفظن منز آسن۔ (50)

(اَلف) کاشر بن مصوتن ہنز صوتیاتی خصوصیٚژ۔ (10)

(ب) کاشر زبانی ہندبن ناوتین منز جسنہٕ تبدیلی ہندی اصوٗل۔ (10)

(ج) کاشر زبانی ہندی پرناوٚتی قسم۔ (10)

(د) اثری تہٕ ثری کڑاوٚتی۔یمن باہم پھیٚر۔ (10)

(ہ) کاشرس منز وجوٗ ہی کڑاوٗت۔ (10)

2. یمن سوالن لیکھو جواب۔ (50)

(اَلف) کاشر زبانی متعلق گریرسن سُند نظریہٕ تہٕ امچہ خامیہٕ کُرِ وواضح (200 لفظن منز) (20)

(ب) کمولسانی خصوصیٚژ وَکنی چھےٚ کاشر زبان ہندِ آریائی مانہٕ آمژ۔(200 لفظن منز) (15)

(ج) ''کاشر زبان نہٕ چھےٚ دردی نہٕ ہند آریائی ،بلکہ چھےٚ وادی منٚز ے وو تلیمژ۔''اتھ بیانس ستی اِتفاق کران کُرِ وہٕ واضح۔(100 لفظن منز) (15)

3. یمن سوالن لیکھو جواب۔ (50)

(اَلف) کاشر زبانی ہندِس جغرافیائی بولہٕ مُطالعس کیاہ چھُ گریرسن سُند دیُت؟ واضح کُرِ و۔(200 لفظن منز) (20)

(ب) وادی اندر کم کم بولیاتی پھیٚر چھِ کاشر زبانی؟ واضح کُرِ و۔(200 لفظن منز) (15)

(ج) ''کال'' کیاہ گوٚ و؟ کالہٕ باگینہٕ ہُند راویتی تصور کیاہ اوس؟(100 لفظن منز) (15)

4. یمن سوالن لیکھو جواب۔ (50)

(اَلف) کاشِر زبانی ہِنٛدِ حوالہٕ کُرِ وساد جُملس تہٕ مرکب جُملس درمیان فرق واضح۔(200لفظن منٛز) (20)

(ب) کاشرِ زبانی منٛز حوالہٕ ناوناوٕنے (Relativization) عنوانس پٹھ لیکھِو نوٹ۔(200لفظن منٛز) (15)

(ج) سوالہٕ جُملہٕ کیٚاہ گوٚو؟ کاشرِ زبانی ہِنٛدِ حوالہٕ کُرِ وسوالہٕ جُملن ہِنٛدٕ بٕن قِسمن ہِنٛز وضاحت۔(100لفظن منٛز) (15)

SECTION - B

5. یمن سوالن لیکھو جواب۔(پٮ۫ٹھ سوالکُ جواب گٮ۫ٹھ 100لفظن منٛز آسُن) (50)

(اَلف) لل دیٚدِ ہِنٛدٕ بٕن واکھن ہُنٛد فِکری پسہٕ منظر وبٮ۫ٹھناوِو۔ (10)

(ب) شیخ العالمؒ سٕنٛز شاعری منٛز کٮ۫ٹھ تصویر چھےٚ ژوداہمہٕ صٚدی ہِنٛز کشیر ہِنٛز ووتلان؟ (10)

(ج) لل دیٚد تہٕ شیخ العالمؒ ہِنٛدس تصوٗرِ موتس باہم گاشراوِو فرق۔ (10)

(د) لل واکھن ہِنٛز زبانی ہِنٛز خوٗبیہٕ کیٚاہ چھےٚ؟ واضح کُرِو۔ (10)

(ہ) حبہٕ خوتوٗنہٕ ہِنٛدٕ بٕن وژنن منٛز کتھ پاٹھی چھُ،۔ذاتگ تہٕ زمانگ گدُرُن بٮ۫ٹن باوتھ لبان؟ واضح کُرِو۔ (10)

6. یمن سوالن لیکھو جواب۔ (50)

(اَلف) کُنو ہمہٕ صٚدی ہِنٛدِس کاٚنسہٕ غزل گو شاعرٕ سُنٛد دیٖوٗت مولناوِو۔(200لفظن منٛز) (20)

(ب) کاشرِ زبانی کیٚاہ چھُ کُنو ہمہٕ صٚدی ہِنٛدِ مثنوی ادبٕک دیٖوٗت؟ (200لفظن منٛز) (15)

(ج) وژنی شاعری ہِنٛز شعرِ زبانی ہِنٛز خصوٗصیٖوٗ کُرِ وواضح۔ (100لفظن منٛز) (15)

7. یمن سوالن لیکھو جواب۔ (50)

(اَلف) ''ہجو رچھ روایت شکن تہ روایت ساز شاعر'' اِتفاق کران وہٕ ژھناوِو۔ (200 لفظن منٛز) (20)

(ب) آزاد ہنٛز شاعری چھے اِنسان دوستی ہنٛز شاعری۔ واضح کرِو۔ (200 لفظن منٛز) (15)

(ج) وُہمہ صدی ہنٛد گوڈنکہ نبصفچہ نظمہ ہُنٛد تنقیدی جاٚیز ہیٚو۔ (100 لفظن منٛز) (15)

8. یمن سوالن لیکھو جواب۔ (50)

(اَلف) جدید دور چہ کاشرِ ناولہ ہُنٛد صورتحال کرِو واضح۔ (200 لفظن منٛز) (20)

(ب) جدید دورس منٛز کم تجرُبہ سٕپدی کاشرِس ڈزامہس منٛز؟۔ (200 لفظن منٛز) (15)

(ج) 1960 پتہٕ کس افسانس منٛز کم ہیتی تبدیلیہ سٕپز رونما ؟ (100 لفظن منٛز) (15)

Total No. of Printed Pages-3]

CC(M)

LAW

(OPTIONAL)

PAPER - I

[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

1. Answer the following questions in about 150 words each. Support your answer with relevant legislative provisions and judicial pronouncements. (5×10=50)

a) In case of repugnancy between Union and State laws, which law shall prevail and why?

b) "Absolute equality may itself be a cause of inequality". Discuss.

c) What is the difference between Judicial activism and Judicial overreach?

d) What are the various Fundamental Duties provided under our Constitution?

e) When is the Doctrine of Pith and Substance invoked?

2. a) Discuss the changing dimensions of Right to Life and Personal Liberty guaranteed under Article 21 with the help of Supreme Court judgments. **(20)**

b) 'Directive Principles of State Policy, though not enforceable by any court, are fundamental in the governance of the State'. Discuss the various measures undertaken by State to ensure the fulfilment of directives enshrined under our Constitution. **(15)**

c) Can Preamble be amended under Article 368 of the Constitution? Answer in the light of relevant judgments. **(15)**

3. a) What is the procedure for appointment and transfer of judges of the High Courts? Discuss the relevant constitutional provisions and judicial pronouncements. **(20)**

b) Discuss the ordinance making power of the President. Is the validity of an ordinance challengeable before a court of law? **(15)**

c) Acknowledging that free and fair elections are essential for any democracy, the Election Commission has undertaken various efforts to ensure the same. Discuss the steps taken by our Election Commission to ensure fairness in the election process. **(15)**

4. a) What do you understand by "Eminent Domain"? Discuss the significance of this doctrine along with limitations, if any. **(20)**

b) What is federalism? How is co-operative federalism different from competitive federalism? **(15)**

c) Describe the powers and functions of Union Public Service Commission. **(15)**

SECTION-B

5. Answer the following questions in about 150 words each. Support your answer with relevant legislative provisions and judicial pronouncements. (5×10=50)

a) What crimes can be prosecuted by the International Criminal Court?

b) Discuss the impact of TRIPS on trade.

c) Highlight the main points of distinction between the IMF and the World Bank.

d) What is the purpose of establishing a Contiguous zone?

e) Write a note on the Nuclear non-proliferation treaty.

6. a) What is the principle of 'Right of innocent passage' under International Law? Discuss in the light of the Corfu Channel Case. **(20)**

b) How is International Humanitarian law enforced? Also discuss its main guiding principles. **(15)**

c) Explain the principle of non-refoulement in the context of asylum seekers and refugees. How is this principle applied under International Law? **(15)**

7. a) Discuss the various theories that explain incorporation of International law into Domestic law. In case of conflict between international obligation and an obligation under municipal law, which one shall prevail and why? **(20)**

b) Can impossibility to perform a treaty be a ground for terminating it or withdrawing from it? Discuss. **(15)**

c) Analyse critically the relationship between 'humanitarian intervention' and 'responsibility to protect'. **(15)**

8. (a) Enumerate the essentials for Recognition as a state under Public International Law. Also discuss what are the different modes of recognition of States under International Law? **(20)**

(b) Discuss the significance of the principle of Double Criminality for extradition. On what grounds can extradition be refused? Answer in the light of International law on extradition. **(15)**

(c) How does the UNO promote co-operation under International Law? Discuss. **(15)**

Total No. of Printed Pages-3]

CC(M)

MANAGEMENT

(OPTIONAL)

PAPER - I

[20]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

1. Describe the following in about 150 words each. **(5×10=50)**

a) Discuss some potential ethical issues that a manager might face. **(10)**

b) How do you keep your team motivated despite conflicts and obstacles? **(10)**

c) Suggest ways to boost employee morale. **(10)**

d) Discuss the characteristics of a learning organization. **(10)**

e) Discuss challenges faced by a human resource manager. **(10)**

2. a) Discuss the Principles of Management by Henri Fayol. **(20)**

b) What is a value chain? Explain with the help of an example? **(15)**

c) Who is an entrepreneur? Discuss fundamental qualities and skills of an entrepreneur. **(15)**

3. a) What is the concept of diversity in the workplace? Discuss major types of workplace diversity. Why is diversity important for organizations? **(20)**

b) What is workplace stress? What are its causes? **(15)**

c) What is organizational conflict? Discuss strategies for managing it? **(15)**

4. a) What is employee training and development? Discuss its benefits. Suggest any five types of employee training programs. **(20)**

b) Discuss employee compensation and its components. What are the principles of compensation management? **(15)**

c) Explain the meaning and process of HR audit. **(15)**

SECTION - B

5. Describe the following in about 150 words each. **(5×10=50)**

a) What are the leading causes of depreciation? **(10)**

b) Discuss the problem of customer misbehaviour. **(10)**

c) What are overhead costs? Give examples. **(10)**

d) What are the components of working capital? **(10)**

e) What is the Cost of Capital? How do you calculate it? **(10)**

6. a) What is variance analysis? What are its types? **(20)**

b) What is zero-based budgeting? Discuss its advantages and disadvantages. **(15)**

c) Alpha Company manufactures chocolates. Fixed costs amount to Rs.270,000 per year. Variable costs per unit are Rs.23, and the average price per unit is Rs.50.

Calculate:

i) How many chocolates must Alpha Company sell to break even?

ii) What is the operating income if Alpha Company sells 16,000 chocolates annually?

iii) If Alpha Company's variable costs decrease to Rs.20 per chocolate while the price and fixed costs remain unchanged, what is the new break-even point? **(5+5+5=15)**

7. a) What is financial leverage? Explain with the help of an example. Distinguish between financial leverage and operating leverage. **(20)**

b) Distinguish between the money market and the capital market. **(15)**

c) What is a dividend policy? Discuss common types of dividend policies. **(15)**

8. a) What is service marketing? Explain its fundamental characteristics. **(20)**

b) What is marketing ethics? Why is marketing ethics important? **(15)**

c) Describe five common pricing strategies. **(15)**

Total No. of Printed Pages-4]

CC(M)

MATHEMATICS

(OPTIONAL)

PAPER - I

[21]

Time Allowed - Three Hours | *Maximum Marks-250*

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SECTION - A

1. a) Find the characteristic roots and the corresponding characteristic vector of the matrix A if

$$A=\begin{pmatrix}2 & 2 & 1\\ 1 & 3 & 1\\ 1 & 2 & 2\end{pmatrix}$$ **(10)**

b) Show that linearly independent solution of $\frac{d^2y}{dx^2}-2\frac{dy}{dx}+2y=0$ are $e^x sinx$ and $e^x cosx$. What is the general solution? Find the solution $y(x)$ with the property $y(0)=2$ and $y'(0)= -3$ **(10)**

c) Prove that the volume of the solid generated by the revolution of the curve $\frac{a^3}{a^2+x^2}$ about its asymptote is $\frac{\pi^2 a^3}{2}$. **(10)**

d) Prove that $x-\frac{x^2}{2}+\frac{x^3}{3(1+x)}<log(1+x)<x-\frac{x^2}{2}+\frac{x^3}{3}$ if $x>0$ **(10)**

e) Find the value of a for which the plane $x+y+z=a\sqrt{3}$ touches $x^2+y^2+z^2+2x-2y-2z-6=0$ **(10)**

2. a) Show that the shortest distance between any two opposite edges of the tetrahedron formed by the plane $y+z=0, z+x=0, x+y=0, x+y+z=a$ is $\frac{2a}{\sqrt{6}}$ and that three lines of shortest distance intersect in the point $x=y=z=-a$ **(20)**

b) Let $L:R^3\to R^2$ be defined by $L\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}1 & 1 & 1\\ 1 & 2 & 3\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}$ and let $\boldsymbol{S}=\{v_1,v_2,v_3\}$ and $T=\{w_1,w_2\}$ be the natural bases for $\boldsymbol{R^3}$ and $\boldsymbol{R^2}$ respectively. Find the matrix of $\boldsymbol{L}$ with respect to $\boldsymbol{S}$ and $\boldsymbol{T}$. **(15)**

c) Solve $x^4\frac{d^3y}{dx^3}+2x^3\frac{d^2y}{dx^2}-x^2\frac{dy}{dx}+xy=1$ **(15)**

3. a) Express the matrix $A=\begin{bmatrix} 1+2i & 2 & 5-5i \\ 2i & 2+i & 4+2i \\ -1+i & -4 & 7 \end{bmatrix}$ as the sum of Hermitian and

Skew-Hermitian matrix. Also express the matrix A as $P+iQ$ where P and Q are Hermitian matrices. **(20)**

b) Show that the integral $\int_0^{\pi/2} \log \sin x \, dx$ is convergent and hence evaluate the value of definite integral. **(15)**

c) Find the equations of the line through the point (1,2,3) parallel to the line $x-y+2z=5, 3x+y+z=6$ **(15)**

4. a) Show that the system of equations:

$\lambda x+y+z=1$, $x+\lambda y+z=\lambda$, $x+y+\lambda z=\lambda^2$ has a unique solution provided $\lambda \neq -2$ or $\lambda \neq 1$. Find solution and state the nature of the solution when $\lambda=1$. **(20)**

b) The sum of squares of the distances of a point from the plane $x+y+z=0, x-2y+z=0$ is equal to square of its distance from the plane $z=x$. Prove that the equation of the locus of the point is $y^2+2zx=0$. By turning the axes of x and z in their plane through angles of 45°. Show that the locus is a straight circular cone with semi-vertical angle 45°. **(15)**

c) Evaluate the mass of a plate in the form of a quadrant of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ whose density per unit area is given by $\rho=kxy$. **(15)**

SECTION - B

5. a) If the population of a country doubles in 50 years, in how many years will it be doubled under the assumption that the rate of increase is directly proportional to the number of inhabitants? [Given that $\log 2=0.3010$ and $\log 3=0.4771$]. **(10)**

b) The speed v of a particle moving along the axis of x is given by the relation $v^2=p^2(8bx-x^2-12b^2)$. Show that the motion is simple harmonic with its centre at $x=4b$ and amplitude is $2b$. Calculate the time taken from the value of x as $5b$ to $6b$. **(10)**

c) If $\mathbf{F}=(x^2+z^3, 2xy-5z, 3xz^2-5y)$. Show that ***Curl*** **F=0.** Find the scalar function $\phi(x,y,z)$ such that **F=*Grad*** ϕ. **(10)**

d) Find $L^{-1}\left\{\frac{3s+1}{(s-1)(s^2+1)}\right\}$. **(10)**

e) Solve the following equation by using method of variation of parameters: $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}-y=x^2e^x$. **(10)**

6. a) i) A circle with centre (2, 3, 0) and radius 1 is drawn in the plane z=0. Find the equation of the sphere which passes through this circle and the point (1,1,1).**(10)**

ii) Find the equation of the sphere whose great circle is $x^2+y^2+z^2+10y-4z=8$ through $x+y+z=3$. **(10)**

b) Find the dimensions of the vector space M_2 of all 2×2 matrices over R. **(15)**

c) Use Laplace Transforms to solve the differential equation under the given parameters:

$\frac{d^3y}{dx^3}-3\frac{d^2y}{dx^2}+3\frac{dy}{dx}-y=t^2e^t$ for $y(0)=1$, $y'(0)=0$ and $y''(0)=-2$. **(15)**

7. a) A uniform bar AB of 10 ft long is hinged at B and supported in a vertical plane by a light string AC which connects A to C, at 10 ft directly above it. If AB weights 20 lb and AC=15ft. Find the tension in AC and the reaction at B by assuming that the weight of AB acts through its middle point. **(20)**

b) Solve the equation $\boldsymbol{p^2+2py\,cotx=y^2}$. **(15)**

c) Find the area of triangle included between the plane $2x-3y+4z-12=0$ and its co-ordinate planes. **(15)**

8. a) i) In a projectile motion, if the maximum horizontal range of a particle is R, show that the greatest height attained is R/4. **(10)**

ii) A man can throw a ball h meters vertically upwards. Show that the greatest horizontal distance he can throw is 2h. **(10)**

b) Let $\boldsymbol{F}=2xz^2\boldsymbol{i}-yz\,\boldsymbol{j}+3xz^3\boldsymbol{k}$. Find *curlF*, *curlcurl***F**, *div***F** *and divcurl***F**. **(15)**

c) Solve $\frac{d^4y}{dx^4}+\frac{d^3y}{dx^3}+\frac{d^2y}{dx^2}=x^2(a+bx)$ **(15)**

Total No. of Printed Pages-4]

CC(M)

MEDICAL SCIENCE

(OPTIONAL)

PAPER - I

[23]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION-A

1. a) Briefly describe the pharmacotherapy of the following: **(3 ×5=15)**

i) Acute migraine

ii) Type 2 Diabetes mellitus

iii) Falciparum malaria

b) A 45-year-old male presents to the clinic with complaints of frequent headaches, dizziness, and occasional nosebleeds. His blood pressure readings are consistently elevated at 160/100 mm Hg despite lifestyle modifications. He is diagnosed as hypertensive. **(20)**

i) What will be the pharmacological management in this patient?

ii) Classify different antihypertensive medications

iii) Differentiate between arteriodilators and venodilators

iv) Describe uses and adverse effects of ACE inhibitors

c) Discuss the neural circuitry of basal ganglia highlighting direct and indirect pathways. Write a note on Parkinsonism disease. **(10+5=15)**

2. a) i) Enumerate the types of skull Fracture and their medicolegal significance. **(5)**

ii) Describe briefly medicolegal importance of Extradural Haematoma. **(5)**

b) Describe the shoulder joint under the following headings: **(1+4+8+2=15)**

i) Type of joint and articular surfaces

ii) Ligaments and capsule

iii) Degrees of freedom, movements, muscles causing these movements, nerve supply of the muscles causing these movements (tabulate if needed)

iv) Applied anatomy

c) Describe the development of the Uterus under the following headings: **(2+6+2=10)**

i) Source

ii) Process

iii) Anomalies

d) Define cardiac output. What are the determinants of Cardiac output. Discuss how cardiac output is regulated . **(5+5+5= 15)**

3. a) Differentiate between the following pairs: **(8+5+6+6=25)**

i) Liver and Pancreas (microanatomy)

ii) Cutaneous innervation of the dorsal and ventral surface of hand

iii) Microanatomy of the testis and ovary

iv) Microanatomy of lung and placenta

b) Describe the optic pathway under the following headings: **(5+10+3+4+3=25)**

i) Structure of retina and receptor cells

ii) Optic pathway (with the help of a suitable diagram)

iii) Visual areas of the cerebral cortex

iv) Pupillary light reflex

v) Applied aspects

4. a) Mention the biochemical functions of each of the vitamins A, D, E and K and deficiency disorders caused by each of these vitamins. Explain the biochemical/ molecular basis why Vitamin D is called a hormone. **(15+5=20)**

b) Discuss the prehepatic, hepatic and post hepatic causes of jaundice, the underlying mechanisms and one example of disorder for each. **(10)**

c) Describe the steps involved in biosynthesis of thyroid hormones. Explain the mechanism of action of thiourea drugs on thyroid hormone synthesis . Mention two autoimmune disorders associated with the thyroid gland and the biochemical basis for the same. **(10+5+5=20)**

SECTION-B

5. a) Describe the mechanism of action, uses, and adverse effects of: **(3×5=15)**

i) Azithromycin

ii) Amphotericin B

iii) Bedaquiline

b) Discuss the pathogenesis and laboratory diagnosis of HIV? **(8+7=15)**

c) A 30-year-old man presents to the clinic with a 2-week history of fatigue, loss of appetite, and jaundice. He reports recent travel to an endemic area and a history of unprotected sex with multiple partners. Laboratory tests reveal positive HBsAg and elevated liver enzymes. **(5+5+10=20)**

i) What will be the pharmacotherapy in this patient?

ii) What is mechanism of action and adverse effects of Tenofovir?

iii) Describe the role of antiviral therapy in preventing hepatitis B transmission and progression to liver cirrhosis

6. a) **Write short notes on:** **(3×10=30)**

i) Meningococcal meningitis

ii) Pathogenesis of Dengue Hemorrhagic Fever (Halsted's ADE hypothesis)

iii) Herpes Simplex Virus Infection

[Turn Over

b) Define the terms microalbuminuria and proteinuria and name one condition for which each can be used as a marker. **(10)**

c) State the principle of Polymerase Chain Reaction (PCR) and enumerate the medical applications of PCR. **(10)**

7 a) I) A 62-year-old male complained of dyspnoea on walking and climbing stairs for last few weeks. He developed discomfort in chest, epigastric pain radiating to the arm for last two days. In early hours of morning, he was brought to emergency with profuse sweating, and low blood pressure and died within one hour. **(2+4+4=10)**

i) What is your diagnosis?

ii) What is the sequence of morphological changes seen?

iii) Enumerate various complications of this disease

II) A 50-year-old female presented with painless lump in left breast for 6 months, gradually increasing in size. On examination, she was found to have a firm to hard lump fixed to underlying structures and skin. Axillary lymph nodes were palpable. **(1+3+4+2=10)**

i) What is your diagnosis?

ii) Enumerate the etiological factors.

iii) Describe the histopathological types of the lesion.

iv) Name two prognostic factors.

b) I) i) Discuss the pathogenesis of diabetes mellitus. **(5+4+6=15)**

ii) Compare Type 1 and Type 2 Diabetes Mellitus (any 4 differences).

iii) What are the complications of diabetes mellitus?

II) Discuss the etiology, pathogenesis, and histopathology of tuberculosis **(5+5+5=15)**

8. a) Differentiate between: **(4×5=20)**

i) Entry and exit wound of bullet

ii) Hanging and Strangulation

iii) Cholera and Arsenic Toxicity

iv) Incised and Lacerated wound.

b) Discuss Clinical features and management of a case of organophosphorus poisoning. **(10)**

c) Describe in brief **(5+10+5=20)**

i) Management of Opium toxicity

ii) Traumatic Asphyxia

iii) Cadaveric Spasm

Total No. of Printed Pages-3]

CC(M)

PHILOSOPHY

(OPTIONAL)

PAPER - I

[24]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. a) How does Hume distinguish between the 'relation of ideas' and 'the matters of fact'? Discuss. **(10)**

b) Critically discuss Spinoza's notion of Substance and Modes. **(10)**

c) Explain and critically discuss Leibniz's principles of sufficient reason and identity of indiscernibles. **(10)**

d) Present an account of Kant's views on metaphysics and his notion of Copernican revolution as propounded in his Critique of Pure Reason. **(10)**

e) What are according to Descartes 'clear and distinct ideas' and how does he propose to arrive at them? Critically discuss. **(10)**

2. a) What roles do observation and experience on the one hand and reason and contemplation on the other play in Plato's and Aristotle's philosophy respectively? Critically discuss. **(20)**

b) Can one conceptualise qualities as not inherent in the object but instead as powers the object has to produce specific sensations in our minds? Discuss with reference to Locke's views regarding substance and qualities. **(15)**

c) "I do not argue against the existence of any one thing that we can apprehend, either by sense or reflection. The only thing whose existence we deny, is that which philosophers call matter or corporeal substance". Critically discuss this statement with reference to Berkeley's philosophy. **(15)**

3. a) Compare and contrast Hegel's view of 'determinate negation' with Spinoza's view that 'all determination is negation'. **(20)**

b) Present an exposition of Husserl's view of "Philosophy as a Rigorous Science". **(15)**

c) How do the ideas of choice and responsibility play out in the theistic existentialist philosophy of Kierkegaard and atheistic existentialist philosophy of Sartre? Discuss. **(15)**

4. a) How does Wittgenstein's view regarding the relation between the language and the world change from Tractatus to Philosophical Investigations? Critically discuss. **(20)**

b) How does Moore interpret the distinction between the object of experience and the content of experience in his refutation of idealism? Critically discuss. **(15)**

c) "Incomplete Symbols are to be viewed as symbols that take on meaning within appropriate contexts, but that remain meaningless in isolation". Elucidate this statement with reference to Russell's philosophy. **(15)**

SECTION - B

5. a) Present an account of Cārvāka's criticism of *Anumāna* (inference) as a *Pramāṇa* (instrument of knowledge). **(10)**

b) How is the process of evolution and involution explained in Aurobindo's philosophy? Discuss. **(10)**

c) Present a critical account of *Upamāna* (similarity) as a *Pramāṇa* in Classical Indian Philosophy. **(10)**

d) How do Naiyāyikas explain the cases of erroneous cognition? Discuss. **(10)**

e) Explain the nature of *Citta* and *Vṛttis* as per Yoga philosophy. **(10)**

6. a) How are the notions of mind and consciousness conceptualized in Sāṁkhya philosophy? Critically discuss. **(20)**

b) How does Rāmānuja's conceptualisation of Substance and Attributes differ from that of Śaṅkara ? Discuss. **(15)**

c) What are according to the Jainas various causes of bondage? How do they propose to overcome them? Critically discuss. **(15)**

7. a) How do Bhaṭṭas and Prabhākaras differ in their accounts of nature of absence (abhāva) and its knowledge? Critically discuss. **(20)**

b) Present an exposition of Arthāpatti as propounded by the Bhaṭṭas . How is it used in their notion of *jñātatā* (knownness)? Critically discuss. **(15)**

c) Explain the difference between *Saṁyoga* (conjunction) and *Samavāya* (inherence) as per Nyāya-Vaiśeṣika school of Classical Indian Philosophy. **(15)**

8. a) What are the main points of difference between Nyāya and Buddhist theory of inference? Critically discuss. **(20)**

b) Compare and contrast Sāṁkhya's account of *dvaitavāda* (dualism) with that of Madhva's. **(15)**

c) How do Cārvākas explain the relation between body and consciousness without resorting to the idea of soul? Critically discuss. **(15)**

Total No. of Printed Pages-7]

CC(M)

PHYSICS

(OPTIONAL)

PAPER - I

[25]

Time Allowed - Three Hours	*Maximum Marks-250*

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vii) *Non Programmable Calculators are allowed.*

SECTION - A

(5×10=50)

1. a) Vander Waal's constants for a gas are; a = 1.32 litre^{2}atm.mol^{-1}; b = 3.13x10^{-2} litre.mol^{-1}. The gas is stored at temperature 300K and has volume 1.2 litre.mol^{-1}. Find the pressure of the gas. **(10)**

b) On what factors does the resolving power of Fabry-Perot interferometer depend? **(10)**

c) An object is situated at the optical axis of a convex spherical surface. A ray of light starting from the object subtends at an angle of 5^0 with the optical axis and intersects the spherical surface at a height of 2.5 cm. If the radius of curvature of the surface is +5cm while refractive index of the material is 1.5. Find the angle which the refracted ray makes with the optical axis. [tan5^o=0.0875] **(10)**

d) A spaceship moving away from the earth with velocity 0.6c fires a rocket (whose velocity is 0.7 c relative to the spaceship)

(i) away from the earth (ii) towards the earth. What will be the velocity of the rocket, as observed from the earth in the two cases? Another rocket is sent with a velocity 0.9c. a light pulse is also sent along the same path. What is the velocity of the light pulse relative to the rocket? **(10)**

e) A mass *m* suspended from a spring of stiffness *s* executes simple harmonic motion. Set up the differential equation of motion and calculate its time period. If we use a stiffer spring without changing the mass, how will the period of oscillation change? **(10)**

2. a) Explain the terms 'stimulated absorption', 'spontaneous emission' and 'stimulated emission' and hence, define Einstein's coefficients. Derive the relation between them. **(15)**

b) Show that the shear is equivalent to an elongation strain and compression strain at right angles to each other and each is half of shearing angle. **(15)**

c) Find the missing orders in a double slit diffraction pattern. **(10)**

d) A gold wire of diameter 0.32 mm elongates by 1 mm, when stretched by a force of 0.33 kg wt. and twists through one radian when equal and opposite torques of 145 dyne-cm are applied at its ends. Find the Poisson's ratio for gold (given, $g = 9.8 m/s^2$). **(10)**

3. a) Using the system matrix for thin lens, prove the relation $1/v - 1/u = 1/f$ for thin lens by matrix method where u and v are the object distance and image distance respectively from the optical center. Also give the value of linear magnification and angular magnification in terms of the elements of the system matrix. **(20)**

b) Discuss the essential requirements and various steps involved for producing laser action. **(15)**

c) What is meant by spherical aberration? Explain its cause and describe how this effect can be reduced. **(15)**

4. a) Calculate the change in entropy when a gas expands reversibly under (i) adiabatic, (ii) isothermal and (iii) isobaric conditions. **(20)**

b) Using Maxwell's thermodynamic relations, prove that

i) $\left(\partial Cp/\partial p\right)_T = -T\left(\partial^2 v/\partial T^2\right)_p$

$= 0$ for a perfect gas

ii) $C_P - C_v = -T\left(\partial p/\partial v\right)_T \left(\partial v/\partial T\right)^2_p$

Where T is the absolute temperature, C_p is the specific heat at constant pressure, C_v is the specific heat at constant volume. **(20)**

c) Calculate under what pressure ice freezes at 272 K if the change in specific volume when 1 kg of water freezes is $91\times10^{-6}m^3$. Given the latent heat of ice = 3.36×10^5 J kg^{-1}.

(10)

SECTION-B

(5×10=50)

5. a) A zone plate is drawn and then copied on a reduced scale so that the diameter of the central zone is 2mm. If a source of monochromatic light of wavelength, λ=5000 A° is placed 2m from the zone plate, find the position of the primary image and the weaker secondary images. **(10)**

b) Show that all reversible engines working between the same temperature limits will have same efficiency. **(10)**

c) Two polaroids are adjusted so as to obtain maximum intensity. Through what angle should one polaroid be rotated to reduce the intensity to (i) half, (ii) one fourth?

(10)

d) A parallel L-C circuit is connected to an A.C. source of voltage $E=E_0 \sin wt$. Calculate the current in the circuit at any instant. **(10)**

e) The electric and magnetic fields are varying sinusoidally in time t as

$\vec{E} = \vec{E}_0 \sin wt$ and $\vec{H} = \vec{H}_0 \sin wt$.

Show that the average value of Poynting vector is $\langle S\rangle = 1/2\,(\vec{E}_0 \times \vec{H}_0)$. **(10)**

6. a) What are Fermions? Write down the basic postulates of Fermi-Dirac Statistics. Hence, derive an expression for the probability distribution of particles governed by Fermi-Dirac statistics. **(25)**

b) Show that the change in entropy $dS=0$ for a reversible process while $dS>0$ for an irreversible process. **(15)**

c) Define and explain the terms Macrostate and Microstate. Illustrate by distributing four particles in two compartments. **(10)**

7. a) What is Joule Thomson effect? Obtain an expression for change in temperature during JouleThomson effect. Hence, deduce the expression for Joule Thomson coefficient and show that it is zero for a perfect gas. **(25)**

b) Find an expression for fringe width in case of Young's double slit experiment. Prove that the dark and the bright bands are of equal width. **(15)**

c) Explain simultaneity of two events in relativity. Show from Lorentz transformation equations that two events simultaneous at different positions in reference frame S are not generally simultaneous in reference frame S' moving with a velocity, $v\hat{i}$ relative to S. **(10)**

8. a) Derive an expression for the gravitational potential at a point (i) outside, (ii) on the surface and (iii) inside a solid sphere. **(20)**

b) Electric potential at a point is given by $V= x^2y + 2z$. What are the components of electric field at that point? Find the electric field at a point (2,1,2). **(10)**

c) A proton and a deuteron have equal kinetic energies. Compare the radii of their paths when a magnetic field is applied normal to their orbits. **(10)**

d) A particle of mass m moving with a velocity u collides with a target particle of unknown mass initially at rest. If, after the collision, the target particle travels forward with a velocity $u/3$ while the incident particle moves backward with a velocity $2u/3$, find the mass of the target particle. **(10)**

Useful Data

Velocity of light in vacuum c	=	$3 \times 10^{8}\ m/s$
Mass of electron m_e	=	$9.11 \times 10^{-31}\ kg$
Charge of electron e	=	$1.602 \times 10^{-19}\ C$
Specific charge of electron e/m_e	=	$1.76 \times 10^{11}\ C/kg$
$1\ u = 1\ amu = 1.66056 \times 10^{-27}\ kg$	=	$931.5\ MeV/c^2$
Rest mass energy of electron $m_e c^2$	=	$0.511\ MeV$
Permittivity in free space ϵ_0	=	$8.8542 \times 10^{-12}\ C^2/N/m^2$
Permeability in free space μ_0	=	$4\pi \times 10^{-7}\ N/A^2$
Gas constant R	=	$8.314\ J/mol/K$
Boltzman constant k_B	=	1.381×10^{-23} Kg
Planck constant h	=	$6.626 \times 10^{-34}\ Js$
Bohr magneton μ_B	=	$9.274 \times 10^{-24}\ J/T$
Nuclear magneton μ_N	=	$5.051 \times 10^{-27}\ J/T$
Fine structure constant α	=	1/137.03599
Mass of proton M_p	=	$1.0072766\ u = 1.6727 \times 10^{-27}\ kg = 938.3\ MeV$
Mass of neutron M_n	=	$1.0086652\ u = 1.6749 \times 10^{-27}\ kg = 939.6\ MeV$
Mass of deuteron M_d	=	$2.013553\ u$
Mass of α - particle M_α	=	$4.001506\ u$
Mass of ${}^{12}_{6}C$	=	$12.0000000\ u$
Stefan - Boltzmann constant σ	=	$5.7 \times 10^{-8}\ Watt/m^2/K^4$
Mass of sun M_S	=	$1.99 \times 10^{30}\ kg$
Radius of sun R_s	=	$6.96 \times 10^{8}\ m$
Gravitational constant G	=	$6.673 \times 10^{-11}\ Nm^2/kg^2$

Total No. of Printed Pages-3]

CC(M)
POLITICAL SCIENCE AND INTERNATIONAL RELATIONS
(OPTIONAL)
PAPER - I
[26]

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.*

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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. Answer the following in about 150 words each: **(5×10=50)**

a) Examine the various conceptions of equality of opportunity. **(10)**

b) What reasons do behaviouralists present to argue that the concept of the state is unsuitable for political theory? **(10)**

c) 'State is an instrument of power'. Elucidate. **(10)**

d) Explain the significance of Aurobindo's concept of Swaraj. **(10)**

e) Would you consider Ambedkar's Annihilation of Caste a radical democratic act? Provide reasons for your answer. **(10)**

2. a) 'While legal rights provide a framework for individual protection and the limitations of state power, their application and interpretation can raise complex issues.' In the light of the statement, critically examine the theory of legal rights. **(20)**

b) Discuss utilitarian objections to natural rights theory. **(15)**

c) Comment on 'Equality as an idea and driver of social change'. Substantiate with examples. **(15)**

3. a) Describe Aurobindo's conception of freedom. **(20)**

b) Analyse Gandhi's idea of satyagraha. **(15)**

c) 'The doctrine of fascism arose as a theory of reaction to democracy, socialism and communism.' Discuss. **(15)**

4. a) Examine how Plato's allegory of the cave illustrates the relationship between philosophy and politics–not only in his era, but also in the modern world. **(20)**

b) 'Kautilya and Machiavelli offer distinct, yet comparable perspectives on the nature of power, governance and political strategy'. Comment. **(15)**

c) Analyse Gramsci's concept of 'organic intellectuals' in facilitating societal transformation. **(15)**

SECTION - B

5. Answer the following in about 150 words each: **(5×10=50)**

a) Why studying the debates of the Constituent Assembly remains important in today's political environment? Give reasons. **(10)**

b) Explain Hannah Arendt's perspective on totalitarianism. **(10)**

c) Write a note on the National Commission for Scheduled Tribes. **(10)**

d) Describe the procedure for amending the Constitution of India. **(10)**

e) Discuss the role of the Lok Sabha Speaker in deciding the anti-defection cases. **(10)**

6. a) 'Framing of the Indian Constitution was an exercise to balance the circumstantial centralization and long-term imperatives of decentralization.' Examine. **(20)**

b) Democracy is shaped by, and in turn shapes, local social and political relations. In light of this observation, evaluate how caste has influenced and contributed to the democratization of panchayat-level politics. **(15)**

c) 'Implementing Panchayati Raj in India is more a formal procedure than a genuine practice of rural self-governance'. Discuss. **(15)**

7. a) Writing modern Indian history from above is as dangerous as writing "definitive general history from below." In this light, critically assess the various historiographical approaches to narrate India's freedom movement. **(20)**

b) 'Despite the significant progress in reforming the Indian electoral process, there is scope for further improvement'. Comment. **(15)**

c) 'The discretionary powers of the Governor play a significant role in the federal structure and governance of states in India'. Discuss. **(15)**

8. a) Examine the various causes of the agrarian crisis in India and suggest remedies to prevent the recurrence of such a crisis. **(20)**

b) 'Identity politics has played a dominant role in India at the expense of development politics.' Discuss. **(15)**

c) Examine the relationship between the legislature and the executive in India through the lenses of 'ministerial responsibility' and 'administrative accountability'. **(15)**

Total No. of Printed Pages-3]

CC(M)

PSYCHOLOGY

(OPTIONAL)

PAPER - I

[27]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION-A

1. Answer the following questions in about 150 words each . (5×10=50)

a) Discuss the significance of the Receiver Operating Characteristic (ROC) curve in Signal Detection Theory .

b) Discuss the influence of culture on the socialization of children .

c) By giving an example , explain the application of two-way ANOVA as a technique to analyse research data.

d) Compare Skinner's and Chomsky's theories of language development .

e) Critically discuss the concept of 'self-actualization' as given by Abraham Maslow.

2 . a) "The definition of Psychology is contingent upon what school of psychology one subscribes to." Discuss this statement. **(20)**

b) Can cross-cultural variations in cognitive development be explained by Piaget's theory? Give your comments. **(15)**

c) What is meant by 'ultimate attribution error'? Is this phenomenon universal ? **(15)**

3 . a) Compare and contrast Indian and Western perspectives on self. **(20)**

b) In what way does the Gestalt theory of learning differ from the Behaviourist theory of learning? **(15)**

c) Describe the Atkinson -Shiffrin Model of human memory. **(15)**

4. a) Describe factors that facilitate human beings to perceive the third dimension (depth) of objects. **(20)**

b) Discuss the differences between negative reinforcement and punishment . **(15)**

c) Describe important features of the grounded theory approach in psychological research. **(15)**

SECTION-B

5. Answer the following questions in about 150 words each. **(5×10=50)**

a) Describe the significance of the case study method in clinical research .

b) What is meant by eudaimonic well-being? How is it different from hedonistic well-being?

c) Discuss the contribution of Jerome Bruner to the field of perception .

d) What is meant by extrasensory perception?

e) What is the significance of research design?

6. a) Define the concept of attitude. Describe any two theories of attitude change. **(20)**

b) Why is the emotional competence of a worker important for an organization? **(15)**

c) Describe a few techniques to improve memory. **(15)**

7. a) How does the psychoanalytic approach enrich our understanding of human personality. Discuss the contributions of any one Neo-Freudian. **(20)**

b) Describe a model of communication. **(15)**

c) Discuss the contributions of the theory of multiple intelligences in the field of education. **(15)**

8. a) What is meant by problem statement? What are the processes involved in developing a sound problem statement? **(20)**

b) In what way is human memory different from storing information in an electronic device? **(15)**

c) Describe the significance of projective tests in the field of clinical psychology. **(15)**

Total No. of Printed Pages-4]

CC(M)

PUBLIC ADMINISTRATION

(OPTIONAL)

PAPER - I

[28]

Time Allowed - Three Hours

Maximum Marks-250

INSTRUCTIONS

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SECTION - A

1. Answer the following questions in roughly 150 words each: **(5×10=50)**

a) What are paradigms mentioned by Nicholas Henry in his book 'Public Administration and Public Affairs' regarding the evolution of public administration as an academic discipline? Briefly discuss. **(10)**

b) Examine Herbert Simon's decision-making theory with special reference to the concept of 'bounded rationality'. **(10)**

c) 'The Hawthorne experiments proved that men are not atomistic creatures but are motivated by a variety of factors and are influenced by their social environment'. In the light of the above statement, briefly discuss Elton Mayo's theory of Human Relations. **(10)**

d) F.W. Riggs work has contributed immensely in redefining boundaries of the discipline of public administration. In this context critically examine Riggs ecological approach for developing societies. **(10)**

e) Explain Frederick Herzberg 'two factor theory of motivation' that contributed to a better understanding of job satisfaction. **(10)**

2. a) 'Globalization in recent times is challenged by protectionism and far right populism.' Comment. **(20)**

b) Analyse the need for a sound budgeting system. Briefly explain the Programme Planning Budgeting system. **(15)**

c) What do you understand by the term delegation? Examine how it is different from decentralization by giving suitable examples. **(15)**

3. a) Changing character of media is a cause of concern due to increasing corporatization. Give your views on electronic media and its impact on shaping public policy in the contemporary times. **(20)**

b) Discuss the evolving trends that define a major shift in the nature and character of global economy today with reference to the imposition of new tariff regimes by strong states like USA. How does it impact the trade and markets in the Global South? Explain. **(15)**

c) Public policy is shaped through multiple actors, institutions, and processes based on societal needs. In the light of the above statement, discuss the various stages of public policy process in India. **(15)**

4. a) Ethics, efficiency and empowerment of citizens are the hallmarks of an ideal model of administration. Discuss the above three values of administration in the context of good governance. **(20)**

b) New Public Management represents Neo-Taylorism philosophy with innovative and quasi -global paradigms that substitute traditional old public administration. Elaborate. **(15)**

c) Authority is an important concept in public administration. Discuss the types of authority identified by the German sociologist Max Weber. What is the difference between authority and power? Explain. **(15)**

SECTION - B

5. Answer the following questions in roughly 150 words each: (5×10=50)

a) The World Bank first used the concept of good governance in a Report on Sub-Saharan Africa 'From crisis to sustainable growth' in 1989. Critically discuss the elements of good governance as devised by the World Bank in the context of India. **(10)**

b) What are the Administrative Tribunals? Discuss their significance and limitations in the context of delivering administrative justice. **(10)**

c) What do you understand by bureaucratic neutrality? Why is it essential for the bureaucracy to maintain neutrality in administration and governance? Discuss. **(10)**

d) The Finance Commission is described as one of the significant constitutional bodies. In this context, briefly examine the role and functions of the Finance Commission in Indian federal system. **(10)**

e) How critical it is to focus on human resource development in the administrative mechanisms adopted by any organization. Give reasons to justify your answer. **(10)**

6. a) Discuss the philosophical underpinnings of Right to Information (RTI) in democracy. How do you explain the significance of RTI in India since its inception in 2005? **(20)**

b) Do you agree that state sovereignty has declined in a globalized world? Critically examine this statement in the context of contemporary international political economy. **(15)**

c) What do you understand by Citizens' Charter? Explain the various factors responsible for the evolution of Citizens' Charter. **(15)**

7. a) How do the Women Self-Help groups (WSHGs) contribute towards the livelihood opportunities and financial inclusion of rural women in India. Elaborate your answer with suitable examples. **(20)**

b) Examine the recruitment policy of the Indian civil services. Does it address the needs of the changing times in so far as societal needs and economic expediencies are concerned? **(15)**

c) Discuss the contribution of Civil Society Organizations (CSOs) towards strengthening democratic governance and ensuring accountability. **(15)**

8. a) Briefly examine the legislative mechanisms to make the executive accountable and answerable in a democratic system. **(20)**

b) Discuss the main features of public grievance redressal mechanisms that India has adopted for enforcing responsibility in administration. **(15)**

c) 'Modern states are using e-governance to provide smart governance through efficient delivery of public services and civic engagement.' In the light of the above statement, briefly explain the concept of e-governance and discuss the key features of the Digital India Mission . **(15)**

Total No. of Printed Pages-3]

CC(M)

PUNJABI

(OPTIONAL)

PAPER - I

[36]

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 Punjabi. 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 Punjabi in Question-Cum-Answer(QCA) Booklet in the space provided.*

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SECTION - A

ਪ੍ਰਸ਼ਨ: 1 (ੳ) ਮਲਵਈ ਉਪ ਭਾਸ਼ਾ ਦੇ ਖੇਤਰ ਸੰਬੰਧੀ ਚਰਚਾ ਕਰਦੇ ਹੋਏ ਇਸ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ 'ਤੇ ਚਾਨਣਾ ਪਾਉ। **(10)**

(ਅ) ਪੰਜਾਬੀ ਕਿਰਿਆ ਵਾਕੰਸ਼ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਇਸ ਦੇ ਵਰਗੀਕਰਨ ਬਾਰੇ ਸਪੱਸ਼ਟ ਕਰੋ। **(10)**

(ਏ) ਵਿਅੰਜਨ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਵਿਅੰਜਨ ਧੁਨੀਆਂ ਦੇ ਵਰਗੀਕਰਨ 'ਤੇ ਸੰਖੇਪ ਨੋਟ ਲਿਖੋ। **(10)**

(ਸ) ਵਚਨ ਤੋਂ ਕੀ ਭਾਵ ਹੈ? ਇਹ ਕਿੰਨੀ ਪ੍ਰਕਾਰ ਦੇ ਹਨ? ਪੰਜਾਬੀ ਵਿੱਚ ਵਚਨ ਪਰਿਵਰਤਨ ਦੇ ਕੀ ਨਿਯਮ ਹਨ? **(10)**

(ਹ) ਸ਼ੁਡ਼ੀਮੱਤ ਅਨੁਸਾਰ ਸ਼ੁਡ਼ੀ ਸਾਧਕ ਦੇ ਰਹੱਸਵਾਦੀ ਅਨੁਭਵ ਦੇ ਅਧਿਆਤਮਕ ਪਡ਼ਾਵਾਂ ਸੰਬੰਧੀ ਚਰਚਾ ਕਰੋ। **(10)**

ਪ੍ਰਸ਼ਨ: 2 (ੳ) ਭਾਸ਼ਾ ਅਤੇ ਉਪਭਾਸ਼ਾ ਨੂੰ ਪਰਿਭਾਸ਼ਿਤ ਕਰਦੇ ਹੋਏ ਇਹਨਾਂ ਦੇ ਅੰਤਰ ਸਬੰਧ ਉੱਤੇ ਵਿਸਥਾਰ ਨੋਟ ਲਿਖੋ। **(20)**

(ਅ) ਵਾਰ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦਿੰਦੇ ਹੋਏ ਇਸ ਦੇ ਲੱਛਣਾਂ ਬਾਰੇ ਵਿਸਤਾਰ ਸਹਿਤ ਚਰਚਾ ਕਰੋ। **(15)**

(ਏ) ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਬਾਰੇ ਦੱਸਦੇ ਹੋਏ ਇਹਨਾਂ ਦੀਆਂ ਕਿਸਮਾਂ 'ਤੇ ਸੰਖੇਪ ਚਾਨਣਾ ਪਾਓ। **(15)**

ਪ੍ਰਸ਼ਨ: 3 (ੳ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਗੁਰਮੁਖੀ ਲਿਪੀ ਕਿਵੇਂ ਉਚਿਤ ਹੈ ? ਭਰਪੂਰ ਚਰਚਾ ਕਰੋ। **(20)**

(ਅ) ਸ਼੍ਰੀ ਗੁਰੂ ਗ੍ਰੰਥ ਸਾਹਿਬ ਵਿਚ ਕਿੰਨ੍ਹੇ ਗੁਰੂਆਂ ਦੀ ਬਾਣੀ ਦਰਜ ਹੈ? ਗੁਰੂਆਂ ਦੁਆਰਾ ਰਚੀ ਬਾਣੀ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਦੱਸੋ। **(15)**

(ਏ) ਵਧੇਤਰ ਨੂੰ ਪਰਿਭਾਸ਼ਿਤ ਕਰਦੇ ਹੋਏ ਅਗੇਤਰ, ਪਿਛੇਤਰ ਅਤੇ ਮਧੇਤਰ ਸਬੰਧੀ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਨੋਟ ਲਿਖੋ। **(15)**

ਪ੍ਰਸ਼ਨ: 4 (ੳ) ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਉਤਪਤੀ ਅਤੇ ਵਿਕਾਸ ਸੰਬੰਧੀ ਸੰਖੇਪ ਜਾਣਕਾਰੀ ਦਿਓ। **(20)**

(ਅ) ਪੰਜਾਬੀ ਨਾਥ ਜੋਗੀ ਸਾਹਿਤ ਬਾਰੇ ਜਾਣਕਾਰੀ ਦਿੰਦੇ ਹੋਏ ਗੋਰਖ ਨਾਥ ਅਤੇ ਚਰਪਟ ਨਾਥ ਉਤੇ ਨੋਟ ਲਿਖੋ । **(15)**

(ਏ) ਤਤਸਮ ਅਤੇ ਤਦਭਵ ਸ਼ਬਦਾਂ ਦੀ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਪਰਿਭਾਸ਼ਾ ਦਿਓ। **(15)**

SECTION - B

ਪ੍ਰਸ਼ਨ: 5 (ੳ) ਹਰਿਭਜਨ ਸਿੰਘ ਦੇ ਜੀਵਨ ਅਤੇ ਕਾਵਿ ਰਚਨਾ ਸੰਬੰਧੀ ਸੰਖੇਪ ਜਾਣਕਾਰੀ ਦਿਉ। (10)

(ਅ) ਲੋਕ ਗੀਤ ਤੋਂ ਕੀ ਭਾਵ ਹੈ? ਇਨ੍ਹਾਂ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ 'ਤੇ ਚਾਨਣਾ ਪਾਉ। (10)

(ਏ) ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ ਦੇ ਜੀਵਨ ਅਤੇ ਵਿਚਾਰਧਾਰਾ ਸੰਬੰਧੀ ਵਿਚਾਰ ਚਰਚਾ ਕਰੋ। (10)

(ਸ) ਪੰਜਾਬੀ ਸਾਹਿਤ ਉੱਤੇ ਪਏ ਫ਼ਾਰਸੀ ਪ੍ਰਭਾਵਾਂ ਸੰਬੰਧੀ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਚਰਚਾ ਕਰੋ। (10)

(ਹ) ਹਰਚਰਨ ਸਿੰਘ ਨੇ ਆਪਣੇ ਨਾਟਕਾਂ ਵਿਚ ਕਿਸ ਕਿਸਮ ਦੀਆਂ ਸਮਾਜਕ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਪੇਸ਼ ਕੀਤਾ? ਉਦਾਹਰਨ ਸਹਿਤ ਦੱਸੋ। (10)

ਪ੍ਰਸ਼ਨ: 6 (ੳ) "ਗੁਰਬਖ਼ਸ਼ ਸਿੰਘ ਨੇ ਨਾ ਕੇਵਲ ਪੰਜਾਬੀ ਵਾਰਤਕ ਨੂੰ ਉੱਤਮ ਸ਼ੈਲੀ ਹੀ ਪ੍ਰਦਾਨ ਕੀਤੀ ਸਗੋਂ ਨਵੇਂ ਨਿਵੇਕਲੇ ਵਿਸ਼ੇ ਵੀ ਲਿਆਂਦੇ"। ਚਰਚਾ ਕਰੋ। (20)

(ਅ) ਸੁਰਜੀਤ ਪਾਤਰ ਦੇ ਕਾਵਿ ਜਗਤ ਸੰਬੰਧੀ ਜਾਣਕਾਰੀ ਦੰਦੇ ਹੋਏ ਇਸ 'ਤੇ ਵਿਸਥਾਰ ਨੋਟ ਲਿਖੋ। (15)

(ਏ) ਅਖਾਣ ਤੋਂ ਕੀ ਭਾਵ ਹੈ? ਇਨ੍ਹਾਂ ਦੀ ਸਮਾਜਕ ਅਤੇ ਸਭਿਆਚਾਰਕ ਮਹੱਤਤਾ 'ਤੇ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਚਾਨਣਾ ਪਾਉ। (15)

ਪ੍ਰਸ਼ਨ: 7 (ੳ) ਜਸਵੰਤ ਸਿੰਘ ਨੇਕੀ ਮਨੋਵਿਗਿਆਨਕ ਕਾਵਿ ਧਾਰਾ ਦਾ ਕਵੀ ਮੰਨਿਆ ਜਾਂਦਾ ਹੈ। ਇਸ ਕਥਨ ਨੂੰ ਮੁਖ ਰੱਖਦਿਆਂ ਨੇਕੀ ਦੀ ਕਵਿਤਾ ਨਾਲ ਜਾਣ ਪਛਾਣ ਕਰਵਾਉ। (20)

(ਅ) ਪ੍ਰਗੀਤ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੰਦੇ ਹੋਏ ਸ਼ਿਵ ਕੁਮਾਰ ਦੀ ਪੰਜਾਬੀ ਪ੍ਰਗੀਤ ਕਾਵਿ ਨੂੰ ਦੇਣ ਉੱਤੇ ਰੋਸ਼ਨੀ ਪਾਓ। (15)

(ਏ) ਨਾਵਲਕਾਰ ਗੁਰਦਿਆਲ ਸਿੰਘ ਦਾ ਪੰਜਾਬੀ ਨਾਵਲ ਵਿਚ ਸਥਾਨ ਨਿਸ਼ਚਿਤ ਕਰੋ। (15)

ਪ੍ਰਸ਼ਨ: 8 (ੳ) ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ ਨੇ ਆਪਣੇ ਨਾਵਲਾਂ ਵਿਚ ਨਾਰੀ ਵੇਦਨਾ, ਨਾਰੀ ਸੰਵੇਦਨਾ ਅਤੇ ਨਾਰੀ ਚੇਤਨਤਾ ਨੂੰ ਚਿਤਰਨ ਦੀ ਕੋਸ਼ਿਸ਼ ਕੀਤੀ ਹੈ। ਉਸ ਦੇ ਨਾਵਲਾਂ ਨੂੰ ਆਧਾਰ ਬਣਾ ਕੇ ਚਰਚਾ ਕਰੋ। (20)

(ਅ) "ਪ੍ਰੋ. ਕਿਸ਼ਨ ਸਿੰਘ ਨੇ ਮੱਧਕਾਲੀ ਕਾਵਿ ਰੂਪਾਂ ਕਿੱਸਾ, ਗੁਰਬਾਣੀ ਅਤੇ ਸੂਫ਼ੀ ਕਾਵਿ ਦੀ ਨਵੇਂ ਸਿਰੇ ਤੋਂ ਵਿਆਖਿਆ ਕੀਤੀ ਹੈ।" ਚਰਚਾ ਕਰੋ। (15)

(ਏ) ਮਹਾਕਾਵਿ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਅਵਤਾਰ ਸਿੰਘ ਆਜ਼ਾਦ ਦੇ ਲਿਖੇ ਮਹਾਕਾਵਿ 'ਤੇ ਵਿਸਥਾਰ ਨੋਟ ਲਿਖੋ। (15)

Total No. of Printed Pages-3]

CC(M)

SOCIOLOGY

(OPTIONAL)

PAPER - I

[29]

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

1. Answer the following questions in about 150 words each. (5×10=50)

a) What is 'objectivity' in social sciences? **(10)**

b) Critically analyse the concept of "Gender" as a social construct. **(10)**

c) What is 'animism' and 'totemism'? **(10)**

d) Define socioeconomic mobility. **(10)**

e) Discuss manifest and latent functions with suitable examples. **(10)**

2. a) Karl Marx argued that "Political power is exercised by those who own the means of production". Critically analyse the statement. **(20)**

b) Discuss the scope of sociology in contrast with history. **(15)**

c) What are the major agents of social change in society? Examine the concept of 'social change' through the help of sociological theory. **(15)**

3. a) Critically evaluate the difference between reliability and validity in research. **(20)**

b) What is the main idea of the functionalist theory of stratification? **(15)**

c) What is "fictive kinship" and how it is different from kinship defined through 'lineage system' ? **(15)**

4. a) Critically analyse Durkheim's view on the social role of religion. **(20)**

b) What are the steps involved in conducting research process in "Sociology"? **(15)**

c) What is the concept of "Power Elite" ? Discuss its relevance in contemporary times. **(15)**

SECTION-B

5. Answer the following questions in about 150 words each. (5×10=50)

a) Discuss the relation between education and social change. **(10)**

b) What is a hypothesis in social science research? **(10)**

c) What is ontology and epistemology? **(10)**

d) Critically analyse the relationship between "media" and "social change". **(10)**

e) Discuss the concept of "Social exclusion" with suitable examples. **(10)**

6. a) Critically analyse the concept of "*commodity fetishism*" as developed by Karl Marx. **(20)**

b) How did Mead explain the development of the *'self'*? **(15)**

c) What is dependency theory? Illustrate with suitable examples. **(15)**

7. a) In what ways has technology reshaped the nature of "work" and "social life"? **(20)**

b) How has the organization of work changed over time? **(15)**

c) What is "sampling"? What is difference between probability and non-probability sampling? **(15)**

8. a) Critically analyse Max Weber's concept of the *'Iron Cage'* in relation to modern bureaucracy. **(20)**

b) What is the difference between structured and unstructured interviews in social science research? **(15)**

c) Analyse the concepts of 'citizenship' and 'democracy' in relation to Indian state. **(15)**

CC(M)
URDU
(OPTIONAL)
(LITERATURE)
PAPER - I
[37]

[Maximum Marks - 250]

[Time Allowed - Three 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 اُردو میں ہی مطلوب ہیں۔

۶۔ سوالات کے جوابات کے لیے 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 پر مختصر تنقیدی نوٹ (100 الفاظ میں) لکھئے۔ (5×10=50)

(الف) جدید ہند آریائی دور (10)

(ب) اردو کی ابتدا کا عصری لسانی پس منظر (10)

(ج) کھڑی بولی اور اردو زبان (10)

(د) مغربی ہندی اور اس کی بولیاں (10)

(ہ) اردو کے آغاز وارتقا میں مشترکہ تہذیب کا کردار (10)

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

(الف) اُردو زبان کے آغاز وارتقا سے متعلق مسعود حسین خاں کے نظریے کی اہمیت (200 الفاظ میں) (20)

(ب) اردو زبان پر عربی وفارسی کے اثرات کی نوعیت (150 الفاظ میں) (15)

(ج) اردو اور ہندی کی مشترک لسانی بنیادیں (150 الفاظ میں) (15)

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

(الف) دکنی اُردو کے لسانی امتیازات (200 الفاظ میں) (20)

(ب) دکن میں اُردو زبان کا آغاز وارتقا (150 الفاظ میں) (15)

(ج) دکنی اردو کی لفظیات پر مقامی زبانوں کے اثرات (150 الفاظ میں) (15)

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

(الف) دبستانِ دکن اور اردو زبان وادب (200 الفاظ میں) (20)

(ب) عادل شاہی دور میں اردو (150 الفاظ میں) (15)

(ج) 'سب رس' کی نثر (150 الفاظ میں) (15)

SECTION - B

5. درجِ ذیل پر مختصر تنقیدی نوٹ (100 الفاظ میں) لکھئے۔ (5×10=50)

(الف) اردو میں مثنوی نگاری کے روایت (10)

(ب) دبستانِ لکھنؤ کی امتیازی خصوصیات (10)

(ج) اُردو میں مرثیہ نگاری کی روایت (10)

(د) غالبؔ کی مکتوب نگاری (10)

(ہ) اردو میں جدید نظم کا آغاز وارتقا (10)

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

(الف) اردو میں ناول نگاری (200 الفاظ میں) (20)

(ب) اردو میں ڈراما نگاری (150 الفاظ میں) (15)

(ج) سرسیدؔ تحریک اور اردو ادب (150 الفاظ میں) (15)

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

(الف) انشائیے کا فن (200 الفاظ میں) (20)

(ب) اردو میں سوانح نگاری (150 الفاظ میں) (15)

(ج) اردو میں افسانہ نگاری (150 الفاظ میں) (15)

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

(الف) محمد حسین آزاد کی نثری خدمات (200 الفاظ میں) (20)

(ب) الطاف حسین حالؔی کی تنقید نگاری (150 الفاظ میں) (15)

(ج) اردو ادب پر جدیدیت کے اثرات (150 الفاظ میں) (15)

Total No. of Printed Pages-3]

CC(M)

ZOOLOGY

(OPTIONAL)

PAPER - I

[31]

Time Allowed - Three Hours | ***Maximum Marks-250***

INSTRUCTIONS

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SECTION-A

1. Answer the following in about 150 words each. **(5×10=50)**

a) Explain the structure and mechanism of action of cnidarian nematocysts. **(10)**

b) Write a note on biological clocks. **(10)**

c) Why is Onychophora considered a "missing link" between Annelida and Arthropoda? **(10)**

d) Differentiate between phase contrast and fluorescence microscopy **(10)**

e) Write the parasitic adaptations of pork tapeworm. **(10)**

2. a) Describe the types of dentition found in mammals. Explain, with diagrams, the adaptations of teeth in relation to feeding habits in different mammalian groups, with suitable examples. **(20)**

b) Discuss the causative virus of AIDS, its modes of transmission, and current strategies for prevention and control. Why is public awareness critical in managing this disease? **(15)**

c) Give a brief account of origin of reptiles. **(15)**

3. a) Give a detailed account of the social organization of any one eusocial insect. **(20)**

b) What is ozone layer? Explain the mechanism of degradation of ozone layer and its possible consequences. **(15)**

c) Describe the life cycle, nature of damage, and control measures of *Pyrilla perpusiella.* How does it impact crop yield and quality? **(15)**

4. a) Describe the process of ecological succession. Differentiate between primary and secondary succession with suitable examples. How does succession lead to the formation of a climax community? **(20)**

b) Explain the structure, types, and function of skeletal elements in Porifera. Discuss their role in classification and their adaptive significance. **(15)**

c) Outline the causative organism, symptoms and transmission routes of *any two* common helminthic diseases in cattle. Mention their effective control and treatment methods. **(15)**

SECTION-B

5. Answer the following in about 150 words each:

a) Explain the characteristics and evolutionary significance of Bipinnaria larva. **(10)**

b) Describe the principle, working and applications of spectrophotometry. **(10)**

c) Explain the ecological importance of ecotones, using suitable examples to illustrate edge effects. **(10)**

d) What is sign stimulus? Explain, with suitable examples, its role in triggering instinctive behaviour. **(10)**

e) Explain the role of vermiculture in organic waste management. How does it contribute to soil fertility and sustainable agriculture? **(10)**

6. a) Discuss how structural modifications in the respiratory systems of aquatic and terrestrial vertebrates support efficient respiration. **(20)**

b) Describe, with suitable examples, morphological, physiological and behavioural adaptations that enable organisms to survive in deserts. **(15)**

c) Write a detailed account of diurnal and nocturnal migration in birds. **(15)**

7. a) Describe the various hormones secreted by pituitary gland and their role in humans. Add a note on the feedback mechanisms of hormonal regulation. **(20)**

b) Describe the role of prenatal diagnosis in the prevention of genetic diseases. What are the commonly used techniques for detecting genetic abnormalities in the fetus? **(15)**

c) Discuss the role of remote sensing technology in monitoring and managing wildlife populations in India. **(15)**

8. a) Compare the general features and life histories of *Monocystis* and *Leishmania.* How are these adaptations related to their parasitic lifestyle? **(20)**

b) With the help of a labelled diagram, describe the major parts of the mammalian ear involved in auditory perception and equilibrium. **(15)**

c) What is the Chi-square test? Describe its application in testing the goodness of fit and independence of attributes. Illustrate with a suitable example. **(15)**
