Total No. of Printed Pages-3]

CC(M)

AGRICULTURE

(OPTIONAL)

PAPER - I

[07]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

1. a) Explain the strategies and techniques for the sustainable management and conservation of natural resources. **(10)**

b) Why Kyoto Protocols and Paris Agreement are considered as the cornerstones of international action for combating climate change? **(10)**

c) How can the marketing management strategies and market intelligence make agriculture a more viable proposition? **(10)**

d) What initiatives the Government has taken in recent years to evolve pulse production in India? **(10)**

e) How can artificial intelligence, machine learning and information & communication technological innovations revolutionise Indian agriculture? **(10)**

2. a) How is the soil and environmental pollution becoming an alarming threat to the existence of life? Discuss soil and environmental pollution mitigation strategies. **(20)**

b) Discuss the current status and prospects of organic and natural farming in India? **(15)**

c) What are the causes of forests degradation and its consequences? What strategies should be adopted to protect forests from threats? **(15)**

3. a) Why plant nutrients' use efficiency is low? Discuss the implications and measures to improve low nutrient use efficiency. **(20)**

b) What weed management practices should be adopted for grasslands and forage crops to tackle the problem of fodder scarcity? **(15)**

c) Why the soils formed from the similar parent material differ in their properties? **(15)**

4. a) How integrated watershed management approach can be helpful in efficient utilization of natural resources for livelihood security and environmental sustainability? **(20)**

b) Discuss the techniques of precision water management for enhancing water and crop productivity. **(10)**

c) How agricultural price policy can ensure decent income to farmers, encourage rural development, prevent farmers' exploitation and maintain food security? **(10)**

d) How can Krishi Vigyan Kendras, state extension agencies and non- governmental agencies play a crucial role for rural development and bridging the gap between agricultural research and practice? **(10)**

SECTION - B

5. a) How do Remote Sensing and Geographic Information Systems complement each other in ecosystem analysis, environmental monitoring and management? **(10)**

b) What is the current status of oil seed production in India and what are the main challenges and opportunities for the oil industry? **(10)**

c) What are the major forest products and how can they be sustainably utilized for economic growth while preserving forest ecosystems? **(10)**

d) What are the advantages and challenges of using biofertilizers in agriculture to improve soil health and crop productivity? **(10)**

e) What are the key components of farm management and planning and how can the data analytics be capitalised to optimize agricultural output while ensuring long-term viability? **(10)**

6. a) What are the components of integrated farming system and how can diversified agriculture contribute to sustainable agriculture, improved resource utilization and enhanced rural livelihoods? **(20)**

b) What are the soil related problems affecting agricultural production and what innovative techniques can be employed to sustain soil health? **(20)**

c) What are the main challenges faced by the farmers in dryland areas and what are the strategies for enhancing resilience and productivity in dryland agriculture? **(10)**

7. a) What are the effective and sustainable methods for weed management in inorganic and organic agriculture? **(20)**

b) What are the criteria of judging irrigation water quality and how can the poor quality water be improved for agricultural use? **(15)**

c) What are the contributions of agricultural cooperatives to economic development, sustainability and resilience of rural farming communities? **(15)**

8. a) What are the benefits and challenges associated with crop insurance and how can it be effectively utilized to mitigate risks in agriculture? **(20)**

b) What are the effective methods for implementing agricultural extension services for technology dissemination and fostering sustainable development? **(15)**

c) How do the agricultural practices in landholding sizes differ and affect local agricultural economy? How does survey of diverse farming and labouring groups influence policy making? **(15)**

Total No. of Printed Pages-3]

CC(M)

ANIMAL HUSBANDRY AND VETERINARY SCIENCE

(OPTIONAL)

PAPER - I

[09]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. a) Explain in detail the layout of a dairy farm for 100 dairy cows with different partitions and requirements. **(20)**

b) Explain the use of non-protein nitrogenous compounds in ruminant ration. Comment why the same cannot be used in the ration of non-ruminants. **(10)**

c) Discuss gaseous exchange in birds. How does it affect flight and thermoregulation? **(10)**

d) Inbreeding depression and heterosis are tools in hands of a breeder. Justify. **(10)**

2. a) Describe the most used diluents along with their properties and composition for cryopreservation of cattle bull semen. **(20)**

b) Explain different steps to be followed for organizing a rural programme on prevention of Foot and Mouth Disease among livestock. **(10)**

c) Highlight the importance of iodine in regulating normal physiology in ruminants. How does its deficiency and toxicity affect ruminants? **(10)**

d) Explain principles, assumptions and applications of Hardy Weinberg Law. **(10)**

3. a) Discuss anti-nutritional factors, their potential risks of toxicity and measures to alleviate them from the diet. **(20)**

b) Explain the structure and role of ATP in biological systems. **(10)**

c) What are lethal genes? Describe their effect on population and strategy for their elimination. **(10)**

d) What is precision livestock farming. Discuss advantages of precision livestock farming. **(10)**

4. a) Who is a key communicator? Describe various techniques to select a key communicator. **(20)**

b) Explain epistasis and dominance in detail with suitable examples. **(10)**

c) Describe the transport of proteins and steroid hormones. Explain the hormone cell interaction. **(10)**

d) Explain different methods to increase the bypass protein in feed of dairy animals. **(10)**

SECTION - B

5. a) Enlist clotting factors. Discuss intrinsic and extrinsic pathway of blood circulation. Comment why new borns are susceptible to bleeding disorders? **(20)**

b) Explain the procedure of forced moulting in layers. **(10)**

c) Explain the role of animals in contemporary society? **(10)**

d) What is genetic code? Explain its properties. **(10)**

6. a) Describe the renal clearance in detail. What are the essential components of the bicarbonate - phosphate buffer system for maintaining acid-base balance? **(20)**

b) Explain the following **(2×5=10)**

i) Least cost feed formulation

ii) Pelleting of feed.

c) Explain the measures to enhance post-thaw sperm motility in buffalo semen. **(10)**

d) What are recurring costs. Explain the same in broiler production. **(10)**

7. a) Describe the role and functions of milk replacer and calf starter. **(20)**

b) Describe oxygen transport. What is Oxygen-Hemoglobin Dissociation Curve? **(10)**

c) Explain the following **(2×5=10)**

i) Livestock Insurance Scheme

ii) Animal Husbandry Infrastructure Development Fund.

d) Define the leguminous and non-leguminous fodders with suitable examples. Which type of fodder is used for silage making and why? **(10)**

8. a) Explain in detail the impact of climate change on livestock production and its mitigation strategies. **(20)**

b) Explain the following **(2×5=10)**

i) Ideal Protein

ii) Biuret

c) Why record keeping is important in livestock farms? Briefly explain the various records to be kept in a commercial dairy farm. **(10)**

d) Explain the factors affecting farmer's group cohesiveness. **(10)**

Total No. of Printed Pages-3]

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

Time Allowed - Three Hours	*Maximum Marks-250*

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Total No. of Printed Pages-3]

CC(M)

ANTHROPOLOGY

(OPTIONAL)

PAPER - I

[11]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION-A

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

1. a) Cultural Materialism **(10)**
   b) Edmund Leach **(10)**
   c) Neo Animism **(10)**
   d) Recent advancement in linguistic anthropology **(10)**
   e) Ruth Benedict **(10)**

2. a) What are the distinctive features of an anthropological imagination? Why is anthropology seen as a bridge between sciences and humanities? **(20)**
   b) Describe the method of structural analysis of myths. **(15)**
   c) Explain the logic of sharing and co-operation in Band type of social organisation with suitable examples. **(15)**

3. a) Discuss the impact of feminist movements in concept of family and marriage as an institution. **(20)**
   b) What is cognatic descent? What are the different types of cognatic descent groups and their significance as survival strategy? **(15)**
   c) Explain the significance of evolutionary biology in understanding human behaviour. **(15)**

4. a) Define the term 'sustainable livelihood framework'. How is the concept important to understand tribal economic organisation in India? **(20)**
   b) Discuss the relevance of the concept 'development cycle of domestic group.' What are the different variables that influence it? **(15)**
   c) Give a brief review of benefits and limitations of various rapid ethnographic methods. **(15)**

SECTION-B

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

5. a) Demographic Transition **(10)**
   b) Neanderthals **(10)**
   c) Contribution of Jane Goodall in studying Primate behaviour. **(10)**
   d) Nutritional anthropology. **(10)**
   e) Gene mapping and Human diseases. **(10)**

6. a) Compare and contrast the anatomical features of Human and Apes. **(20)**
   b) Differentiate between Human Growth and Development. Discuss various methods of studying human growth. **(15)**
   c) Discuss the salient features of upper palaeolithic culture in India. **(15)**

7. a) Discuss the Bio-cultural adaptation to high altitude among human population. **(20)**

b) Describe various autosomal abnormalities of chromosomes in humans. **(15)**

c) Describe the biological basis of racial classification. **(15)**

8. a) Discuss the causes for early menarche and late onset of menopause in women. **(20)**

b) Are the non-communicable diseases increasing in Indian populations. Discuss your answer with suitable examples. **(15)**

c) Give an account of practical applications of anthropometry. **(15)**

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(10)

Total No. of Printed Pages-3]

CC(M)

BOTANY

(OPTIONAL)

PAPER - I

[13]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

Write short notes on: **(5×10=50)**

1. a) Prions

b) Importance of Botanical gardens

c) Cycadofilicales

d) Mycotoxins

e) Apomixis

2. a) What is alternation of generation? Discuss, with relevant examples and suitable diagrams the haplontic, diplontic and triphasic diplobiontic life cycle in algae. **(20)**

b) Discuss the process of embryogenesis in dicots. Enlist the key genes and their functions involved in embryogenesis. **(15)**

c) How can disease forecasting help in mitigating the adverse effects of climate change. According to you, which all parameters should be considered to design a good climate model for sustainable agriculture? **(15)**

3. a) 'Structure and function in plants is closely coordinated'. Justify the statement with reference to C3 and C4 plants. **(20)**

b) Define biocontrol agents. Discuss with suitable examples their mode of action and relevance in agriculture. **(15)**

c) How is the fruit of Mustard different from that of Wheat and Banana. Enumerate the diagnostic features, floral formulae and diagram of the families to which these two plants belong. **(15)**

4. a) Trace the history of domestication of any two important crop plants. Trace the journey and spread of potato and tomato. **(20)**

b) Define totipotency. How is it different from pluripotency? Discuss with suitable examples any four applications of totipotency. **(15)**

c) Discuss the physiological and molecular response of plants to pathogen attack. Elaborate upon the role played by the hormones involved in plant defense? **(15)**

SECTION - B

Write short notes on the following: **(5×10=50)**

5. a) Pseudoalleles

b) Intellectual Property Rights

c) Polyploidy in plants

d) Tests of significance

e) Signal hypothesis

6. a) 'The introduction of transgenic crops in fields has been a much-debated issue'. Discuss your views on the same. Give scientific evidence in support of your answer. **(20)**

b) Discuss the salient features and importance of DNA packaging in eukaryotes. What advantages does it have over that in prokaryotes? Explain with help of well-labelled diagrams. **(15)**

c) 'The duration as well as quality of light plays a significant role in plant growth and development'. Discuss the role of phytochrome in mediating light mediated responses in plants. **(15)**

7. a) Trace the development of the technique of DNA sequencing. How has the application of this technique revolutionized medicine and agriculture. **(20)**

b) Describe any two pathways involved in the production of secondary metabolites in plants. Discuss the relevance of secondary metabolites to plants. **(15)**

c) What is Emerson enhancement effect. How did it contribute to the modern understanding of photosynthesis. Describe the Z-scheme of photosynthesis. **(15)**

8. a) Enlist and describe the different characters used to define a plant community. How can these be used in conservation of plants? **(20)**

b) Mutations are considered to be raw material for evolution. Discuss the different types of mutations. Elaborate upon their biochemical basis. **(15)**

c) Differentiate between active and passive transport of ions. Discuss any three mechanisms responsible for movement of ions across a membrane. Support your answer with suitable illustrations. **(15)**

Total No. of Printed Pages-4]

CC(M)

CHEMISTRY

(OPTIONAL)

PAPER - I

[15]

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SECTION - A

1. a) Explain Maxwell's law for the distribution of speeds among molecules of a gas with the help of a well labelled plot. How will you derive the expression for most probable speed using this law? Is this speed distribution impacted by temperature? **(15)**

b) For the cell:

Cd (Hg, 5% by wt.) | $CdSO_4$ (0.05 m) || $CdSO_4$ (0.02 m) | Cd (Hg, 10 % by wt.)

i) Write the half-cell reactions and the net reaction.

ii) Determine the EMF of the cell if the mean activity coefficient of $CdSO_4$ in 0.05 m and 0.02 m solutions is 0.20 and 0.30 respectively. **(15)**

[Mol. wt. of Cd = 112.4, log(3.5185) = 0.5464]

c) What do you understand by the terms symmetry elements and symmetry operations? Explain the following with respect to the above terms:

i) Mirror plane

ii) Proper rotation axis **(10)**

d) What is quantum efficiency? A quantum efficiency of 1×10^6 is obtained for a photochemical reaction between $H_2(g)$ and $Cl_2(g)$ using a wavelength of 480nm. Determine the amount of HCl(g) produced under the given conditions per calories of radiant energy absorbed. **(10)**

2. a) Discuss the origin of surface tension in liquids. Discuss one experimental method for the determination of surface tension of a liquid. **(15)**

b) What is thermodynamic aspect of the term "entropy"? Determine the change in entropy when 1 mol of ice is heated from 250K to 300K and the heat capacities (C_P,m) of water and ice are taken as 75.3 and $37.7JK^{-1}mo1^{-1}$ respectively. Given that the latent heat of fusion of ice is $6.02KJmo1^{-1}$.

[$\log_e(1.0926) = 0.0886$, $\log_e(1.0983) = 0.0938$] **(15)**

c) What do you mean by "component" of a system? How is it different from "constituent" of a system? Determine the number of components in the following systems:

i) Ammonium chloride undergoes thermal decomposition.

ii) Aqueous acetic acid.

iii) Calcium carbonate in equilibrium with its decomposition products. **(10)**

d) What are stoichiometric defects that occur in the solid state and give an example of each? Discuss the possibility of electrical conduction and its mechanism due to these defects in solids. **(10)**

3. a) An electron is placed in a 1-D box having a length of 0.10 nm. Determine:

i) The energy difference between n = 2 and n = 1 states of the electron.

ii) The probability of finding the electron in between x = 0 and x = L/2 in the n = 1 state. **(15)**

(b) A certain element having molar mass 181g/mol and density $16.4\times10^3kgm^{-3}$ crystallizes in a BCC lattice arrangement. Determine:

i) The edge length of the unit cell.

ii) The distance between the (112), (210) and (222) planes.

iii) The nearest neighbour distance between its atoms. **(15)**

c) What is half-life of a reaction? What is its significance? A certain compound decomposes at 300°C with a rate constant, $k = 2.4\times10^{-4}sec^{-1}$. Determine the temperature at which the half-life of the reaction would be 139.6 seconds if the activation energy for the reaction is 42kcal mol^{-1}. [log(20.67) = 1.3153] **(10)**

d) Outline a Born - Haber cycle for the formation of NaCl. Calculate the electron affinity of Cl with the help of the following thermochemical data in KJ/mol:

$\Delta H_{formation} = -381.2$, $\Delta H_{sublimation} = 108.4$, Ionization enthalpy = 495.4,

$\Delta H_{dissociation} = 241.8$, Lattice energy = -757.3. **(10)**

4. a) What are the assumptions on which Langmuir adsorption isotherm is based? Derive the expression for this type of isotherm and explain the terms involved in it. **(15)**

b) Show that:

i) $\mu_{JT} = \dfrac{T(\partial V/\partial T)_p - V}{C_p} = \dfrac{V(\alpha T - 1)}{C_p}$ and is zero for an ideal gas.

ii) $[\partial H/\partial p]T$ is zero for an ideal gas. **(15)**

c) What are ion selective electrodes? Give an example of one such electrode and explain its working mechanism. **(10)**

d) Explain the following:

i) Electrophoretic effect.

ii) Critical solution temperature. **(10)**

SECTION - B

5. a) What is Na^+- K^+ pump? How does it function? Comment on the selectivity of this pump in transporting the Na^+ and K^+ ions. **(15)**

b) Explain the concept of Jahn-Tellar distortion. Which of the following complexes are expected to show this distortion?

i) $[CuCl_6]^{4-}$

ii) $[Cr(acac)_3]$

iii) $[Co(CN)_6]^{4-}$ **(15)**

c) Give the electron count of the following organometallic compounds:

i) $[Re(CO)_5(PF_3)]^+$

ii) $[ClMn(CO)_5]$

iii) $[Co(\eta^4\text{-}C_4H_6)(\eta^3\text{-}C_3H_5)]$

iv) $[Rh_2(CO)_4Cl_2]$

v) $[Fe(CO)_4(PPh_3)]$ **(10)**

d) i) What are boranes? Give one example of a Nido-borane and Arachno - borane each. **(5)**

ii) Complete the following reactions: **(5)**

A. $B_2H_6 + 2(Me)_3N \rightarrow ?$

B. $3BCl_3 + 3NH_4Cl \xrightarrow{140^oC} ? \xrightarrow{NaBH_4} ?$

C. $2Na[BH]_4 + I_2 \xrightarrow{DMG} ?$

D. $B_2H_6 + 2LiH \rightarrow ?$

6. a) How does IR spectroscopic technique help in understanding the structural aspect of carbonyl compounds? Explain the order of IR frequency in the following carbonyl complexes.

Complex	**v(CO) cm^{-1}**
$[Ti(CO)_6]^{2-}$	1748
$[V(CO)_6]^-$	1859
$[Cr(CO)_6]$	2000
$[Mn(CO)_6]^+$	2204

(15)

b) A solution containing 0.319g of a hydrate isomer (Molecular formula: $CrCl_3.6H_2O$, molecular weight: 266.35) was passed through a cation exchange resin in acidic form. The acid so liberated used 19ml of 0.125 N NaOH for neutralization. Identify the isomer. **(15)**

c) Give the IUPAC name of the following coordination complexes:

i) $[Pt(NH_3)BrCl(CH_3NH_2)]$

ii) $[Co(NH_3)_3(ONO)_3]$

iii) $[Pt(NH_3)_4]\ [PtC1_4]$

iv) $[Rh(NCS)_3(NH_3)_3]$

v) $K_2[Co(N_3)_4]$ **(10)**

(d) Why are absorption bands of lanthanide ions weak but very sharp? Explain. **(10)**

7. a) What are fluxional molecules? How does fluxionality differ from isomerism and tautomerism? **(15)**

b) What are cytochromes? What is the basis of their classification? Briefly describe the active site in cytochrome c? **(15)**

c) What are interhalogen compounds? Comment on their reactivity when compared to halogens. Draw the structures of the following species showing the position of lone pair of electrons if any: I_2Cl_6, IF_5, $[ICl_2]^-$ **(10)**

d) What is chelate effect? How does it impact the stability of coordination compounds? **(10)**

8. a) How is Zeise's salt prepared? Discuss its bonding and structural aspects. **(15)**

b) What are silicones? Discuss their characteristic properties and applications. **(15)**

c) Compare and contrast hemoglobin and myoglobin as oxygen carriers. **(10)**

d) What are phosphazenes? How are they prepared? Give the general formula of cyclophosphazenes and draw the structures of any one cyclophosphazene molecule. **(10)**

CC(M)

CHEMISTRY

(OPTIONAL)

PAPER - I

[15]

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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. a) Explain Maxwell's law for the distribution of speeds among molecules of a gas with the help of a well labelled plot. How will you derive the expression for most probable speed using this law? Is this speed distribution impacted by temperature? **(15)**

b) For the cell:

Cd (Hg, 5% by wt.) | $CdSO_4$ (0.05 m) || $CdSO_4$ (0.02 m) | Cd (Hg, 10 % by wt.)

i) Write the half-cell reactions and the net reaction.

ii) Determine the EMF of the cell if the mean activity coefficient of $CdSO_4$ in 0.05 m and 0.02 m solutions is 0.20 and 0.30 respectively. **(15)**
[Mol. wt. of Cd = 112.4, log(3.5185) = 0.5464]

c) What do you understand by the terms symmetry elements and symmetry operations? Explain the following with respect to the above terms:

i) Mirror plane

ii) Proper rotation axis **(10)**

d) What is quantum efficiency? A quantum efficiency of 1×10^6 is obtained for a photochemical reaction between $H_2(g)$ and $Cl_2(g)$ using a wavelength of 480nm. Determine the amount of HCl(g) produced under the given conditions per calories of radiant energy absorbed. **(10)**

2. a) Discuss the origin of surface tension in liquids. Discuss one experimental method for the determination of surface tension of a liquid. **(15)**

b) What is thermodynamic aspect of the term "entropy"? Determine the change in entropy when 1 mol of ice is heated from 250K to 300K and the heat capacities (C_P,m) of water and ice are taken as 75.3 and 37.7$JK^{-1}mol^{-1}$ respectively. Given that the latent heat of fusion of ice is 6.02$KJmol^{-1}$.
[$\log_e(1.0926) = 0.0886$, $\log_e(1.0983) = 0.0938$] **(15)**

c) What do you mean by "component" of a system? How is it different from "constituent" of a system? Determine the number of components in the following systems:

i) Ammonium chloride undergoes thermal decomposition.

ii) Aqueous acetic acid.

iii) Calcium carbonate in equilibrium with its decomposition products. **(10)**

d) What are stoichiometric defects that occur in the solid state and give an example of each? Discuss the possibility of electrical conduction and its mechanism due to these defects in solids. **(10)**

3. a) An electron is placed in a 1-D box having a length of 0.10 nm. Determine:

i) The energy difference between n = 2 and n = 1 states of the electron.

ii) The probability of finding the electron in between x = 0 and x = L/2 in the n = 1 state. **(15)**

(b) A certain element having molar mass 181g/mol and density $16.4\times10^3kgm^{-3}$ crystallizes in a BCC lattice arrangement. Determine:

i) The edge length of the unit cell.

ii) The distance between the (112), (210) and (222) planes.

iii) The nearest neighbour distance between its atoms. **(15)**

c) What is half-life of a reaction? What is its significance? A certain compound decomposes at 300°C with a rate constant, $k = 2.4\times10^{-4}sec^{-1}$. Determine the temperature at which the half-life of the reaction would be 139.6 seconds if the activation energy for the reaction is 42kcal mol^{-1}. [log(20.67) = 1.3153] **(10)**

d) Outline a Born - Haber cycle for the formation of NaCl. Calculate the electron affinity of Cl with the help of the following thermochemical data in KJ/mol:

$\Delta H_{formation} = -381.2$, $\Delta H_{sublimation} = 108.4$, Ionization enthalpy = 495.4,

$\Delta H_{dissociation} = 241.8$, Lattice energy = -757.3. **(10)**

4. a) What are the assumptions on which Langmuir adsorption isotherm is based? Derive the expression for this type of isotherm and explain the terms involved in it. **(15)**

b) Show that:

i) $\mu_{JT} = \dfrac{T(\partial V/\partial T)_p - V}{C_p} = \dfrac{V(\alpha T - 1)}{C_p}$ and is zero for an ideal gas.

ii) $[\partial H/\partial p]T$ is zero for an ideal gas. **(15)**

c) What are ion selective electrodes? Give an example of one such electrode and explain its working mechanism. **(10)**

d) Explain the following:

i) Electrophoretic effect.

ii) Critical solution temperature. **(10)**

SECTION - B

5. a) What is Na^+- K^+ pump? How does it function? Comment on the selectivity of this pump in transporting the Na^+ and K^+ ions. **(15)**

b) Explain the concept of Jahn-Tellar distortion. Which of the following complexes are expected to show this distortion?

i) $[CuCl_6]^{4-}$

ii) $[Cr(acac)_3]$

iii) $[Co(CN)_6]^{4-}$ **(15)**

c) Give the electron count of the following organometallic compounds:

i) $[Re(CO)_5(PF_3)]^+$

ii) $[ClMn(CO)_5]$

iii) $[Co(\eta^4\text{-}C_4H_6)(\eta^3\text{-}C_3H_5)]$

iv) $[Rh_2(CO)_4Cl_2]$

v) $[Fe(CO)_4(PPh_3)]$ **(10)**

d) i) What are boranes? Give one example of a Nido-borane and Arachno - borane each. **(5)**

ii) Complete the following reactions: **(5)**

A. $B_2H_6 + 2(Me)_3N \rightarrow ?$

B. $3BCl_3 + 3NH_4Cl \xrightarrow{140°C} ? \xrightarrow{NaBH_4} ?$

C. $2Na[BH]_4 + I_2 \xrightarrow{DMG} ?$

D. $B_2H_6 + 2LiH \rightarrow ?$

6. a) How does IR spectroscopic technique help in understanding the structural aspect of carbonyl compounds? Explain the order of IR frequency in the following carbonyl complexes.

Complex	**v(CO) cm^{-1}**
$[Ti(CO)_6]^{2-}$	1748
$[V(CO)_6]^-$	1859
$[Cr(CO)_6]$	2000
$[Mn(CO)_6]^+$	2204

(15)

b) A solution containing 0.319g of a hydrate isomer (Molecular formula: $CrCl_3.6H_2O$, molecular weight: 266.35) was passed through a cation exchange resin in acidic form. The acid so liberated used 19ml of 0.125 N NaOH for neutralization. Identify the isomer. **(15)**

c) Give the IUPAC name of the following coordination complexes:

i) $[Pt(NH_3)BrCl(CH_3NH_2)]$

ii) $[Co(NH_3)_3(ONO)_3]$

iii) $[Pt(NH_3)_4][PtCl_4]$

iv) $[Rh(NCS)_3(NH_3)_3]$

v) $K_2[Co(N_3)_4]$ **(10)**

(d) Why are absorption bands of lanthanide ions weak but very sharp? Explain. **(10)**

7. a) What are fluxional molecules? How does fluxionality differ from isomerism and tautomerism? **(15)**

b) What are cytochromes? What is the basis of their classification? Briefly describe the active site in cytochrome c? **(15)**

c) What are interhalogen compounds? Comment on their reactivity when compared to halogens. Draw the structures of the following species showing the position of lone pair of electrons if any: I_2Cl_6, IF_5, $[ICl_2]^-$ **(10)**

d) What is chelate effect? How does it impact the stability of coordination compounds? **(10)**

8. a) How is Zeise's salt prepared? Discuss its bonding and structural aspects. **(15)**

b) What are silicones? Discuss their characteristic properties and applications. **(15)**

c) Compare and contrast hemoglobin and myoglobin as oxygen carriers. **(10)**

d) What are phosphazenes? How are they prepared? Give the general formula of cyclophosphazenes and draw the structures of any one cyclophosphazene molecule. **(10)**

(12)

Total No. of Printed Pages-8]

CC(M)

CIVIL ENGINEERING

(OPTIONAL)

PAPER - I

[17]

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) 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.

v) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.

vi) No continuation sheets shall be provided to any candidate under any circumstances.

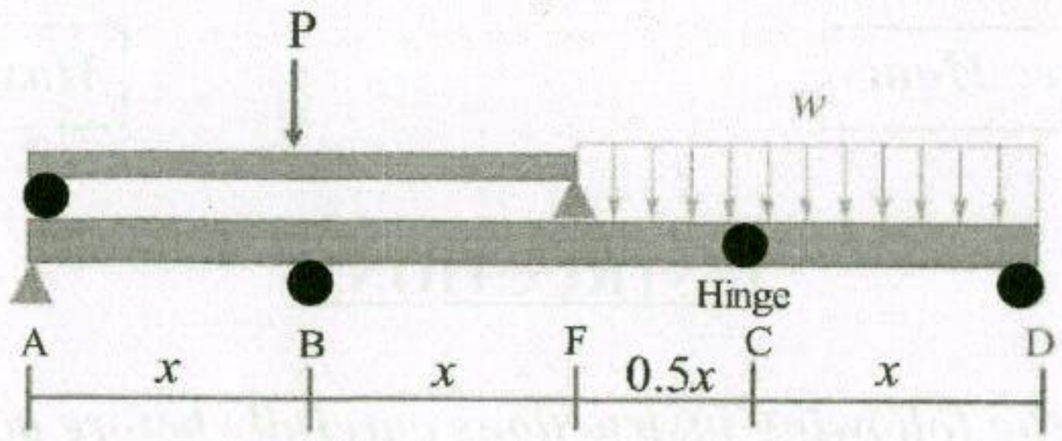
vii) No blank page should be left in between answers to various questions.

viii) Non Programmable Calculators are allowed.

SECTION - A

1. (a) Draw the Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for only the bottom beam ABFCD. At C there is a moment releasing hinge. (i) Determine the Value of minimum shear (ii) Location of minimum shear (iii) Value of minimum bending moment (iv) Location of minimum bending moment (v) Slope of BD just to the left of F (vi) Slope of BMD just to the right of F (vii)Value of maximum bending moment (viii) Distance of point of maximum bending moment from support A.

(1+1+3+2+3+3+3+4 =20)



(b) Calculate the discharge through a pipe of diameter 200 mm when the difference of pressure head between the two ends of a pipe 500 m apart is 4 m of water. Take the value of f=0.009. **(10)**

(c) Answer the following short answer questions:

(i) Why are the end returns provided in fillet welds?

(ii) Why are plastic or compact sections preferred for compression members?

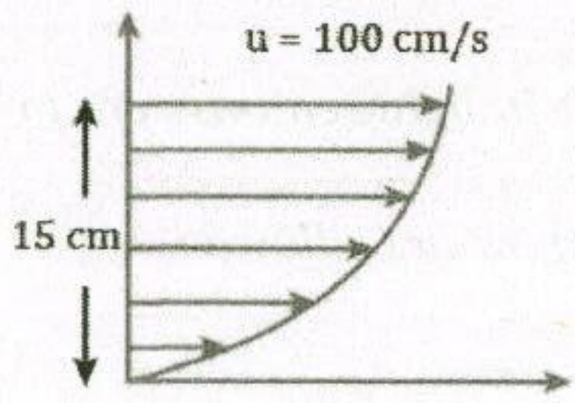
(iii) Under what circumstances will block shear failure dominate in bolted connection of steel tension members?

(iv) Define Kinematic Viscosity and explain its relationship with dynamic viscosity.

(v) What is critical flow? Why it is important in design of hydraulic structures.

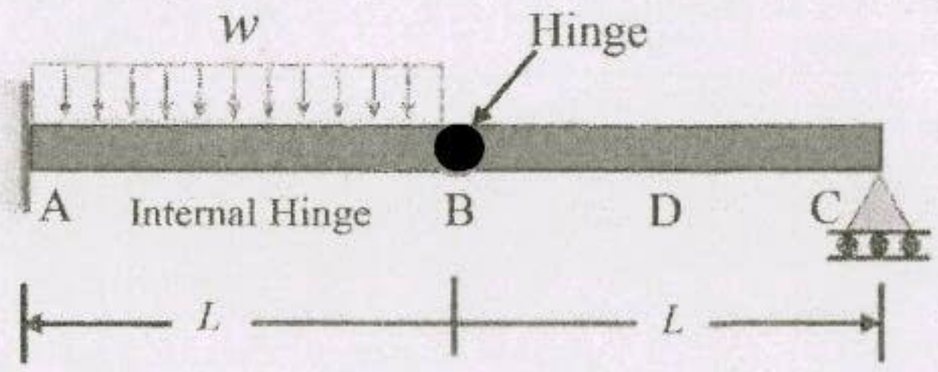
(4+4+4+4+4 = 20)

2. (a) A fluid flows over a flat plate, exhibiting a laminar flow pattern. The velocity distribution across the fluid layer follows a parabolic profile. The maximum velocity of 100 cm/s is reached at a distance of 15 cm from the plate. The dynamic viscosity of the fluid is 10 poise (equivalent to 1 Pa's). Calculate the shear stress within the fluid layer at a distance of 0 cm, 10 cm, and 15 cm from the plate. **(20)**

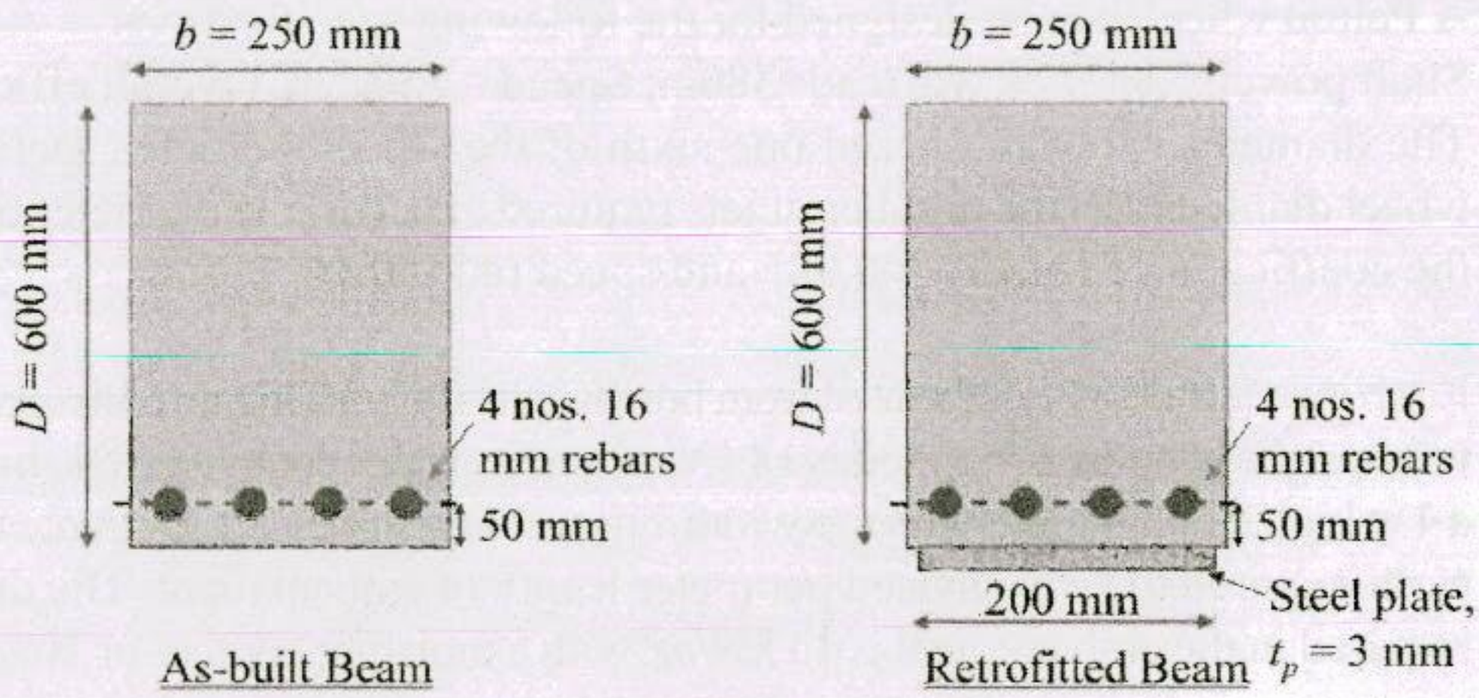


(b) For the construction of an earthen dam, an unconfined compression test was performed on a clay sample under saturation conditions. The maximum (peak) load the clay sustained was 127 N, and the vertical displacement was 0.8 mm. The diameter and length of the sample were 38 mm and 76 mm. (i) Determine the undrained shear strength. (ii) Draw Mohr's circle of stress for the test and locate S_u. **(10+5 = 15)**

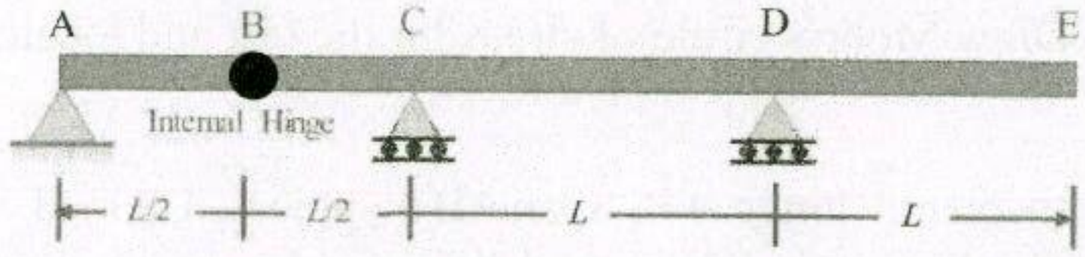
(c) A beam with an internal hinge at B. Span AB is subjected to load w N/m. The modulus of elasticity of both spans is E N/m^2 and the second moment of area is I m^4. Point D is at the center of BC. Given: $w = 4$ N/m, $L = 4$ m. (i) Determine deflection at point D (ii) Determine slope at point D. **(7.5+7.5 = 15)**



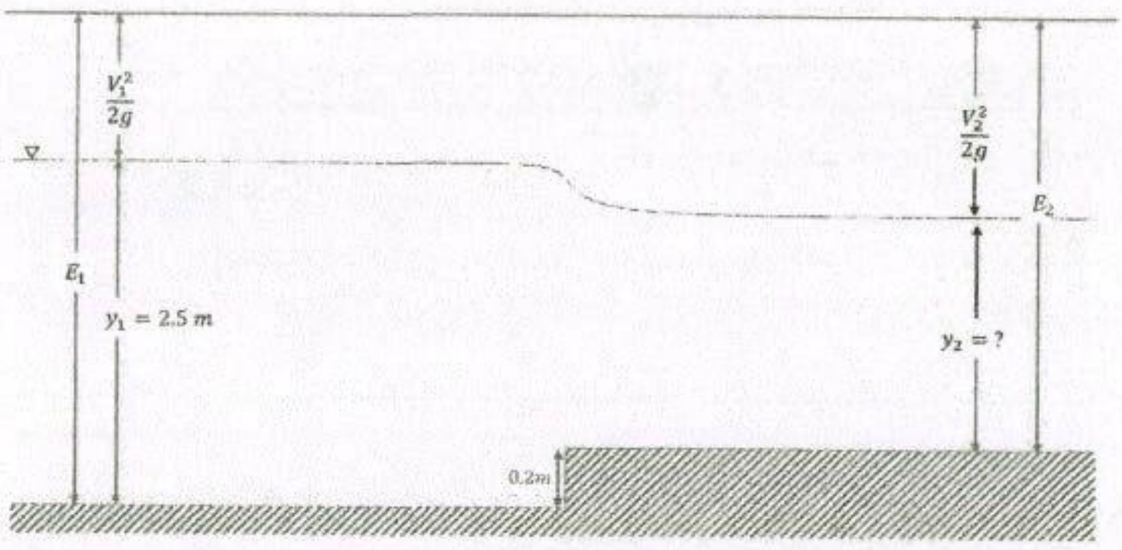
3. (a) An RC beam has cross-section as shown in the left figure below. Check whether the beam is safe to resist an ultimate moment of 125 kN-m. Take $f_{ck} = 20$ MPa and $f_y = 250$ MPa. The structural engineer decided to retrofit the beam with a steel plate of thickness, $t_p = 3$ mm (yield strength, $f_{yp} = 250$ MPa). The steel plate is glued at the bottom of the beam as shown in the right figure below. Find the ultimate moment capacity of the retrofitted rectangular beam and check whether the beam is now safe to resist an ultimate moment of 125 kN-m. **(5+10=15)**



(b) Draw the influence line diagram for reaction at C using Müller-Breslau principle. Using ILD, calculate maximum reaction at C, if a uniformly distributed load of l0kN/m of length $2L$ moves on the top of the beam. Take $L = 10$ m. **(5+5 = 10)**



(c) A 4-m wide rectangular channel is carrying 10 m^3/s at a depth of 2.5 m. There is a step rise of 0.2 m in the channel bottom. Assuming there are no losses at the transition, determine the flow depth downstream of the bottom step. Does the water surface rise or fall at the step? **(10+5 = 15)**



(d) A 10-m wide, rectangular, concrete-lined channel (n = 0.013) has a bottom slope of 0.01 and a constant-level reservoir at the upstream end. The reservoir water level is 6.0 m above the channel bottom at the entrance. Assuming the entrance losses and the approach velocity in the reservoir to be negligible, determine the channel discharge and critical slope for the estimated discharge. **(5+5=10)**

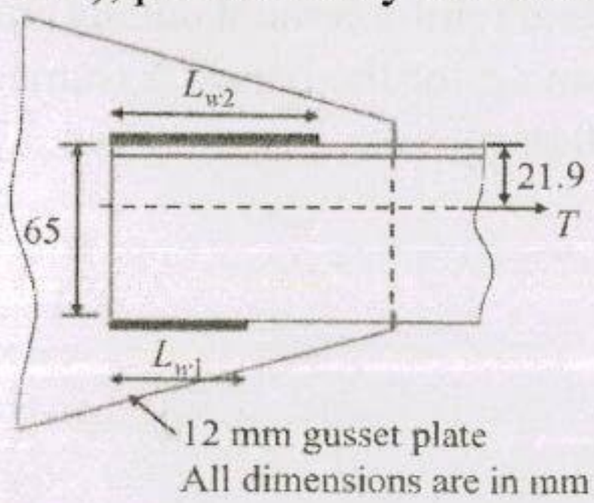
4. (a) A Pelton wheel is to be designed for the following specifications.
Shaft power = 11772 kW; Head=380m; Speed = 750rpm; Overall efficiency=86%
The diameter is not to exceed one-sixth of the wheel diameter. Determine (i) the wheel diameter (ii) the number of jets required and, (iii) the diameter of the jet. Take the coefficient of velocity =0.985 and speed ratio=0.46. **(20)**

(b) Earth is required to be excavated from borrow pits for building an embankment. The wet unit weight of undisturbed soil is 18 kN/m^3 and its water content is 8%. In order to build a 4 m high embankment with top width 2 m and side slopes 1:1, estimate the quantity of earth required to be excavated per meter length of embankment. The dry unit weight required in the embankment is 15 kN/m^3 with a moisture content of 10%. **(15)**

(c) What is an elastic collision, and how does it differ from an inelastic collision? Provide an example of each. **(15)**

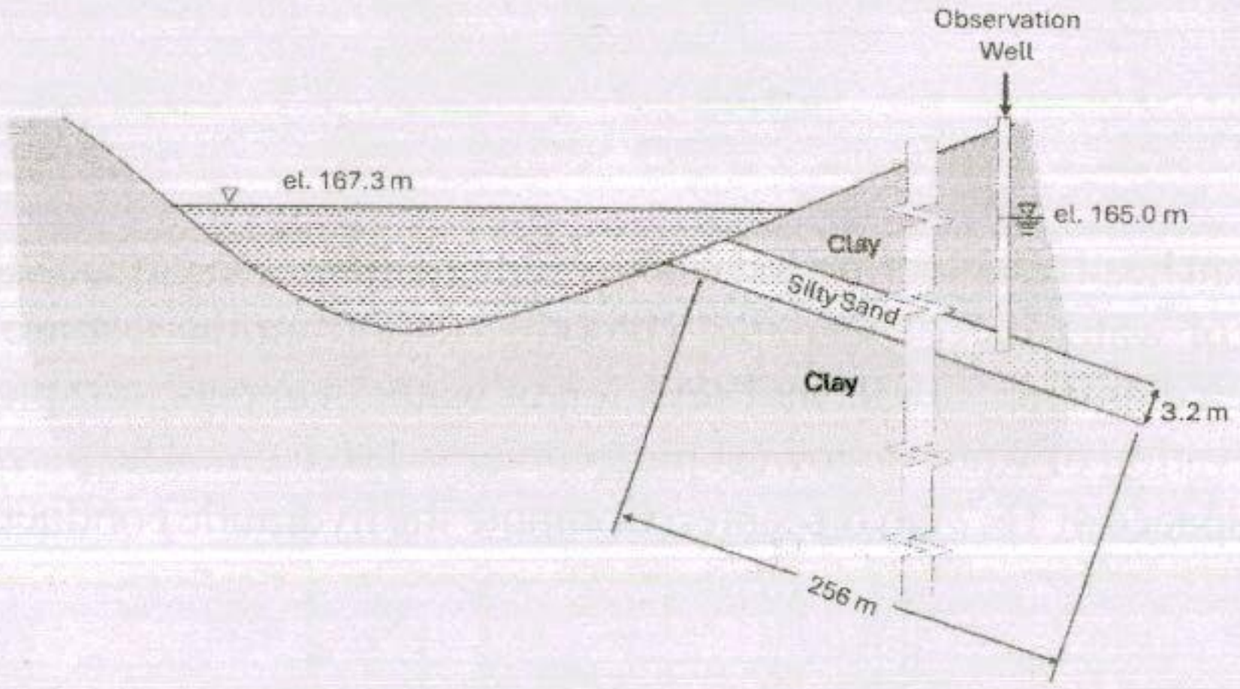
SECTION -B

5. (a) Design a fillet weld to connect ISA 65 × 45 × 8 mm with 12 mm thick gusset plate. The member carries a tensile service load T =100 kN. Assume weld size as 5 mm, steel grade E250 (Fe 410), partial safety factor for weld as 1.25. **(10)**

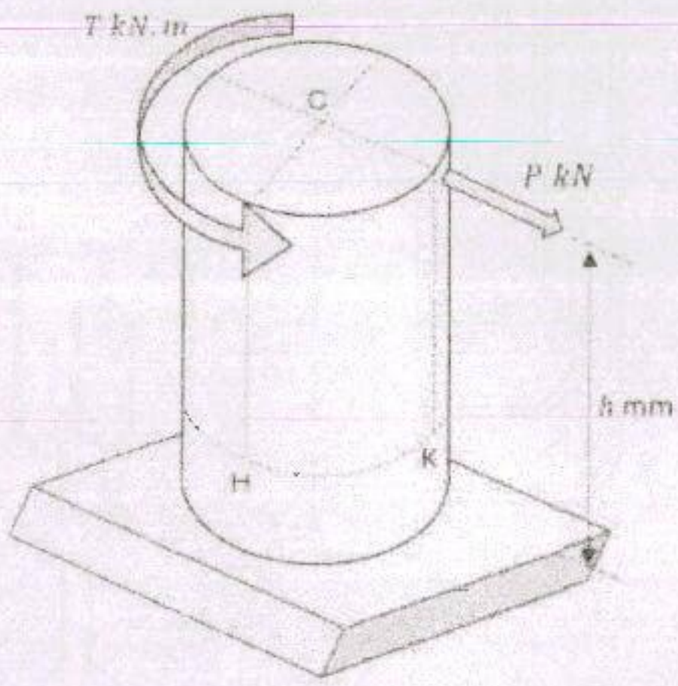


All dimensions are in mm

(b) A 3.2-meter-thick silty sand stratum intersects one side of a reservoir, as shown in Figure. This stratum has a hydraulic conductivity of 4×10^{-2} cm/s and extends along the entire 1000-meter length of the reservoir. An observation well has been installed in this stratum as shown in the figure below. Compute the seepage loss from the reservoir through this stratum. **(10)**

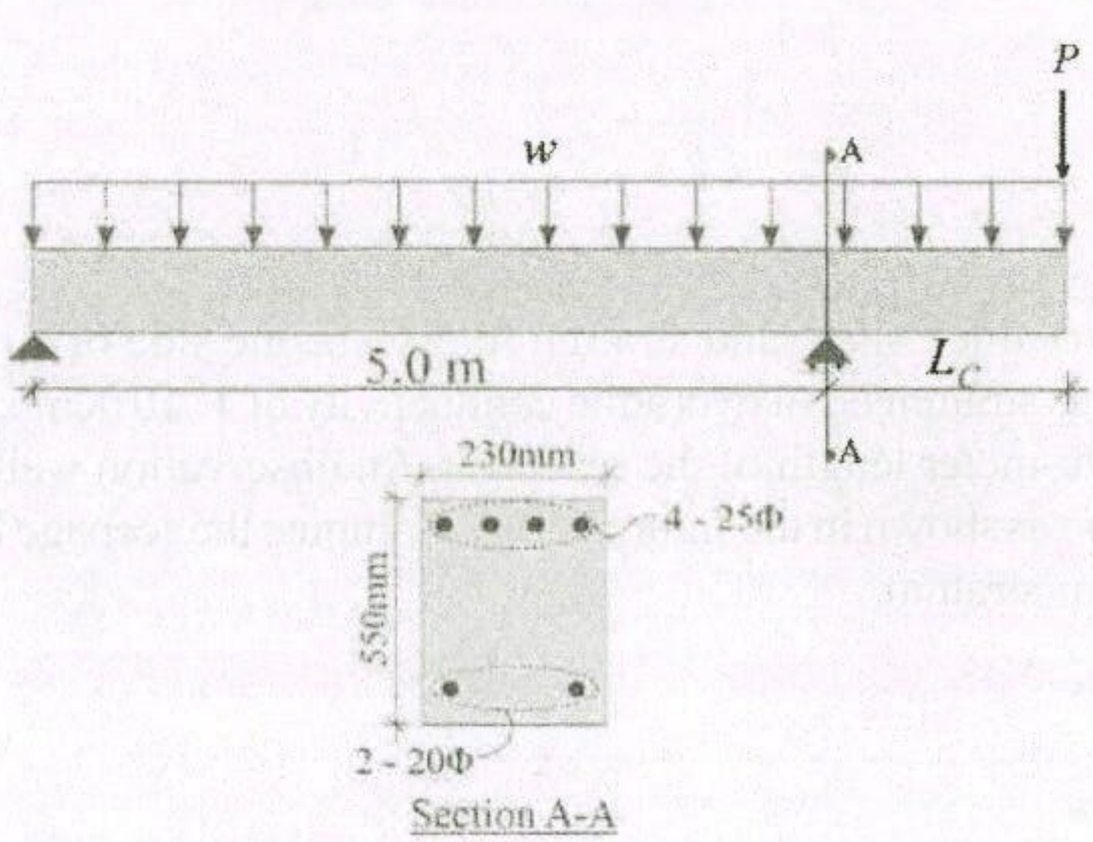


(c) A lateral load, P = 10 kN, and a torque, T =1.4 kN-m applied on top of a circular column (diameter, d = 65 mm) that is fixed at the base. Given h = 240 mm. (i) Draw the stresses on the element at H and (ii) determine the maximum principal stress. **(5+5=10)**



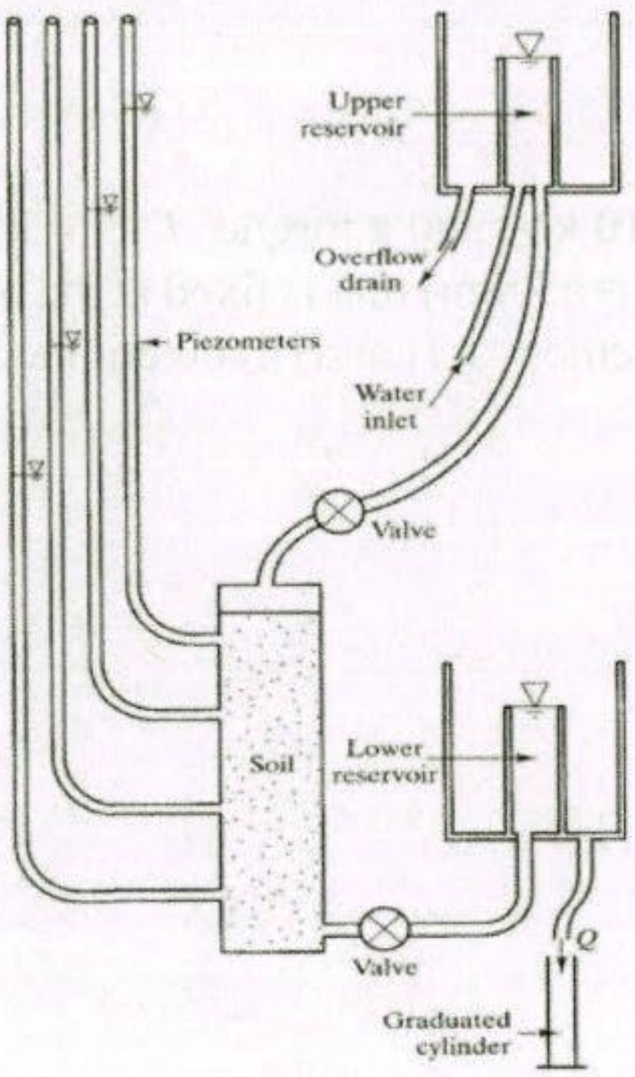
(d) Explain any five dimensional-numbers and list their use cases. **(4+4+4+4+4=20)**

6. (a) A factored point load, P=75 kN is acting at the tip of the beam. The beam is also subjected to a factored uniformly distributed load (including self-weight), w = 20 kN/m. The beam cross-section and reinforcement details are shown at section A-A. Find the maximum cantilever span Lc for the beam. Assume M30 concrete and Fe415 Steel and effective cover as 50 mm. **(20)**

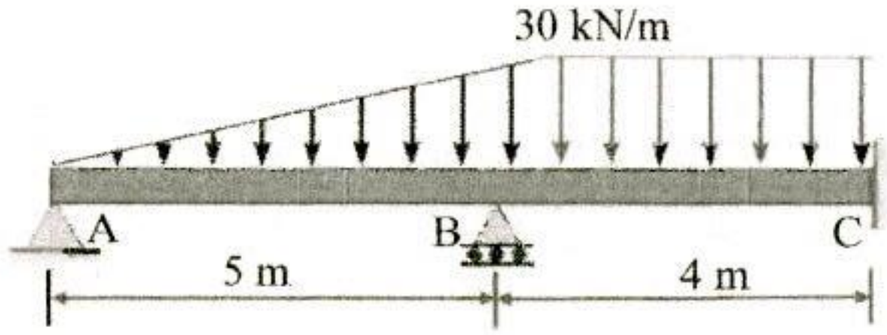


Section A-A

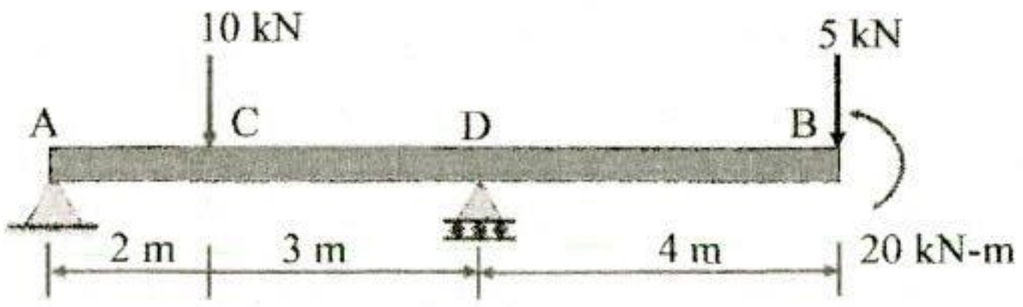
(b) A constant head test is performed using a permeameter. The graduated cylinder collects 892 ml of water in 112 seconds. The other data from the test are as follows: Soil specimen diameter = 18.0 cm; Elevation of water in upper-most piezometer = 181.0 cm; Elevation of water in lowest piezometer = 116.6 cm; The piezometer inlets are evenly spaced at 16.7 cm on center. Compute the hydraulic conductivity,k. **(10)**



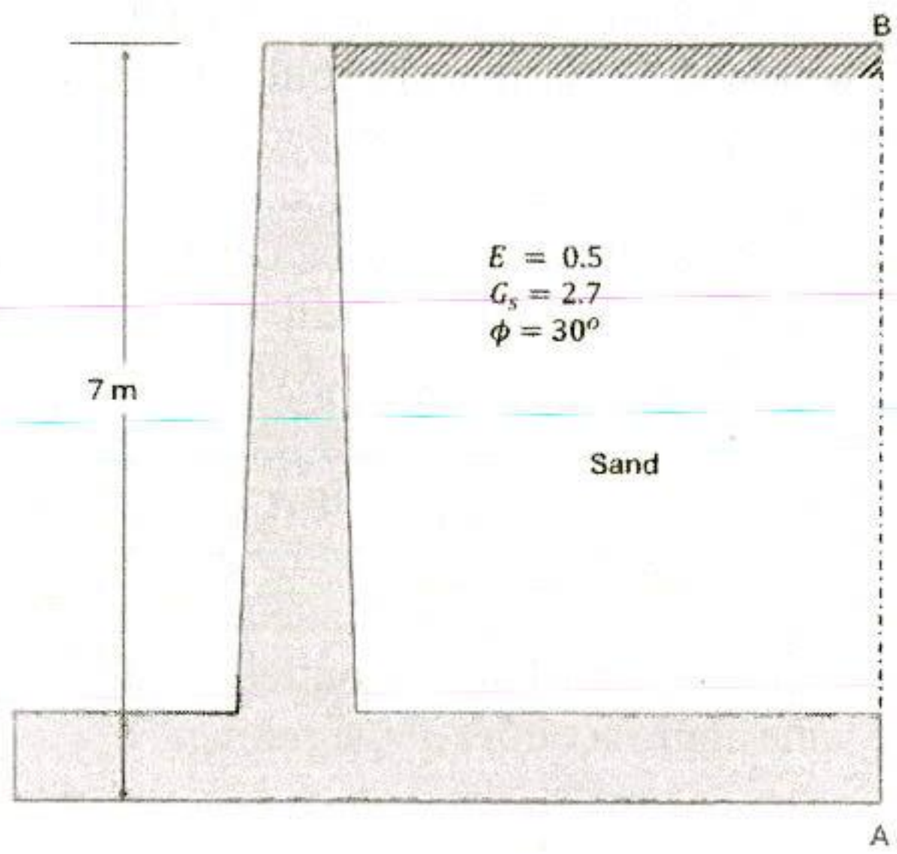
(c) Using the moment distribution method, determine the moment at B, and draw the moment diagram for the beam. Assume the support at A is hinged, B is roller and C is fixed. *EI* is constant. **(10)**



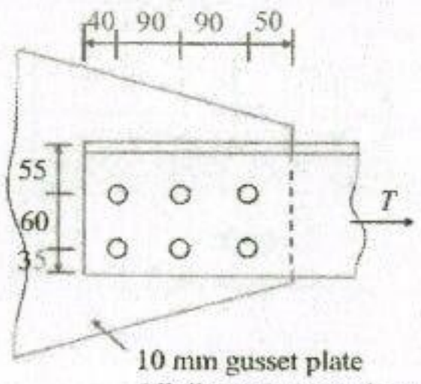
(d) Using the unit load method, determine the slope and deflection at free end B. Flexural rigidity, EI = constant. **(10)**



7. (a) A cantilever retaining wall of 7 meters height retains sand. The properties of the sand are: e = 0.5, $\phi = 30^{o}$, and $G_s = 2.7$. Using Rankine's theory, determine the active earth pressure at the base when the backfill is (i) Dry (ii) Saturated (iii) Submerged. Also, calculate the resultant active force in each case. Additionally, determine the total water pressure under the submerged condition. **(6+7+7=20)**

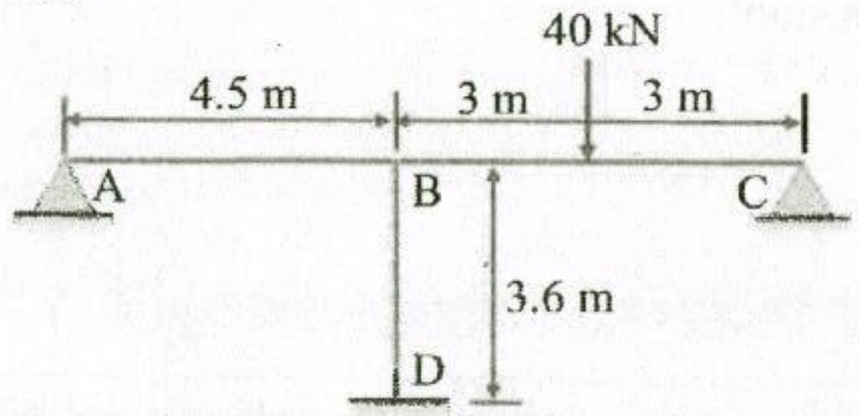


(b) A single angle ISA 150 × 100 × 10 mm connected to 10 mm thick gusset plate with 20 mm high-strength bolts of grade 8.8S. What is the maximum service load that can be supported, based on shear and bearing strengths of bolts, if the bolt threads do not fall in the plane of shear? Assume steel grade E250 (Fe 410), and bolt hole to be drilled one, partial safety factor for material of bolt as 1.25. **(15)**

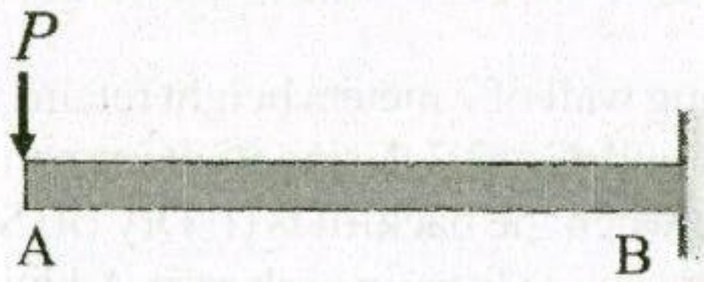


10 mm gusset plate
All dimensions are in mm

(c) Using slope deflection method, determine the moments at B and D, and draw the bending moment diagram of the frame. Assume the support at A and C are hinged, D is fixed, *EI* is constant. **(15)**



8. (a) For the cantilever beam, determine the vertical deflection at point A using stiffness method. Also, determine the fixed end moment at B and draw BMD. **(15)**



(b) A column of length L and rectangular cross-section (a×b) has a fixed end B and support a centric load at A as shown in figure below. Two smooth and rounded fixed plates restrain end A from moving in one of the plane of symmetry of the column and allow it to move in the other plane. Determine the ratio a/b for most efficient design against buckling. **(10)**

(c) A bridge is planned on a 50-m wide rectangular channel carrying a flow of 200 m3/s at a flow depth of 4.0 m. For reducing the length of the bridge, what is the minimum channel width such that the upstream water level is not influenced for this discharge? **(15)**

(d) The external and internal diameters of an inward flow reaction turbine are 1.2 m and 0.6 m. The head on the turbine is 22 m and velocity of flow through the runner is constant and equal to 2.5 m/s. The guide blade angle is given as 10° and the runner vanes are radial at inlet. If the discharge at outlet is radial, determine, a) the speed of the turbine. b) The vane angle at outlet of the runner. **(5+5=10)**

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(13)

Total No. of Printed Pages-8]

CC(M)

COMMERCE AND ACCOUNTANCY

(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

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

1. a) What is the importance of Financial Analysis? **(10)**

b) Explain Employees Stock Option and its benefits for Employees and Employer Company. **(10)**

c) Explain the Meaning and the Types of Responsibility Centers. **(10)**

d) What is the meaning of Activity Based Costing? State the process to implement Activity Based Costing and explain its main advantages. **(10)**

e) Explain the definition and meaning of Salary as per Income Tax Act, 1961. **(10)**

2. a) The following is the Trial Balance of M/s.Vibhuti Steels Ltd as on 31st March 2023:

Particulars	**Amount in Rupees**	
	Debit	**Credit**
Equity Share Capital(Share of Rs.10 each)		14,00,000
12% Bank Loan		2,80,000
Surplus in the Statement of Profit and Loss Account		5,18,000
Trade Creditors		2,24,000
Sales		81,76,000
Sales and Purchase Returns	33,600	42,000
Provision for Doubtful Debts		56,000
Building (at cost)	7,00,000	
Machinery(at cost)	21,00,000	
Stock	1,68,000	
Trade Receivables	7,00,000	
Bad Debts	29,400	
Cash and Bank	68,600	
Interim Dividend Paid	84,000	
Purchase	57,40,000	
Salaries	10,48,600	
Manufacturing Expenses	3,22,000	
Auditor's Fees	84,000	
Provision for Depreciation on Building		1,12,000
Provision for Depreciation on Machinery		4,06,000
Bills Receivables	49,000	
Directors' Fees	70,000	
Preliminary Expenses	16,800	
Total	**1,12,14,000**	**1,12,14,000**

Further you are provided with the following information:

i) Stock on 31st March 2023 was valued at Rs.2,80,000.

ii) Provide depreciation on Building @5% of cost and on Machinery @10% of cost.

iii) Maintain provision for doubtful debts at 2% of Trade Receivables.

iv) Make a provision of 40% for Corporate Taxes.

v) Transfer Rs.37,800 to General Reserve
vi) Write off Preliminary Expenses.
vii) Bank Loan was raised on 1-Oct-2022.
viii) The company has disputed a claim of Rs.14,000 for workmen's compensation.
ix) Bills receivables represent short term loans and advances and not bills accepted by trade debtors.

From the above balances and information, **Prepare year end Statement** of Profit and Loss Account and Balance Sheet as on 31st March 2023 as per Schedule III of Companies Act, 2013. **(30)**

b) The product of a manufacturing concern passes through two processes: A and B, so as to become the finished product. It is ascertained that in each process 5% of the weight of input is lost and 10% is the scrap, which from process A realizes Rs.200 per tonne and from process B Rs.500 per tonne. The following data is available relating to both the processes for a particular month:

Particulars	Process - A	Process - B
Materials in tonne	1,000	70
Cost of materials per tonne in rupees	313	500
Wages in Rupees	70,000	25,000
Manufacturing Expenses in rupees	20,000	13,125
Output in tonnes	830	780

Prepare process Accounts showing cost per tonne of each process. There was no stock or work in progress in each process. **(20)**

3. a) The ledger balances of Ramneek Ltd. as on 31st March 2023 are as follows:

Freehold Property at cost	1,08,000
Plant and Machinery	3,96,000
Lease hold Property at cost	2,52,000
Stock in trade	54,000
Trade Debtors	1,08,000
Investments at cost	72,000
Equity Share Capital (Share of Rs.10 each fully paid)	2,70,000
8% Cumulative Preference shares of Rs.10 each fully paid	3,60,000
9% Debentures (Secured on Freehold property)	1,08,000
Interest accrued on debentures	4,860
Securities Premium	9,000
Trade Creditors	1,53,000
Bank Overdraft	1,72,800
Accumulated Depreciation on Leasehold Property	32,400
Accumulated Depreciation on Plant and Machinery	1,08,000
Goodwill	99,000

Preference Dividends are in arrears for the past 4 years. After approval by the Tribunal of a scheme for the reduction of capital the following steps were taken:

i) The Preference shares were reduced to Rs.7.50 per share and the equity shares to Rs.2 per share. After reduction the shares were consolidated into shares of Rs.10 each. The authorized capital was restored to Rs.3,60,000 8% Cumulative Preference shares and RS.2,70,000 Equity shares, both of Rs.10 each.

ii) One new Equity Share of Rs.10 each was issued for every Rs.40 of gross Preference Dividend in Arrears.
iii) The balance in securities premium account was utilised.
iv) The debenture holders took over the freehold property at an agreed value of Rs.1,35,000 and paid the balance to the company after deducting the amount due to them.
v) Plant and Machinery was written down to Rs.2,52,000.
vi) Investments were sold for Rs.57,600.
vii) Goodwill, accumulated losses, trade debts of Rs.15,480 and obsolete stock of Rs.18,000 were written off.
viii) Contingent liability for which no provision was made was settled at Rs.12,600 and an amount of Rs.11,340 was recovered from insurers for a long pending claim.
ix) The available cash is deposited into the bank overdraft account.

You are required to :

(A) Determine the accumulated losses;
(B) Show the necessary journal entries to record above transaction in the books of company;
(C) Show the Capital Reduction Account and Cash Account. **(30)**

b) As an investment manager, you are supplied the following information:

Investment in Equity	**Initial Price**	**Dividends**	**Year-end Market**	**Beta risk factor**
Kafka Ltd.	Rs.50	Rs.4	Rs.100	0.8
Sama Ltd.	70	4	120	0.7
Jackob Ltd.	90	4	270	0.5
8% Govt. Bonds	1000	140	1010	1.0

You are required to calculate expected rate of return (cost of equity) on each security using Capital Assets Pricing Model (CAPM). **(20)**

4. a) Mr.Satish is a Sales Manager in a company in Jaipur. He has furnished the following details regarding his salary income for the previous year 2022-23:

i) Basic Salary Rs.85,000 p.m.
ii) Dearness Allowance Rs.30,000 p.m.
iii) Bonus Rs.50,000 p.a.
iv) Travelling Allowance Rs.45,000 out of which he spends Rs.30,000 for official purposes.
v) Reimbursement of medical bills Rs.25,000 (the treatment was done in a govt.hospital in India).
vi) He lived in a bungalow belonging to the company .Its fair rent is Rs.15,000 p.m. The company has provided on this bungalow the facility of a watchman and a cook each of whom is paid a salary of Rs.12,500 p.m. The company paid in respect of bungalow Rs.5,000 p.a towards electricity bills and Rs.3,000 p.a. for water bills.
vii) He has been provided with 1.5 lts. Engine capacity car for official and personal use. The maintenance and running expenses of the car (including driver) are borne by the company.

viii) The following amounts were deposited into his provident fund account

I. Own contribution Rs.90,000.

II. Employer Contribution Rs.1,25,000.

III. Interest @ 12% p.a Rs.66,600.

ix) Rent of house recovered from Mr.Satish Rs.21,600.

Compute his taxable income under the head salary for the assessment year 2023-24.

Assuming that the population of Jaipur is 26 Lakhs as per 2001 census and Mr.Satish:

A) Does not opt to be taxed under Section 115BAC.

B) Opts to be taxed under section 115BAC. **(30)**

b) The following are the Balance Sheets of M/s.Ananya Garments Ltd. As at 31- March-2022 and 31-March-2023.

Balance Sheet of M/s Ananya Garments Ltd. as on 31-March-2022- and 31-March-2023.

Particulars	**Note No**	**Amounts in Rupees**	
		2022-23	**2021-22**
I Equity and Liabilities			
(1) **Shareholders Funds**			
(a) Share Capital	1	5,35,000	4,10,000
(b) Reserves and Surplus	2	4,97,500	3,35,000
(2) **Non-Current Liabilities**			
Long term Borrowings	3	3,75,000	5,00,000
(3) **Current Liabilities**			
Trade Creditors		85,000	1,17,500
Total		**14,92,500**	**13,62,500**
II. ASSETS			
(1) **Non-Current Assets**			
Property, Plant, and equipment			
Tangible Assets	4	6,72,500	6,45,000
(2) **Current Assets**			
a) Inventories		4,50,000	4,72,500
b) Trade Receivables		2,12,500	1,90,000
c) Cash and cash equivalent		1,57,500	55,000
Total		**14,92,500**	**13,62,500**

Note to Accounts

Particulars	Amounts in Rupees	
	2022-23	2021-22
1. Share Capital		
Issued Subscribed and paid up		
"53,500 equity shares of '10 each'	5,35,000	4,10,000
2. **Reserves and Surplus**		
Balance in Statement of Profit and Loss	4,97,500	3,35,000
3. **Long term Borrowings**		
10% Debentures	3,75,000	5,00,000
4. **Tangible Assets**		
a) Land	1,87,500	2,50,000
b) Equipments	6,50,000	5,00,000
Less: Accumulated Depreciation	(1,65,000)	(1,05,000)
	6,72,500	**6,45,000**

Additional Information:

i) Interim dividend of Rs.1,50,000 were declared and paid during the year (ignore corporate dividend tax)

ii) Equipment costing Rs.1,25,000 with accumulated depreciation of Rs.75,000 was sold for Rs.40,000.

iii) Interest on 10% debentures paid during the year amounted to Rs.50,000.

Prepare a statement of cash flow for the year ended 31-Mar-2023 as per AS-3(Revised)(20)

SECTION - B

Write short notes on the following : **(5×10=50)**

5. a) Features and Characteristics of Mutual Fund. **(10)**

b) Difference between Primary Market and Secondary Markets. **(10)**

c) Tax Audit. **(10)**

d) Banking Sector Reforms in India. **(10)**

e) Factors Affecting Dividend Policy. **(10)**

6. a) SG Ltd has just installed Machine X at a cost of Rs.4,80,000 having a useful life of 6 years with no residual value. The annual production is estimated at Rs.1,80,000 units which can be sold at Rs.13 per unit. Annual operating costs are estimated at Rs.4,40,000 (excluding depreciation) at this level. Fixed costs are estimated at Rs.8 per unit (excluding depreciation) for the same level of output. The company has just come across another machine Y having the same useful life and capable of giving same output. The annual operating cost is expected at Rs.3,40,000(excluding depreciation). There will be no change in fixed cost. The capital cost of the machine is Rs.5,40,000 with nil residual value. The company can sell the machine X at Rs.1,40,000 but the cost of dismantling and removal will amount to Rs.40,000. The operations with Machine X have not yet started and the company wants to sell Machine X and purchase MachineY.

SG Ltd.provides depreciation under the straight-line method. Assume corporate tax at 35%. The cost of capital may be assumed at 12%.

(A) Advise whether the company should opt for replacement.

(B) Will there be any change in your view if Machine X has not been installed but the company must select any one of the two machines.

(Present Value of Interest Factor of Annuity: PVIFA12%, 6=4.111) **(30)**

b) A Company produces a single product which is sold in the domestic market at Rs.75 per unit. The present production and sale are 50,000 units per month, representing 50% of the available capacity. The cost of the product is composed of variable cost of Rs.50 per unit and fixed cost of Rs.10 Lakhs per month.

To improve the profitability, the management has three proposals as under:

i) To accept an export supply order for 30,000 units per month at reduced price of Rs.60 per unit, incurring additional variable cost of Rs.6 per unit towards export packing and duties.

ii) To increase the domestic market sales by selling to the domestic chain stores 30,000 units at Rs.55 per unit, retain the existing sales at the existing price.

iii) To reduce the selling price for the domestic market sales as advised by the sales department as under :

Reduce Selling Price by (Rs)	**Increase in Sales Expected in Units**
6	20,000
9	40,000
10	45,000

Prepare a comparative statement of profitability to show the results of above proposal and give your comments and advise on these proposals. (20)

7. a) The operating details of M/s.GKs Ltd during the year ended 31-Mar-2016 are as given below:

Particulars	**Cost per Unit (Rs.)**
Raw materials	30
Direct Labour	5
Overheads	15
Depreciation	5
Total cost	55
Profit	5
Selling price	60

Past trends indicate that the raw materials are held in stock, on an average for 2 months, work in progress (50% complete as to conversion costs) will approximate to half month's production. Finished goods remain in warehouse for one month. Suppliers of materials extend one month's credit. Normally two month's credit is allowed to debtors. A minimum cash balance of Rs.75,000 is expected to be maintained. The production pattern is assumed to be even during the year. Cash sales are expected to be 75% less than credit sales. Labour and overhead expenses remain in arrears for one month. The safety margin is 15%. Assuming the operating level to be 3,00,000 units, **Prepare a statement of working capital determination. (30)**

b) The Gamma Ltd. is considering the feasibility to buy from a nearby jobber a component in the necessary quantities at a unit price of Rs.7.50.Transportation and storage costs for the component would be negligible and therefore can be ignored. Gamma Ltd. produces the component from a single raw material. The firm at present orders materials in Economic Order Quantity of 1000 units at a unit price of Rs.2; Average annual usage is 20,000 units of

the component. The yearly storage cost (including rent, taxes, return on inventory investment, etc.) at present is computed at Rs.2.50 per unit. The minimum inventory is set at 200 units. Direct labour cost for the component is Rs.5 per unit. Fixed manufacturing overhead is absorbed at Rs.2 per unit based on a normal capacity of 20,000 units. In addition to the above costs, the machine on which the components are produced is leased at Rs.100 per month.

Should Gamma Ltd.Make or buy the component? Would you like to qualify your answer in any way? **(20)**

8. a) AB Ltd.provides you with the following figures:

Profit before interest and taxes	Rs.3,00,000
Less: Interest on Debentures @12%	Rs. 60,000
Earnings Before Tax	Rs.2,40,000
Corporate Tax @50%	Rs.1,20,000
Earnings After Tax	Rs.1,20,000
Number of equity shares(Rs.10 each)	Rs. 40,000
Earnings Per Share (EPS)	Rs. 3
Current Market Price	Rs. 30
PE ratio (P/E)	Rs. 10

The company has undistributed reserves of Rs.6,00,000. The company needs Rs.2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt ratio higher than 35% will push the P/E ratio down to 8 and raise interest rate on additional borrowings to 14%. You are required to ascertain the probable price of the share under the following situations:

i. Additional funds are raised as debt; and

ii. The amount is raised by issuing equity shares

iii. 50% of the additional funds are raised as debt and 50% as equity. **(30)**

b) The standard cost of Material and Labour for the making of a unit of a certain product are estimated as under:

Material: 800 kg at Rs.41.50 per kg

Labour : 180 hours at Rs.31.25 per hours

On completion of the production of a unit, it was found that 750 kg of material costing Rs.43.75 per kg. has been consumed and that the time taken was 160 hours, the wage rate being Rs.32.50 per hour. **(10)**

c) Z Ltd. has 10 lakh equity shares outstanding at the beginning of the year 2006. The current market price of the share is Rs.150 each. The company recommended Rs.8 per share as dividend. The capitalization rate is 12%.

i) Based on MM approach, calculate the market price of the share of the company when the recommended dividend is (A) declared, and (B) not declared.

ii) How many new shares are to be issued by the company at the end of the accounting year on the assumption that the net income for the year is Rs.2 crores and the investment budget is Rs.4 crores when dividends are distributed? What will be the market value of shares at the end of accounting year? **(10)**

Total No. of Printed Pages-3] **Roll No. _____**

CC(M)

DOGRI

PAPER - I

[26]

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

INSTRUCTIONS

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

*i) There are **EIGHT** questions divided in two Sections and printed in **Dogri.***

*ii) Candidate has to attempt **Six** questions in all.*

*iii) Questions No. 1 and 5 are compulsory and out of the remaining, **FOUR** are to be attempted choosing at least **Two** question from each Section.*

iv) The number of marks carried by a question/part is indicated against it.

v) Answers must be written in the medium authorized in the Admission Certificate which must be stated clearly on the cover of this Question-cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in a medium other than the authorized one.

vi) Word limit in questions, wherever specified, should be adhered to.

vii) Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

SECTION - A

हिदायत – सुआल नं. 1 जरुरी ऐ। बाकी त्रंऊं सुआलें (2,3 ते 4) चा कोई दो सुआल करो।

1. (अ) डोगरी भाशा खेतर दियें सीमा–रेखाएं बारै जानकारी दिंदे होई इसदियें कंढी, प्हाड़ी ते मदानी पट्टियें बारै मुख्तसर चर्चा करो। (30)

(ब) डोगरी भाशा दियें व्यंजन ध्वनियें दा उच्चारण–स्थान दे अधार उप्पर वर्गीकरण ते विश्लेशन करो। (25)

(जां/OR)

(अ) सिद्ध करो जे डोगरी भाशा दा उद्भव प्राचीन भाशा वैदिक संस्कृत थमां होए दा ऐ। (30)

(ब) डोगरी भाशा च लिंग–परिवर्तन दे सिद्धांतें दा उदाहरणें समेत ब्यौरा देओ। (25)

2. डोगरी भाशा दी शब्द–रचना च प्रत्ययें दा केह् योगदान ऐ? उपसर्गें दे योगदान कन्नै बने दे शब्दें बारै विस्तार च जानकारी देओ। (35)

3. डोगरी भाशा दी ध्वनि–संरचना च खंडेतर ध्वनियें दा केह् योगदान ऐ ? मात्रा ते अनुनासिकता ध्वनिगुणें बारै उदाहरणें समेत ब्यौरा देओ। (35)

4. डोगरी भाशा दे संयुक्त जां मिश्रत वाक्यें दी रचना बारै विस्तार च ते उदाहरणें समेत जानकारी देओ। (35)

SECTION - B

हिदायत – सुआल नं. 5 जरुरी ऐ। बाकी त्रंऊं सुआलें (6,7 ते 8) चा कोई दो सुआल करो।

5. आज़ादी पैह्ले दे डोगरी साहित्य च कविता साहित्य गद्य साहित्य दी तुलना च किश मता लभदा ऐ। इस कथन दी पुश्टी युक्तियें ते रचनाएं दे हवाले कन्नै करो। (55)

(जां/OR)

हेठ दित्ती दियें पुस्तकें चा कु'नें पं'जें रचनाएं दे बारे च 40-40 शब्दें च सारगर्भत जानकारी देओ। **(5×11=55)**

(क) मंगू दी छबील

(ख) जागो डुग्गर

(ग) दुद्ध, लहु जैहर

(घ) चेता

(ङ) निग्घे रंग

(च) सत रंग

(छ) अनन्त

(ज) सोचें दा सरलाऽ

(झ) जो तेरै मनचित लग्गी जा

(ञ) सप्तक

6. बावा जित्तो जां दाता रणपत दी कारक दे कथ्य दी जानकारी देइयै उं'दे चरित्र दे गुणें दा बखान करो। (35)

7. डोगरी क्हानी दी विकास यात्रा दा संक्षिप्त परिचे देइयै भगवत प्रसाद साठे जां नरेंद्र खजूरिया दी क्हानीकला बारै अपने विचार प्रकट करो। (35)

8. डोगरी नाटक दे विकास च प्रो. राम नाथ शास्त्री जां विश्वनाथ खजूरिया दे योगदान बारै विस्तृत ब्यौरा देओ।(35)

(14)

Total No. of Printed Pages-3]

CC(M)

ECONOMICS

(OPTIONAL)

PAPER - I

[21]

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

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

1. a) Using IS-LM analysis, explain how equilibrium rate of interest and income are determined with the interaction of both product and money markets.

b) At the equilibrium level, Walrasian adjustment differ from Marshallian adjustment. Discuss.

c) What is crowding out phenomenon? Does government borrowing always crowd out the private investment? Illustrate.

d) Evaluate Kuznet's inverted U shaped curve hypothesis of income distribution.

e) The perfect price discrimination under Monopoly market causes redistribution of consumer surplus and producer surplus. Explain using suitable diagrams.

2. a) Discuss the social choice theory in Economics. Distinguish between the views of Amartya Sen and Kenneth Arrow in making choices for social welfare. **(20)**

b) Explain one of the non- collusive models of oligopoly. Why does an oligopolist avoid price competition among rivals? **(15)**

c) What are the characteristics of monopolistic competition? Does a monopolistically competitive market lead to excess capacity? **(15)**

3. a) Explain the effectiveness of fiscal and monetary policies using Mundell-Flemming Model. **(20)**

b) What are the causes of fluctuations in real exchange rate? Explain the economic impact when the real exchange rate is greater than one. **(15)**

c) Do you agree with the view that the infatuation with free trade under WTO is at an end. What are the contentions between developed and developing nations in this regard? Give reasons for your answer. **(15)**

4. a) Explain Harrod -Domar growth model. How has Solow improved upon Harrod- Domar's growth model? **(20)**

b) What are the tools used by a central bank to control money supply in an economy? Discuss the effectiveness of such tools in a developing country. **(15)**

c) An economy is specified by the following data :

consumption function $C = 0.8\ (1-t)Y$

investment function $I = 900 - 60\ i$

tax rate $t = 0.25$, $G = 700$

money demand function, $L = 0.25Y - 62.5\ i$

real money supply, $M/P = 500$

i) Calculate the equations for IS and LM functions.

ii) Find the equilibrium level of income (Y) and the interest rate (i). **(15)**

SECTION - B

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

5. a) What policies would you suggest to combat negative externalities in production?

b) How is sustainable development linked to long run economic development of an economy? What are the main issues of sustainable development?

c) Define dominant strategy and Nash equilibrium. Show when a dominant strategy equilibrium exists, it is the unique Nash equilibrium.

d) Discuss the classical dichotomy that money is neutral.

e) What role commercial banks play in economic growth of a country?

6. a) i) Differentiate between Monopolistic Competition and Duopoly.

ii) Two firms are engaged in Duopoly competition in a market where price of commodity is given by, $P = 250 - 2Q$ and Marginal Costs are given as $MC_1 = MC_2 = 10$. Find equilibrium

output, price and profit of both firms. **(8+12)**

b) What is high powered money? Why is it called so? Explain the derivation of it. **(15)**

c) Explain the Keynesian theory of determination of national income. How is it an improvement over classical theory? **(15)**

7. a) Why do some countries focus on producing agricultural products while others focus on technology? What happens.when these countries trade? Are there more benefits for a country to produce all types of products, or is it better to focus on a few? **(20)**

b) Distinguish between balance of trade and balance of payments. How do depreciation and appreciation in the external value of a currency impact a country's Balance of Payments. **(15)**

c) Distinguish between monetary union and economic union. Do the proliferations in trading blocks virtually effect the free trade in the world. Give reasons for your answer. **(15)**

8. a) Explain with diagrams, the role of elasticity of demand and supply in determining the incidence of a per unit tax imposed on a commodity. **(20)**

b) Monetary contraction is a better option than devaluation to improve Balance of payments position of a developing economy under fixed exchange rate system. Discuss. **(15)**

c) Discuss the balanced and unbalanced growth strategies. Are the two strategies substitute or complementary to each other? Explain. **(15)**

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(15)

Total No. of Printed Pages-7]

CC(M)

ELECTRICAL ENGINEERING

(OPTIONAL)

PAPER - I

[23]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

Please go through the following Instructions carefully before attempting the paper.

i) *There are **Eight** questions divided in **Two** Sections A and B 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 assigned to a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer (QCA) Booklet in the space provided.*

ii) *The 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.*

v) *Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.*

vi) *No continuation sheets shall be provided to any candidate under any circumstances.*

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

viii) *Non Programmable Calculators are allowed.*

SECTION - A

1. a) A 220 V dc shunt motor takes a total current of 80 A and runs at 800 rpm. Field resistance is 50 Ω and armature resistance is 0.1 Ω. If iron and frictional loss is 1600 W, then find the following:

(i) Gross mechanical power,

(ii) Net mechanical power,

(iii) Armature Cu loss,

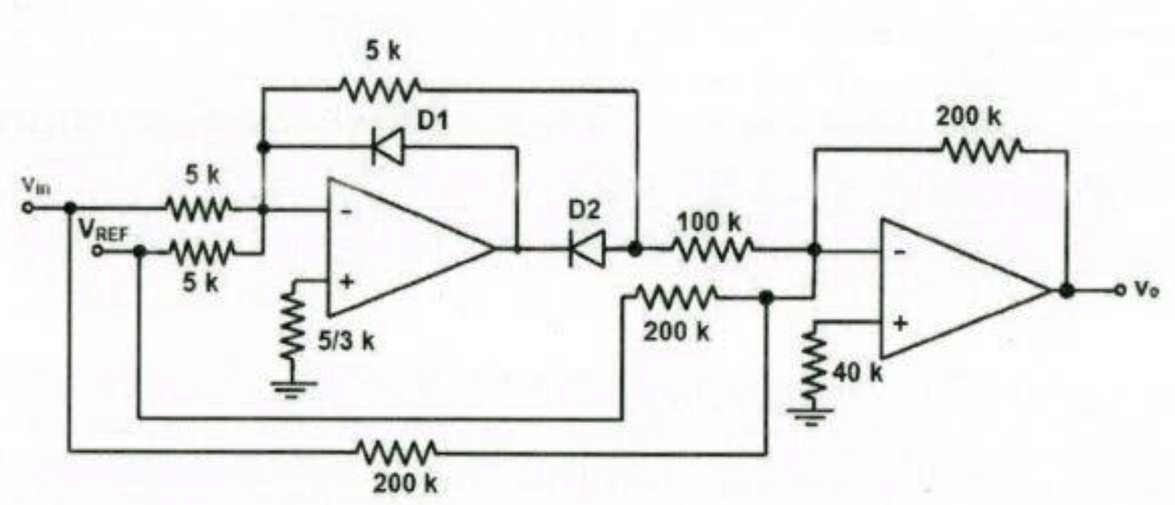
(iv) Armature and shaft torque. **(10)**

b) A 200V, 800 rpm and 120A separately excited dc motor has an armature resistance of 0.04Ω. The motor is fed from a step-down chopper which provides both motoring and braking operations and has a source voltage of 400V. Assume continuous conduction operation. Calculate the duty ratio of the chopper for motoring operation at rated torque and 500 rpm. **(10)**

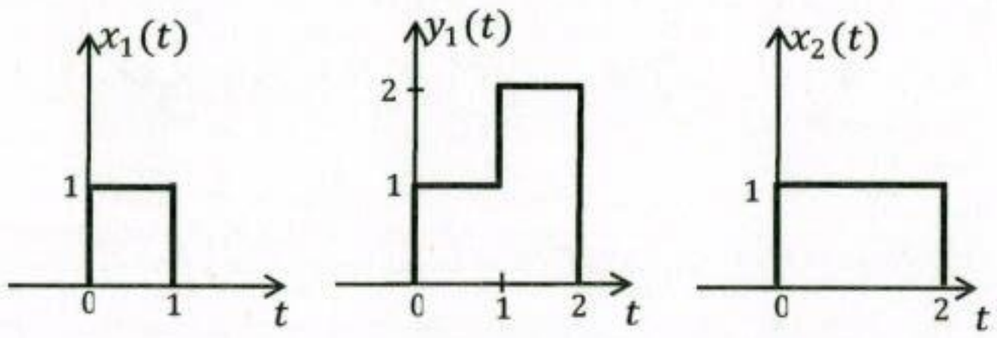
c) The parallel plates in a capacitor have an area of $3\times10^{-4}m^2$ and are separated by 0.3 cm. A voltage of 20 sin (10^3t) V is applied across the parallel plates of capacitor. Find the displacement current when the dielectric material between the plates has a relative permittivity of 4. **(10)**

d) Analyze the OPAMP circuit shown in the figure for a sinusoidal input voltage. Draw the transfer characteristic of the circuit for $V_{REF} < 0$.

(10)



e) Consider an LTI system which generates the output signal $y_1(t)$corresponding to input signal $x_1(t)$ as shown in the figure. Determine and sketch the output $y_2(t)$ of the system when the signal $x_2(t)$ is applied as the input. **(10)**



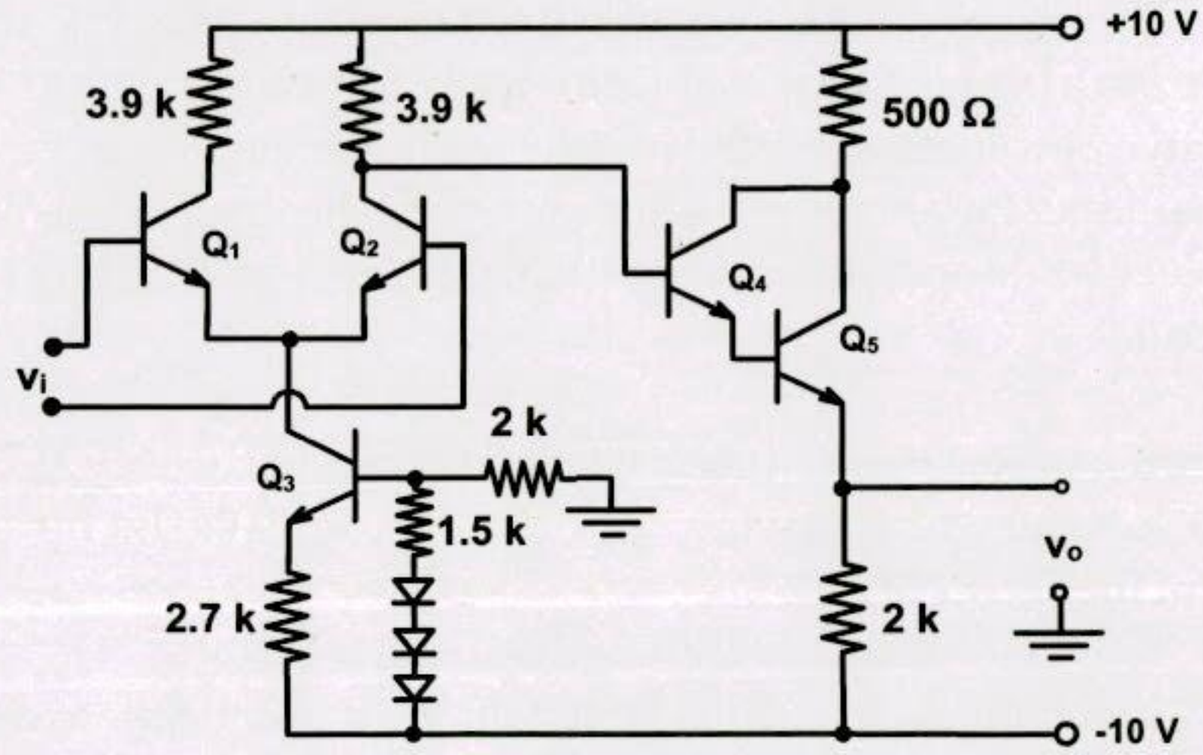
2. a) For the differential amplifier circuit shown in the figure, given that, V_{BE}= 0.7 V, V_D = 0.7 V, V_A = 80 V, β = 100. Find the following. **(20)**

(i) Dc operating currents and voltages,

(ii) Differential gain (A_d),

(iii) Common mode gain (A_c),

(iv) Common mode rejection ratio (CMRR), and



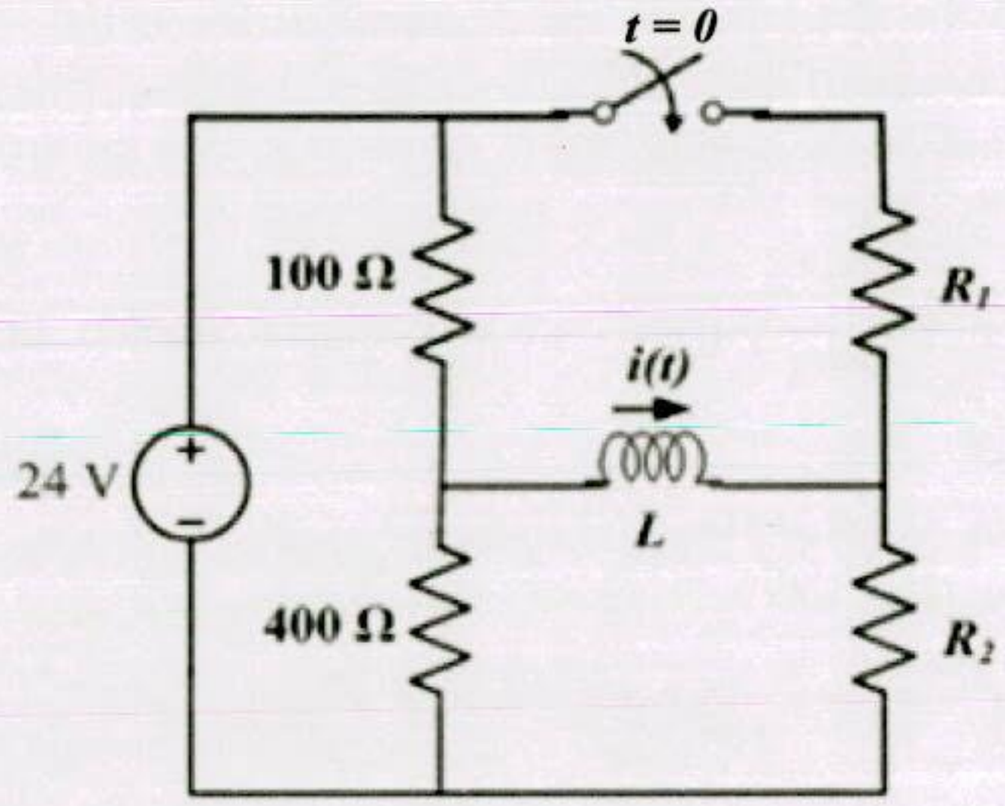
b) Consider the signal $x(t) = \cos^2(1000\,\pi t) + 3\cos(6000\,\pi t)$. What is the Nyquist rate (minimum sampling frequency) for $x(t)$?
If the signal is passed through an ideal low-pass filter having cut-off frequency 2kHz, What is the Nyquist rate for the output signal? **(20)**

c) Design a digital logic circuit that has three one-bit inputs A, B, and C. Its output Z will be HIGH only when a majority of the inputs are HIGH. **(10)**

3. a) For the circuit shown in the figure, before $t = 0$ the switch was in open position for a long time. At $t = 0$, the switch is closed. The current $i(t)$ is given by

$$i(t)=15+53.6e^{-548t}mA \text{ for } t > 0.$$

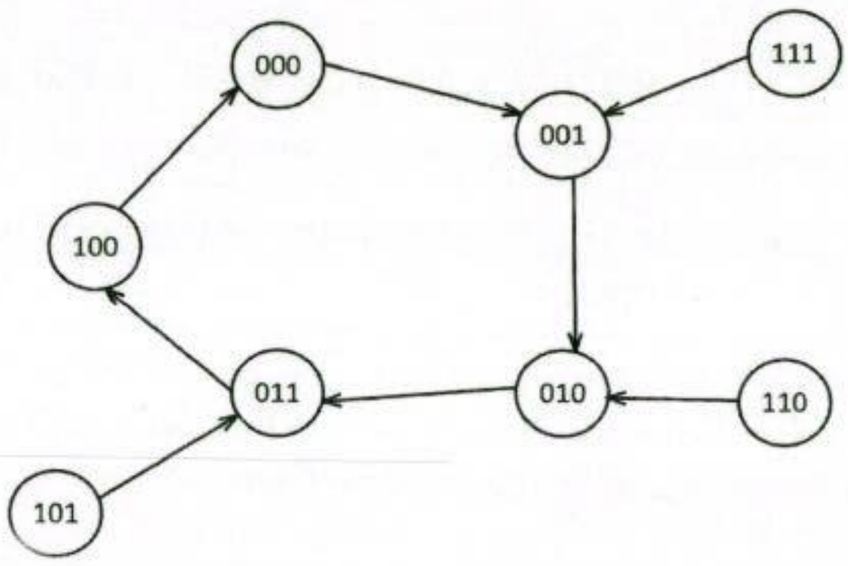
Determine the values of R_1, R_2, and L. **(20)**



b) A three phase 50 Hz, 3300 V/ 220 V transformer has an apparent power rating of 20 kVA. The iron loss is 160 W and full load copper loss is 1%. If this transformer is connected to a 0.8 lagging power factor load of 14.96 kW on 220 V side then find the input active power drawn by the transformer. Calculate the fraction of load at which this transformer has maximum efficiency. Find the input active power drawn by the transformer while operating at maximum efficiency and feeding a 0.9 leading power factor load. **(20)**

c) A zero-mean white Gaussian noise with power spectral density $N_0/2$ is passed through an ideal low-pass filter having cut-off frequency 10kHzPlot the power spectral density of the filter output. **(10)**

4. a) Design a synchronous sequential circuit for the state transition diagram shown in the figure using Dflip-flops. What is the function of the designed sequential circuit?**(20)**

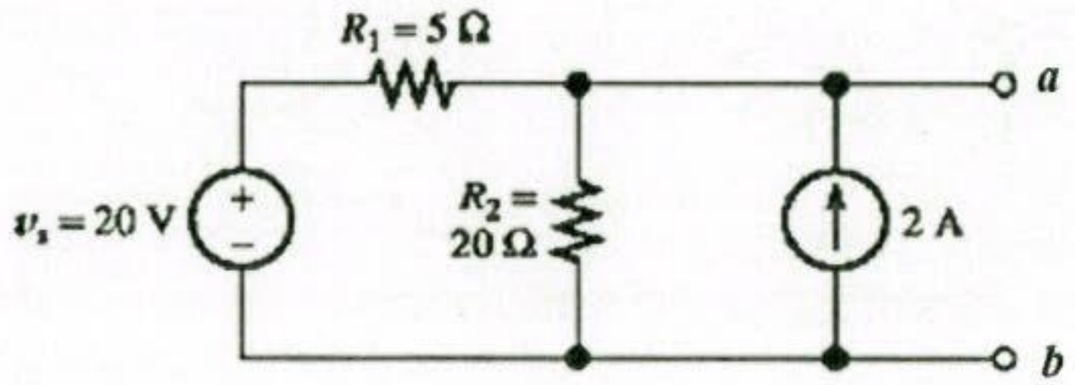


b) A three-phase half controlled bridge converter charges the battery from a 400 V, 50 Hz three-phase supply. The battery open circuit emf is 200V, and the internal resistance is 0.4Ω. A large inductor is connected in series with the battery to maintain the current constant.

(i) Calculate the firing angle (in degrees), if the battery is charged with the constant current of 10A.

(ii) If the firing angle is kept at 35°, then calculate the magnitude of charging current. **(20)**

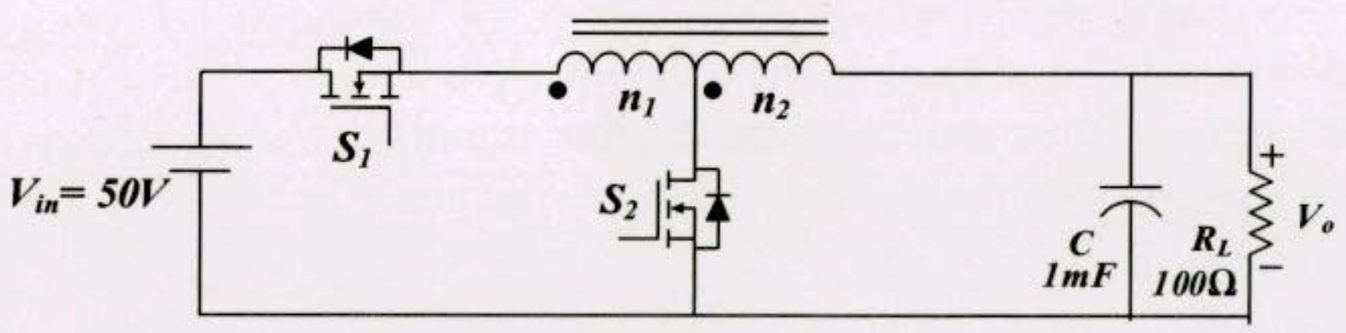
c) Find the Thevenin equivalent circuit with respect to the terminals *a*, *b* for the circuit shown in the figure. **(10)**



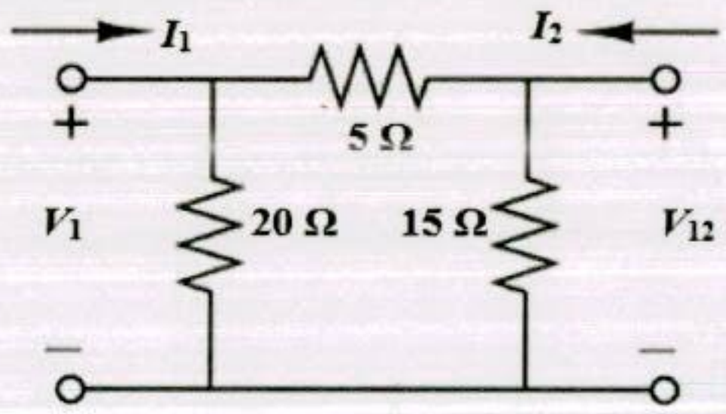
SECTION - B

5. **a)** A 250 V dc shunt generator is connected to a load, which draws 195 A. The generator has an armature resistance of 0.02 Ω and field resistance of 50 Ω. If stray loss in this generator is 950 W, then find the electrical efficiency, mechanical efficiency and generator efficiency. **(10)**

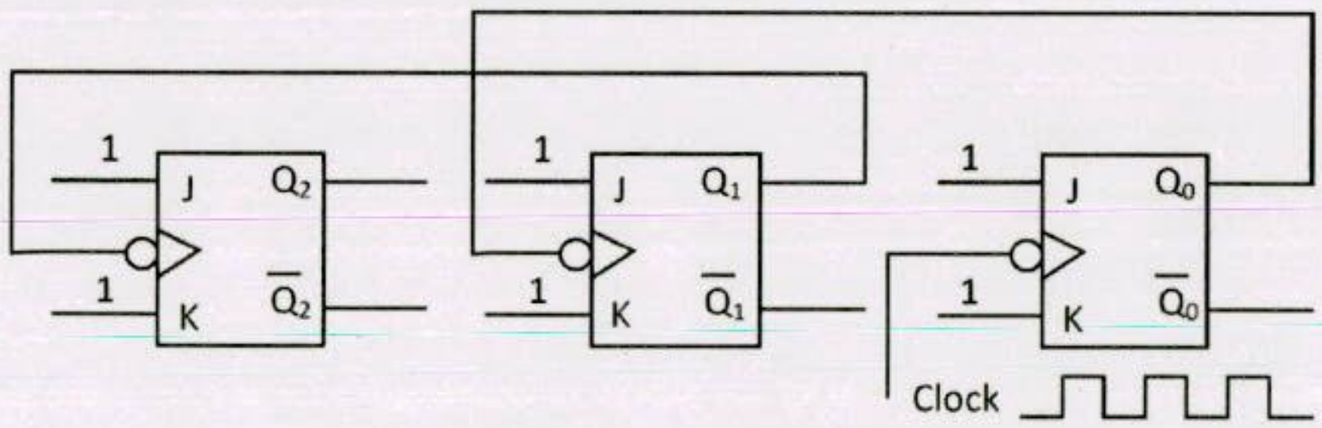
b) For the DC-DC converter shown in the figure, find the output voltage V_0. If the switches S_1 and S_2 are switched in a complementary manner with conduction period of S_1 and S_2 kept at 70μs and 30μs, respectively. The switching frequency of the switches is kept at 10kHz. The values of , $n_1=4$, $n_2=3$. Assume the switches are ideal and the converter is lossless. **(10)**



c) Find the T-equivalent of the circuit shown in the figure. **(10)**



d) Consider the digital circuit shown in the figure, all preset ($\overline{PRE}$) and clear ($\overline{CLR}$) of the JK Flip-Flops are HIGH. Sketch Q_0,Q_1, and Q_2 for 12 clock pulses.**(10)**

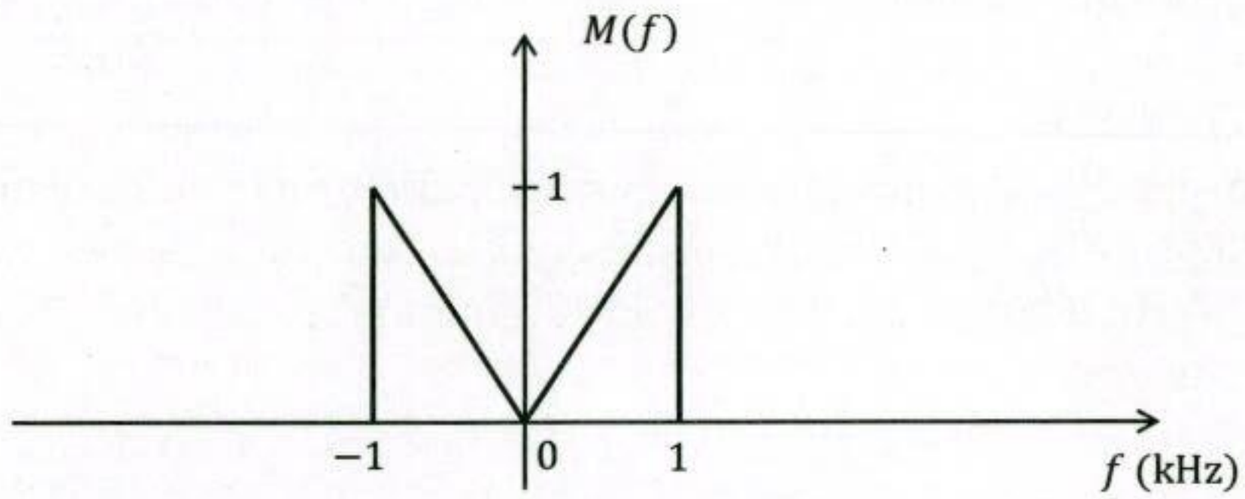


e) Consider an angle modulated signal given by

$$s(t) = 5\cos(\omega_c t + 4\sin 50\pi t + 2\sin 100\pi t + \sin 200\pi t)$$

Determine the peak frequency deviation, and estimate the bandwidth of $s(t)$ by using Carson's rule. **(10)**

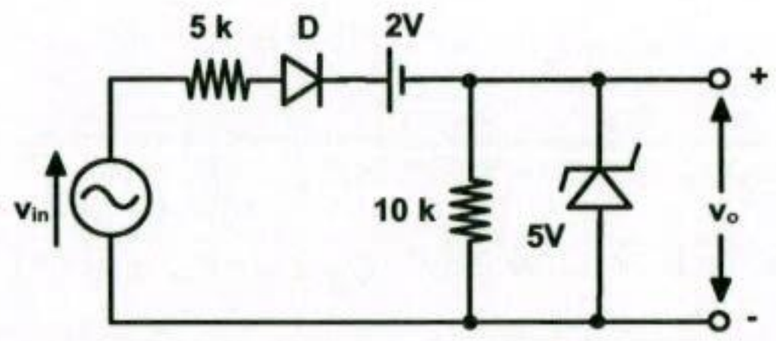
6. **a)** Consider a DSB-SC amplitude modulated signal
$s(t) = m(t)\ cos\ (2\pi f_c t)$.
where $m(t)$ is the message signal and f_c is the carrier frequency. Given f_c=10kHz.
The spectrum of the message signal is shown in the figure. **(20)**



(i) What is the bandwidth of the message signal?
(ii) Sketch the spectrum of the modulated signal.
(iii) What is the bandwidth of the modulated signal?

b) A 100 m long lossless transmission line operates at a frequency of 100 kHz and has an inductance of 30 μH and a capacitance of 20 nF.Find.
(i) Propagation velocity,
(ii) Phase constant, and
(iii) Characteristic impedance of the line. **(20)**

c) Draw the transfer characteristic of the circuit shown in the figure. The forward voltage drop of diodes is 0.7V.



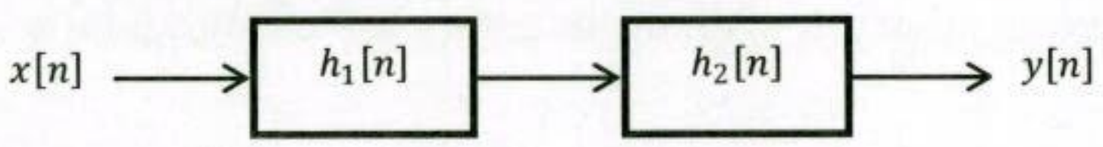
(10)

7. **a)** Two LTI systems, with the following impulse responses,are connected in cascade as shown in the figure.

$$h_1[n] = \delta[n] - \delta[n-1]$$

$$h_2[n] = \delta[n] + \delta[n-1]$$

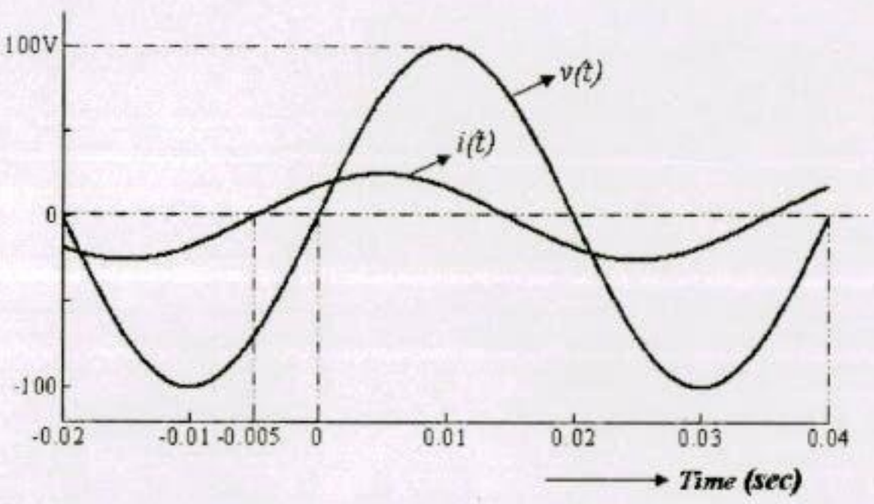
(a) Determine the overall impulse response of the cascade connection.
(b) Determine the output $y[n]$ of the system when the input $x[n] = u[n]$, where $u[n]$ is the unit sample sequence. **(20)**



b) A two-element series circuit is connected across an ac supply. The waveforms of the applied voltage $v(t)$ and current $i(t)$ are shown in the figure. If one of the elements is a resistance of 2 Ω, determine

(i) The second element in the series circuit,

(ii) The reactive power consumed by the series circuit. **(20)**



c) A three-phase, 400 V, 50Hz, 1460rpm, 4-pole, star connected squirrel cage induction motor is fed from a voltage source inverter (VSI) operating at constant flux. The VSI is fed from a three-phase fully controlled rectifier having 440 V, 50 Hz mains input. If the VSI is operated in 180° conduction mode, calculate the firing angle of the rectifier for the motor speed of 800rpm at rated torque. **(10)**

8. a) A synchronous generator with synchronous reactance of 0.8 pu is connected to an infinite bus at rated voltage. With its excitation voltage adjusted to 1.3 pu, the synchronous generator delivers an output power of 0.5 pu. Neglect all the losses and take infinite bus as reference voltage.

(i) Calculate (a) Load angle, (b) Armature current, (c) Power factor, and (d) Reactive power exchanged.

(ii) If it is desired to generate maximum output power at same excitation voltage, then calculate (a) Load angle, (b) Armature current, (c) Power factor, and (d) Reactive power exchanged. **(20)**

b) The no-load and blocked rotor test results for a three-phase, star-connected, 50 Hz, 2000 hp, 6 pole induction motor with a stator phase resistance of 0.015 Ω are given below:

Test	Input voltage (kV)	Line current (A)	Three phase power (kW)
No load test	2.3	25	11
Blocked rotor test	0.47	400	75

Determine the per phase equivalent circuit parameters assuming stator and rotor reactance to be equal. **(20)**

c) A plane wave travelling in a medium of $\epsilon_r = 1, \mu_r = 1$ has an electric field intensity of $50\sqrt{\pi}$ V/m. Determine the total energy density. **(10)**

(16)

Total No. of Printed Pages-3|

CC(M)

ENGLISH LITERATURE

(OPTIONAL)

PAPER - I

[25]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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

i) *There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in All. Question **No.1** and **5** are compulsory and out of the remaining, any **Three** are to be attempted choosing at least **One** question from each Section. The number of marks carried by a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer (QCA) Booklet in the space provided.*

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

iii) *If you encounter any typographical error, please read it as it appears in the text book.*

iv) *Candidates are in their Own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.*

v) *No continuation sheets shall be provided to any candidate under any circumstances.*

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

SECTION-A

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

1. a) Renaissance Humanism. **(10)**

b) Epic Simile **(10)**

c) Jacobean Drama **(10)**

d) Imagination in Romantic Literature. **(10)**

e) Victorian Morality. **(10)**

2. a) Critically comment on John Donne's idea of death and love with reference to his poetry. **(20)**

b) "Nothing will come of nothing..." Discuss William Shakespeare's *King Lear* in the light of this statement. **(15)**

c) In what ways does *The Tempest* by William Shakespeare problematise the politics of racism and social hierarchy? **(15)**

3. a) Comment on the thematic significance of the sublime in William Wordsworth's 'Tintern Abbey' and 'Upon Westminster Bridge'. **(20)**

b) Discuss John Milton's idea of the evil and his portrayal of Satan in *Paradise Lost* Book I and IX. **(15)**

c) Contextualise Alfred Tennyson's 'In Memoriam' with reference to the conventions of the Elegiac Tradition In Literature. **(15)**

4. a) Does Alexander Pope's *The Rape of the Lock* extend the mock epic tradition to early eighteenth century as representative of neoclassical aesthetics? Comment. **(20)**

b) Write a critical essay on William Wordsworth's love for nature as articulated in 'Three years to grow' and 'She dwelt among untrodden ways'. **(15)**

c) Nora in Henrik Ibsen's *A Doll's House* subverts accepted notions of matrimony and patriarchal discourse. Discuss. **(15)**

SECTION-B

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

Keep Cats

If you want to learn to cope with

the otherness of lovers

Otherness is not always neglect

Cats return to their litter trays
When they need to.
Don't cuss out of the window
at their enemies
That stare of perpetual surprise
in those great green eyes
will teach you
to die alone

a) Comment critically on the theme of the poem. **(10)**

b) Elaborate on the relevance of the phrase 'the otherness of lovers'. **(10)**

c) Analyse the significance of the 'litter trays' with reference to cats in the poem. **(10)**

d) How does the poet use irony in the poem? **(10)**

e) Write a short note on the metaphor of the cat in the poem. **(10)**

6. a) Discuss Jonathan *Swift's Gulliver* Travels from the perspective of narrative and genre. **(20)**

b) Scholars and critics have warned not to invest the title of Jane Austen's *Pride and Prejudice* with more significance than is warranted. Comment. **(15)**

c) Offer a critical reading of Mark Twain's *The Adventures of Huckleberry Finn* within the context of African-American multiculturalism. **(15)**

7. a) Discuss Henry Fielding's *Tom Jones* as a bildungsroman. **(20)**

b) How does the novel *Hard Times* by Charles Dickens offer a socio economic critique of capitalist ethos? **(15)**

c) Write a critical essay on the structure of George Eliot's *The Mill on the Floss* and its relation to Eliot's views on womanhood in contemporary times. **(15)**

8. a) Analyse critically Jane Austen's treatment of love, marriage and class in *Pride and Prejudice*. **(20)**

b) Comment critically on the title of *Hard Times* by Charles Dickens. **(15)**

c) Does Tess in Thomas Hardy's *Tess of the d'urbervilles* interrogate given notions of sexual, moral and patriarchal norms in nineteenth century England? Give a reasoned answer. **(15)**

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Total No. of Printed Pages-3]

CC(M)

GEOGRAPHY

(OPTIONAL)

PAPER - I

[27]

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.*

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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

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

1. a) Discuss the views of Penck challenging Davis's concept of cycle of erosion.

   b) Describe the role of man in global ecological imbalance.

   c) Give an account of the major gene pool centres of the world.

   d) Explain the factors responsible for the eustatic changes.

   e) Explain the increasing cases of marine pollution and its mitigation strategies.

2. a) With suitable diagrams discuss the formation of depositional landforms produced by glaciers. **(20)**

   b) Give an account of the factors influencing world distribution of plants and animals. **(15)**

   c) Explain the impact of ENSO Modoki on the global climate. **(15)**

3. a) Describe the significance of the hill ranges of the Peninsular India. **(20)**

   b) Explain the role of National Green Tribunal for the environmental awareness in India. **(15)**

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

4. a) With suitable diagrams describe the pressure belts and permanent wind systems of the earth. **(20)**

   b) Explain the cases and consequences of increasing frequency of cyclones in the Bay of Bengal. **(15)**

   c) Give an account of the evidences in support of the Continental Drift Theory. **(15)**

SECTION - B

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

5. a) Discuss the Spheres of urban influence in the context of increasing million plus cities in India.

   b) Explain the geo-political significance of buffer zones.

   c) Explain 'population as social capital' in Indian context.

   d) Describe the concept of nation and state in the context of Israel and Palestine war.

   e) Briefly explain the behavioural approaches in Human Geography.

6. a) How system's approach is different from the regional approach? Explain. **(20)**

b) Describe the challenges and ways for the sustainable development of cities in India. **(15)**

c) Discuss the current trend of the world population growth and related socio economic problems. **(15)**

7. a) Critically examine the suitability of the Von Thunen's agricultural locations theory in the Indian conditions. **(20)**

b) How Primate City concept is different from Rank-Size rule concept? Explain. **(15)**

c) Briefly explain the Laws of international boundaries and frontiers in the context of growing enmity between countries. **(15)**

8. a) Describe the characteristics and distribution of major groups of mankind in the world. **(20)**

b) Explain world food and nutrition problems with special references to the developing countries and suggest the remedies. **(15)**

c) Discuss the types and patterns of the rural settlements with suitable examples. **(15)**

Total No. of Printed Pages-3]

CC(M)

GEOLOGY

(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.*

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

SECTION - A

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

1. a) Draw and describe the layered structure of earth in terms of chemically distinct layers. **(10)**

b) Distinguish between glacial and mature stage river valleys. **(10)**

c) Discuss use of primary sedimentary structures in determining the top of the beds. **(10)**

d) What is isostacy? Briefly describe principal models of isostacy. **(10)**

e) Draw the electromagnetic spectrum and mark the regions used by optical sensors and microwave sensors in remote sensing? **(10)**

2. a) List and describe coastal geomorphic processes. Discuss both erosional and depositional landforms. **(20)**

b) Describe historical context of the theory of Continental drift and evidence supporting it. **(15)**

c) Describe texture which describe relationship between deformation and metamorphism. Illustrate the answer with sketches. **(15)**

3. a) Describe in detail the various types of interference patterns of folds, illustrating your answer with suitable sketches. **(20)**

b) Compare and evaluate the geological data available through modern satellite imagery in comparison to that obtained through aerial photographs? **(15)**

c) Which type of meteorites preserve the earliest evidence of the nature of solar system? Discuss with examples. **(15)**

4. a) Discuss the theories of accretion and differentiation of earth. What is Iron Catastrophy and what is generally considered as the source/s of heat for this event? **(20)**

b) Using topography and geology, how one can estimate dip direction from a geological map? Discuss and illustrate your answer by the use of Rule of V's. **(15)**

c) What is chemical weathering and how it is related to the carbon cycle. **(15)**

SECTION-B

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

5. a) Describe the genetic classification of sub-surface water. **(10)**

b) Briefly describe the Cretaceous-Paleogene boundary in India. **(10)**

c) Describe paleoclimatic fluctuations during the deposition of Gondwana sediments inferred through the fossils and sediments. **(10)**

d) Discuss the western and eastern syntaxial bends in the context of evolution of Himalaya. **(10)**

e) Describe basic features of rain-water harvesting in water-scarce regions. **(10)**

6. a) Define "Precambrian" and its division with approximate time periods. Discuss in brief the rock sequences representing this time period in India. **(20)**

b) Describe significant fossils from marine Palaeozoic rocks of India. **(15)**

c) Describe different types of porosity. Differentiate between porosity and permeability. What type of porosity controls groundwater in a granitic terrain? **(15)**

7. a) Define landslides and describe different types of landslides with illustrations. Differentiate between rotational and translational landslides. **(20)**

b) Describe Hadean rock record on earth. **(15)**

c) Discuss and describe the types of mineral-walled microfossils with examples, illustrations and age ranges. **(15)**

8. a) Describe mammal faunal assemblage from the Siwalik and equivalent rocks from India and adjacent regions. Discuss this in the context of evolution of vertebrates. **(20)**

b) What do you understand by Indus-Tsangpo-Suture Zone (ITSZ)? What is its significance in understanding the evolution of Himalaya? Describe atleast two localities from where ITSZ has been reported. **(15)**

c) Describe engineering properties of rocks relevant for use as construction material. **(15)**

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Total No. of Printed Pages-3]

CC(M)

HINDI

PAPER - I

[28]

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

INSTRUCTIONS

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

*i) There are **EIGHT** questions divided in **Two** Sections and printed in **HINDI.***

*ii) Candidate has to attempt **FIVE** questions in all.*

*iii) Questions **No. 1** and **5** are compulsory and out of the remaining, **THREE** are to be attempted choosing at least **ONE** question from each Section.*

iv) The number of marks carried by a Question/Part is indicated against it.

v) Answers must be written in the medium authorized in the Admission Certificate which must be stated clearly on the cover of this Question-cum-Answer (QCA) Booklet in the space provided. No marks will be given for answers written in a medium other than the authorized one.

vi) Word limit in questions, wherever specified, should be adhered to.

vii) Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

खंड–1

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

1. क) पूर्वी हिंदी और पश्चिमी हिंदी में अंतर

   ख) देव नगरी लिपि की वैज्ञानिकता

   ग) प्रयोजन मूलक भाषा

   घ) त्रिभाषा सूत्र

   च) यूनिकोड और हिंदी

2. क) काव्यभाषा के रुप में ब्रज भाषा की विशेषताएं बताइए. **(20)**

   ख) हिंदी की प्रमुख बोलियों और उनके परस्पर संबंध पर प्रकाश डालिए। **(15)**

   ग) विज्ञान एवं तकनीकी के क्षेत्र में हिन्दीं की स्थिति स्पष्ट कीजिए। **(15)**

3. क) "हिन्दी नई चाल में ढली" इस कथन के आधार पर भारतेंदु की भाषा शैली पर प्रकाश डालिये। **(20)**

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

   ग) राज भाषा और राष्ट्र भाषा में अंतर स्पष्ट कीजिए। **(15)**

4. क) हिन्दी सूफी काव्य में निहित सांस्कृतिक समन्वय पर प्रकाश डालिए। **(20)**

   ख) काव्यभाषा के रुप में अवधी भाषा की विशेषताएं बताइए। **(15)**

   ग) दक्खिनी हिन्दी की विशेषताएं बताइए। **(15)**

खंड–2

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

5. क) छायावादी काव्य में प्रेम

   ख) जायसी अवधी के अरघान हैं।

   ग) वर्तमान सन्दर्भ में कबीर की प्रासंगिकता

   घ) तुलसी के राम

   च) बिहारी की श्रृंगारिकता

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

   ख) हिंदी के ललित निबंधो के सांस्कृतिक पक्ष पर प्रकाश डालिए। **(15)**

   ग) समकालीन हिंदी रंग मंच पर प्रकाश डालिए। **(15)**

7. क) वस्तु और संवेदना की दृष्टि से समकालीन कहानी के वैशिष्ट्य की विवेचना कीजिए। (20)

ख) हिंदी साहित्य के इतिहास लेखन में नामकरण की समस्या पर प्रकाश डालिए। (15)

ग) आत्मकथा और डायरी लेखन के स्वरुप को रेखांकित करते हुए दोनों के अंतर को स्पष्ट कीजिए। (15)

8. क) जयशंकर प्रसाद के नाटकों में व्यक्त राष्ट्रिय एवं सांस्कृतिक चेतना पर प्रकाश डालिए। (20)

ख) 'छायावादी काव्य में व्यक्त राष्ट्रीय चेतना'–पर संक्षिप्त निबंध लिखिए। (15)

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

(20)

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Total No. of Printed Pages-4]

CC(M)

HISTORY

(OPTIONAL)

PAPER - I

[31]

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

Mark the following places on the map with a short note not exceeding 30 words.

(20×2.5=50)

1. i. Lothal
   ii. Burzahom
   iii. Rakhigarhi
   iv. Langhnaj
   v. Pattadakal
   vi. Sankissa
   vii. Halebidu
   viii. Bhimbetka
   ix. Sarnath
   x. Ellora Caves
   xi. Poompuhar
   xii. Bidar
   xiii. Devagiri
   xiv. Jajnagar
   xv. Sirpur
   xvi. Patan
   xvii. Muziris
   xviii. Dasarna
   xix. Rameshwaram
   xx. Korkai

2. a) Examine the intricate social, economic, and environmental factors that may have contributed to the sustainability of the Indus Valley Civilization for over 700 years. How did these factors interplay and eventually influence the civilization's continuity and ultimate decline? **(20)**

   b) What are some key features that distinguish the Neolithic and Chalcolithic cultures in India, and how did the shift from stone tools to metal tools impact the daily lives of these communities? **(15)**

   c) Explore the significance of the later Vedic texts, such as the Brahmanas and Upanishads, in the development of Indian philosophy, religious thought, and social structure. How did these texts pave the way for the evolution of classical Indian civilization, and what were their lasting influences? **(15)**

3. a) What were some of the main policies and edicts implemented by Emperor Ashoka during his rule, and how did these policies contribute to the promotion of moral and ethical values in ancient India? **(20)**

b) What are the fundamental teachings and beliefs of Buddhism and Jainism, and how did these two ancient Indian religious traditions influence the spiritual and ethical landscape of the Indian subcontinent? **(15)**

c) What economic policies and measures did Ashoka implement as part of his Dhamma to ensure the welfare and prosperity of his subjects, and how did these policies impact the economic stability of the Mauryan Empire? **(15)**

4. a) What are the distinctive characteristics and artistic contributions of major schools of art in ancient India, such as the Gandhara, Mathura, and Ajanta schools, and how did they reflect the cultural diversity and evolution of artistic expressions in the subcontinent? **(20)**

b) What were the primary functions and roles of guilds in ancient India, and how did they impact local trade, craftsmanship, and community welfare during that time? **(15)**

c) Explore the Gupta Empire's foreign relations and connections with other contemporary civilizations, such as the Roman Empire and Southeast Asian states. How did these interactions influence trade, culture, and the exchange of knowledge during the Gupta Age? **(15)**

SECTION - B

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

5. a) Evaluate *Arthashastra* as a source of history.

b) What are the primary crops and domesticated animals that were central to the agricultural practices of the Indus Valley people, and how did these resources contribute to the sustenance of their society?

c) Who were the Sufi saints, and what was their primary focus in Islamic spirituality?

d) What role did Indian Ocean trade play in connecting different regions, and how did it influence the economies and societies of the participating cultures during late ancient history?

e) What were the major trade and economic developments in medieval India?

6. a) What were some notable scientific and technological advancements and contributions made by ancient Indian scholars, and how did these innovations influence both Indian society and global knowledge? **(20)**

b) How did the Bhakti movement challenge the established religious and social norms of its time in India, and what were the broader cultural and political implications of this religious reform movement? **(15)**

c) How did the construction techniques and purposes of rock-cut caves, such as the Karla Caves and Badami Cave Temples, differ across various regions in India, and what do these differences reveal about the cultural and religious diversity of ancient India? **(15)**

7. a) What were the key socio-political challenges faced by the Khilji dynasty during their rule, and how did they manage to navigate these challenges while shaping the medieval history of India, particularly in the context of their administration, military expansion, and economic policies? **(20)**

b) What were the key factors that contributed to the downfall of the Lodhi dynasty and the rise of the Mughal Empire in India, and how did this transition impact the subsequent history of the Indian subcontinent? **(15)**

c) What were some of the main reasons that foreign travelers like Marco Polo and Hiuen Tsang visited India, and what were the key observations they made about the country during their Journeys? **(15)**

8. a) How did the development of port cities like Calicut, Masulipatnam, and Surat contribute to the growth of Indian maritime trade during the late medieval period, and what were the key commodities and trade routes that characterized this era of Indian maritime commerce? **(20)**

b) How did Shivaji's approach to local governance, including the establishment of forts and the concept of self-sufficient villages, contribute to the stability and prosperity of the Maratha state during his rule? **(15)**

c) What were the architectural and artistic achievements during the reign of the Tughlaq dynasty in the Delhi Sultanate, and how did their architectural endeavors, like Tughlaqabad and Firoz Shah Kotla, contribute to the cultural and urban development of the region? **(15)**

Roll No._____ Total No. of Printed Pages - 4

CC(M)

KASHMIRI - I

[30]

Time Allowed : 3 Hours **Maximum Marks : 250**

(Answer must be written in Kashmiri)

جواب دِنہٕ بزٕوٹھہ پُرٕ سوالن متعلق خاص ہدایات۔

۱۔ یتھ پرچس چھِ اَٹھ سوال یم دون حصن (سیکشن) پٹھ مشتمل چھِ۔

۲۔ توہہٕ چھِ کُل پانزٕہ سوالن ہِنٛدٕ جواب دِنٛ۔

۳۔ سوال نمبر 1 (اکھ) تہٕ سوال نمبر 5 (پانزٕہ) جواب دِیُن چھُ لازمی۔

۴۔ دو یو سیکشنو منز چھِ باقی تز ہن سوالن ہِنٛدٕ جواب دِنٛ۔ مگر پزتھ سیکشن کیٚو سوالو منز چھِ کم کھوتہٕ کم اکہٕ سوالُک جواب دِیُن ضرٕوری۔ پزتھ سوالس تہٕ سوالکس حصس بزٕوٹھہ کنہٕ چھِ نمبر (Marks) دٕرج کرنہٕ آہٕتی۔

۵۔ سوالن ہِنٛدٕ جواب دِنہٕ باپتھ چھُ لفظن ہُنٛد تعداد مُقرر کرنہٕ آمُت۔ اچ پابندی کٕرنی چھِ لازمی۔

۶۔ سوالن ہِنٛدٕ ہن جوابن ہٕیہٕ ترتیب وار اہمیت دِنہٕ۔

۷۔ اگر کُنہٕ سوالُک یا تمکہٕ کُنہٕ حصُک لیکھنہٕ آمُت جواب توہہٕ مُجراہ چھُنہٕ یژھان تھاؤن، تتھ گژھ کٕراس دِیُن۔ تہٕ ہٕیہٕ سُہ جواب تصوٚر کرنہٕ۔ یوٚ دوٚے سُہ جواب اڈٕلیوٚ کے تہٕ آسہٕ۔

۸۔ کانہٕ صفحہ یا صفحٕک حصہٕ اگر خالی روزِ تتھ گژھ کٕراس دِیُن۔

SECTION - A

1. یمن پیٹھ لیکھو نوٹ۔ (پنتھ سوالک جواب 100 لفظن منز) (50)

(الف) ناوِتکی قسم (10)

(ب) کزاوتکی قسم (10)

(ج) صوتیم تہ امکی قسم (10)

(د) کاشُر جُملہ (10)

(ہ) کاشُر کی مصوتہ (10)

2. یمن سوالن لیکھو جواب۔ (50)

(الف) کاشُر زبانی ہُند مؤلہ آگر کنیاہ چھُ؟ (20)

(ب) کاشُر زبان چھا ہند آریائی زبان؟ (20)

(ج) کاشُر زبان کتہ کتہ چھ بولنہ یوان؟ (10)

3. یمن سوالن ہِندی جواب لیکھو۔ (50)

(الف) مصوتس تہ مصمتس درمیان فرق کُرِ دو واضح۔ (20)
(200 لفظن منز)

(ب) کاشُر س منز گرہ کفیز چھ کزاوتس؟ (20)

(ج) کزاوتی ترتیب کتھ چھ ونان؟ (10)

4. یمن سوالن ہِندی جواب لیکھو۔ (50)

(الف) سوالہِ جُملس تہِ سار جُملس درمیان کنیاہ فرق چھے ؟ (20)
(200 لفظن منز)

(ب) پورِ ناوے تہِ جُملہِ ملوٗن کتھ چھِ ونان؟ (20)
(200 لفظن منز)

(ج) کاشُرس منز کرٕ قسم چھِ جُملن؟ (10)
(100 لفظن منز)

SECTION - B

5. یمن پیٹھ لیکھو نوٹ۔ (پرتھ نوٹس گوٚشن 100 لفظ آسنٛ) (50)

(الف) لل دیدٕ تہِ شِوَمت (10)

(ب) شیخِ شُرٕ کہ (10)

(ج) کاشُر ڈرٲما (10)

(د) کاشُر نظم (10)

(ہ) کاشُر افسانہِ (10)

6. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) للہِ واکھن ہِندی فنی محاسن کرٕ وبیان۔ (20)
(200 لفظن منز)

(ب) شیخِ شُرٕ کمن ہُند لہجہِ کُتھ چھٕ؟ (20)
(200 لفظن منز)

(ج) ''واکھ'' کنیاہ گوٚو؟ (100 لفظن منز) (10)

Turn Over

7. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) کاشرِ ورشکی اہم موضوع کیاہ چھ؟ (20)
(200لفظن منز)

(ب) ''گلریز'' مثنوی ہُند امتیاز کیاہ چھ؟ (200لفظن منز) (20)

(ج) محمود گامی چھا کاشرِ غزلک بانی کار کنہ نہ؟ (100لفظن منز) (10)

8. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) مہجور نہ شاعری منز کاشُر سماج۔ (200لفظن منز) (20)

(ب) کاشرِ ڈرامہٕک اِبتداتہٕ اِرتقا۔ (200لفظن منز) (20)

(ج) کاشرِس منز نظم نگاری۔ (100لفظن منز) (10)

Roll No._____ Total No. of Printed Pages-4

CC(M)

KASHMIRI

PAPER - I

[30]

Time Allowed - 3 Hours *Maximum Marks - 250*

(Answer Must be written in kashmiri)

جواب دِنہٕ بروٗ نہٕ پُرٕ سوالن متعلق خاص ہدایات۔

۱۔ یتھ پرچس منز چھِ آٹھ سوال یم دون حصن (سیکشنن) پٹھ مشتمل چھِ۔

۲۔ توہٕ چھِ کُل پانزٕہ سوالن ہندٕ ک جواب دِنٛ۔

۳۔ سوال نمبر 1 (اکھ) تہٕ سوال نمبر 5 (پانزٕہ ک) جواب دِیُن چُھ لازمی۔

۴۔ دویو سیکشنو منز چُھ باقی تزٕہ سوالن ہُند جواب دِیُن۔ مگر پزٕ تھ سیکشن کہٕ سوالو منز چُھ کم کھوٚتہٕ کم اکہٕ سوالک جواب دِیُن ضروری۔ پزٕ تھ سوالس تہٕ سوالکس حصس برونہٕ کنہٕ چھِ (Marks) درج کرنہٕ آہٕتۍ۔

۵۔ سوالن ہُند جواب دِنہٕ باپتھ چُھ الفاظن ہُند تعداد مقرر کرنہٕ آمُت۔ اَمچ پابندی کرٕ فی چھےٚ لازمی۔

۶۔ سوالن ہندٕ ن جوابن یٖیہٕ ترتیب وار اہمیت دِنہٕ۔

۷۔ اگر کُنہٕ سوالک یا تمکہٕ کُنہٕ حصٕک لکھنہٕ آمُت جواب تُہٕ مُجرا چھونہٕ یژھان تھاوٗن، تتھ گژھ کراس دِیُن۔ نتہٕ یٖیہٕ سُہ جواب تصور کرنہٕ، یٖدوٗ سُہ جواب اڈلیو کےٚ تہٕ آسہٕ۔

۸۔ کانہٕ صفحہ یا صفحٕک کانہٕ حصہ اگر خالی روزِ، تتھ گژھ کراس دِیُن۔

SECTION - A

1. یمن پٹھ لیکھو نوٹ۔ (پڑتھ سوالک جواب 100 الفاظ منز) (50)

(الف) سوالہ جملہ۔ (10)

(ب) صوتی بولن تان۔ (10)

(ج) جُملیات۔ (10)

(د) ڈکھہ کراوٗت۔ (10)

(ہ) صوتیم تہٕ امکی قسم۔ (10)

2. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) کاشر زبانٕ ہُند نسبی رشتہ۔ (200 الفاظ منز) (20)

(ب) کاشر زبانٕ متعلق گریرن سنز راے۔ (200 الفاظ منز) (20)

(ج) کاشرس منز علاقہ وار بولن ہُند پھیر۔ (100 الفاظ منز) (10)

3. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) مصوتہ کیاہ گوٗ و تہٕ امکی قسم۔ (200 الفاظ منز) (20)

(ب) کفیژ بدلاوٕ کنٕ کم صوتیمی تبدیلیہ چھےٚ کراوٗنٕ ترکیبہ منز یوان؟ (200 الفاظ منز) (20)

(ج) کاشرس منز اشارہ ناوٗت۔ (100 الفاظ منز) (10)

4. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف)۔ کاشر بن جملن منز حالت یا کیس۔ (200 الفاظ منز) (20)

(ب)۔ جملہ واٹون ۔ حوالہ ناوٗنے۔ (200 الفاظ منز) (20)

(ج)۔ سادٕ جملہ۔ (100 الفاظ منز) (10)

SECTION - B

5. یمن پیٹھ لیکھو نوٹ۔ (پنتھ سوالک جواب۔ (100 الفاظ منز) (50)

(الف)۔ شیخ العالم تہ ریشت۔ (10)

(ب)۔ للہ واکھ۔ (10)

(ج)۔ غزل (10)

(د)۔ مثنوی۔ (10)

(ہ)۔ ترقی پسندی۔ (10)

6. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) لل دیدِ ہنز شاعری ہُند فکری پوت منظر۔ (200 الفاظ منز) (20)

(ب) شیخہ شُرکین منز شیخ العالمہؒ زمانکی سماجی عکس۔ (200 الفاظ منز) (20)

(ج) شرکین تہ واکھن درمیان ہشر۔ (100 الفاظ منز) (10)

7. یمن سوالن ہُند جواب لیکھو۔ (50)

(الف) حبہ خاتونہ ہُند وژن اوس روایتی شاعری نشہ مختلف۔ (200 الفاظ منز) (20)

(ب) کاشر مثنوی محمود گامی سُند دیُت۔ (200 الفاظ منز) (20)

(ج) رسول میرن اون کاشر س غزلس منز نوبر۔ (100 الفاظ منز) (10)

8. ہیٹھ سوالن ہُندے جواب لکھو۔ (50)

(الف) عبدالاحد آزاد ہے شاعری پٹھ ترقی پسندی ہُنداثر۔ (200 الفاظ منز) (20)

(ب) کاشر افسانہ بارس پٹھ محرکات۔ (200 الفاظ منز) (20)

(ج) کاشر ناولک ابتداء تہ ارتقاء ۔ (100 الفاظ منز) (10)

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Total No. of Printed Pages-3]

CC(M)

LAW

(OPTIONAL)

PAPER - I

[33]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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

*i) There are **Eight** questions divided in **Two** Sections and printed in English. Candidate has to attempt **Five** questions in all. Question **No. 1** and **5** are compulsory and out of the remaining, any **Three** are to be attempted choosing at least **One** question from each Section. The number of marks carried by a Question/Part is indicated against it. Answers must be written in English in Question-Cum-Answer (QCA) Booklet in the space provided.*

ii) Your answer should be precise and coherent.

iii) If you encounter any typographical error, please read it as it appears in the text book.

iv) Candidates are in their own interest advised to go through the general instructions on the back side of the title page of the Answer Script for strict adherence.

v) No continuation sheets shall be provided to any candidate under any circumstances.

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

SECTION-A

Write short notes on the following. **(5×10=50)**

1. a) Doctrine of Waiver.

b) Exceptions to the doctrine of *Audi alteram partem.*

c) Sub- delegation.

d) Explain the concept of Curative Petition.

e) 'Right to property is not a fundamental right'. Comment.

2. a) Explain the nature of restrictions that may be imposed on the freedom of speech and expression guaranteed under the Constitution of India. Can a blanket ban be imposed on all communication in the name of internet security? Refer to relevant constitutional provisions and case laws. **(20)**

b) What protections does the Constitution guarantee to persons who are detained under any law providing for preventive detention in India? Explain. **(15)**

c) Examine critically the Status, powers and duties of Ombudsman in India. **(15)**

3. a) Discuss the nature of the power of President to grant Pardon. Can the Supreme Court give directions in the disposal of an application asking for pardon? **(20)**

b) Interpret the term 'consultation' used in Articles 124 and 217 of the Constitution, dealing with appointment of judges. Also comment critically if the collegium system has outlived its utility. **(15)**

c) Discuss the recent developments in laws relating to the appointment, conditions of service and term of office of the Chief election commissioner and other election commissioners. **(15)**

4. a) The Constitutional provisions relating to freedom of trade, commerce and intercourse throughout the territory of India seek to establish a common and barrier free market in India. Critically examine in the light of judicial interpretation of Articles 301 and 304 of the Constitution of India. **(20)**

b) Article 254 provides for a method of resolving conflicts between a law made by the legislature of a State with respect to a matter falling in the concurrent list. Discuss **(15)**

c) Examine the applicability of *'Res-judicata'* in proceedings under Article 32 of the Constitution of India. Does it apply to cases of *Habeas Corpus* petitions? **(15)**

SECTION-B

Write short notes on the following. **(5×10=50)**

5. a) *Jus cogens.*

b) International law is positive morality.

c) Sources of International law.

d) What is the Wednesbury principle in administrative law?

e) COP 28.

6. a) What are the three principles of "Rule of Law" as defined by Dicey? What are the exceptions if any to the Rule of Law? Also discuss the role of judiciary in establishing rule of law in India. **(20)**

b) The idea of sovereignty over territory is fundamental to International law. Discuss. Also enumerate exceptions, if any, to the above rule. **(15)**

c) What are the essential ingredients of the Doctrine of *rebus sic stantibus* in treaty law. Discuss the approach of the ICJ regarding this doctrine. **(15)**

7. a) What is the significance of Ratification? Can a treaty be invoked against a State which has signed but not ratified it? Discuss the law and procedure on the conclusion of a treaty. **(20)**

b) What are the principal theories and the legal effects of Recognition? Also discuss the implications of withdrawal of recognition. **(15)**

c) In the light of recent trends in International law attaching direct responsibility for crimes and conferring rights even against the State of which such individuals are citizens or nationals, evaluate the place of Individual in International law? **(15)**

8. a) In the case of Colombia v. Peru (1950), it was held that 'there is either extradition or asylum'. Discuss the two concepts and comment whether they are related or exclusive? **(20)**

b) What are the key principles of International Humanitarian law? Also discuss the challenges faced in implementation of international humanitarian law. **(15)**

c) Enumerate the crimes over which the International Criminal Court has jurisdiction. How is the ICC different from the ICJ? Explain. **(15)**

Total No. of Printed Pages-3]

CC(M)

MANAGEMENT

(OPTIONAL)

PAPER - I

[35]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

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

1. a) Explain the concept of Innovation Management. **(10)**

b) What is the Semantic Barrier in communication? **(10)**

c) Suggest ways to make performance appraisal effective. **(10)**

d) Discuss common leadership styles. **(10)**

e) What is meant by managerial ethics? **(10)**

2. a) Define and differentiate between centralisation and decentralisation of authority. Critically evaluate the advantages and disadvantages of the two systems in organisational context. **(20)**

b) What is process Orientation in organisation context? How is process Orientation related to Customer orientation. **(15)**

c) What is Flexible Systems Management? What are its advantages? **(15)**

3. a) What are the main determinants of organizational culture? **(20)**

b) Discuss individual personality traits that are important in the recruitment process. **(15)**

c) What is a learning organisation? What are its characteristics? **(15)**

4. a) Discuss different methods of promotion of a product in consumer market. **(20)**

b) Describe various types of fringe benefits. **(15)**

c) Briefly explain different sources of external recruitment. **(15)**

SECTION - B

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

5. a) What are the limitations of financial statements? **(10)**

b) Explain the various types of media available for advertising . **(10)**

c) What is Economic Order Quantity? **(10)**

d) Distinguish between a share and a debenture. **(10)**

e) Discuss the uses of Marketing Research. **(10)**

6. a) For a company, sales are Rs.80,000, variable costs are Rs.4,000, and fixed costs are Rs.4,000. Calculate the following:

i) PVR,

ii) BEP (Sales),

iii) Margin of Safety, and

iv) Profit. **(5+5+5+5=20)**

b) Distinguish between relevant and irrelevant costs in managerial decision making with the help of examples. **(15)**

c) Discuss types of inventory control. **(15)**

7. a) Explain the functions of Securities and Exchange Board of India (SEBI). **(20)**

b) Discuss the determinants of the capital structure of a company. **(15)**

c) What is working capital? What are its components? **(15)**

8. a) What do you understand by market segmentation? Discuss criteria for successful market segmentation. **(20)**

b) Explain the factors that influence consumer buying behaviour. **(15)**

c) What is meant by internet marketing? Discuss its benefits and challenges. **(15)**

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(23)

Total No. of Printed Pages-4]

CC(M)

MATHEMATICS

(OPTIONAL)

PAPER - I

[37]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. a) Find the characteristic polynomial and minimal polynomial of the symmetric matrix A: $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$: Hence or otherwise prove that A is similar to a diagonal matrix. **(10)**

b) Find an integrating factor of $(y^2 + 2x^2y)dx - (xy - 2x^3)dy = 0$ and hence solve it. **(10)**

c) Find the volume enclosed by the surfaces $x^2 + y^2 = z, x^2+y^2 = 2x, z = 0$. **(10)**

d) If $f''(t) > 0, \forall t \in \mathbb{R}$, show that $f\left[\frac{1}{2}(x+y)\right] \leq \frac{1}{2}[f(x)+f(y)], \forall x, y \in \mathbb{R}$. **(10)**

e) Show that the equation $x^2 + 2yz - 1 = 0$ represents a quadric of revolution. Also find the axis of revolution. **(10)**

2. a) Prove that the shortest distance from the origin to the hyperbola:
$x^2 + 8xy + 7y^2 = 225, z = 0$ is 5 units. **(20)**

b) Let $T : P_2(\mathbb{R}) \to P_3(\mathbb{R})$ be the linear transformation defined by

$$T(f(x)) = 2f'(x) + 3\int_0^x f(t)dt.$$

Verify the rank-nullity theorem for T, and prove that T is one-to-one, but not onto. ($P_n(\mathbb{R})$ is the vector space of all polynomials with real coefficients having degree $\leq n$). **(15)**

c) Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = x^{-2}e^{-x}$ by the method of variation of parameters. **(15)**

3. a) Discuss the convergence of the following improper integrals: **(20)**

i) $\int_0^{\pi/2} \frac{\sin^p x}{x^q} dx$

(ii) $\int_0^{\infty} \left(\frac{1}{1+x} - \frac{1}{e^x}\right)\frac{dx}{x}$.

b) Let A be a unitary matrix such that $\lambda = -1$ is *not* an eigenvalue of A, then show that $A = (I + iH)^{-1}(I - iH)$, for some Hermitian matrix H. **(15)**

c) Find the equations of the line drawn parallel to $\frac{x}{4} = \frac{y}{1} = \frac{z}{1}$ so as to meet the lines **(15)**

$z = 5x - 6 = 4y + 3$

$z = 2x - 4 = 3y + 5.$

4. a) Investigate for what values of λ, μ the simultaneous non-homogeneous linear equations

$x + 2y + z = 8$

$2x + y + 3z = 13$

$3x + 4y + \lambda z = \mu$

have (i) no solution (ii) a unique solution (iii) infinitely many solutions. **(20)**

b) Show that all the spheres that can be drawn through the origin and each set of points where planes parallel to the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 0$ cut the coordinate axes, form a system of spheres which are cut orthogonally by the sphere $x^2 + y^2 + z^2 + 2bx - 2ay = 0$ **(15)**

c) Evaluate

$$\int_0^1 \int_0^{\sqrt{x-x^2}} \frac{xy\left(x^2 + y^2\right)}{\sqrt{x^2 - \left(x^2 + y^2\right)^2}} dxdy.$$ **(15)**

SECTION - B

5. a) Determine the orthogonal trajectories of the family of curves $y^2 - 2cx = c^2$.

Is this family of curves self-orthogonal? Justify. **(10)**

b) If a particle moving along a space curve has velocity $\vec{v}$ and acceleration $\vec{f}$, show that the radius of curvature ρ is given by $\frac{|\vec{v}|^3}{|\vec{v} \times \vec{f}|}$ **(10)**

c) Solve $\left(4y\frac{d^2y}{dx^2}-\left(\frac{dy}{dx}\right)^2\right)\left(\frac{dy}{dx}\right)^2=3$ **(10)**

d) Show that the locus of the point of intersection of three mutually perpendicular tangent planes to a central conicoid $ax^2+by^2+cz^2=1$ is a sphere centre at origin, the same as that of the given conicoid. What this sphere is called? **(10)**

e) A particle moves in a straight line towards a centre of force varying inversely as the cube of the distance from the centre, starting from rest at a distance a from the centre of the force. Find its velocity and the time of reaching a point distant b from the centre of force. **(10)**

6. a) Let V and W be finite - dimensional vector spaces (over the same field). Prove that V is isomorphic to W if and only if $\dim(V)=\dim(W)$. **(20)**

b) Find the locus of a line which meets the lines $y=mx$, $z=\pm c$ and the circle $x^2+y^2=1$, $z=0$. **(15)**

c) Use Laplace transforms to solve $\frac{d^2y}{dt^2}+4\frac{dy}{dt}+4y=t^3e^{-2t}$, $y(0)=0$, $y'(0)=0$. **(15)**

7. a) Show that the plane $z=0$ cuts the enveloping cone of the sphere $x^2+y^2+z^2=11$ which has its vertex at (2,4,1), in a rectangular hyperbola. **(20)**

b) Solve $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=\frac{1}{(1-x)^2}$, $x>1$. **(15)**

c) A uniform beam of length $2a$ rests with its ends on two smooth planes which intersect in a horizontal line. If the inclinations of the planes to the horizontal are α and $\beta(\beta>\alpha)$. Show that the inclination of the beam to the horizontal in one of the equilibrium positions is $\tan^{-1}\left((\cot\alpha-\cot\beta)/2\right)$, and the beam is unstable in this position. **(15)**

8. a) A particle, inside and at the lowest point of a fixed smooth hollow sphere of radius a, is projected horizontally with velocity $\sqrt{7ga/2}$. Show that it will leave the sphere at a height $3a/2$ above the lowest point and that its subsequent path meets the sphere again at the point of projection. **(20)**

b) Solve $x(x\cos x-2\sin x)\frac{d^2y}{dx^2}+(x^2+2)\sin x\frac{dy}{dx}-2(x\sin x+\cos x)y=0$. **(15)**

c) If $\vec{F}=(x^2+y-4)\hat{i}+3xy\hat{j}+(2xz+z^2)\hat{k}$, evaluate $\iint_S\left(\vec{\nabla}\times\vec{F}\right).\hat{n}\,dS$, where S is the surface of the sphere $x^2+y^2+z^2=16$ above the xy plane. **(15)**

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Total No. of Printed Pages-12]

CC(M)

MECHANICAL ENGINEERING

(OPTIONAL)

PAPER - I

(39)

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

INSTRUCTIONS

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iii) If you encounter any typographical error, please read it as it appears in the text book.

iv) Diagrams/Figures, wherever required shall be drawn in the space provided for answering the question itself.

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vi) No continuation sheets shall be provided to any candidate under any circumstances.

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

viii) Non Programmable Calculators are allowed.

SECTION-A

1. a) Consider four lamina's having same dimensions. Two laminas (1 and 2) stacked one over the other as shown in Figure 1 were kept in a storeroom (*Room#1*) with conditions not favourable for longer shelf life (max shelf life 3 days), whereas the other two stacked in same manner were kept in a different room (*Room#2*) with conditions favourable for longer shelf life (max shelf life 30 days). After 10 days' laminates were prepared by using two laminas from each room.

Laminate 1: using laminas from Room #1.

Laminate 2: using laminas from Room #2.

Calculate the maximum deflection for Laminate 1 and Laminate 2 respectively. **[10]**

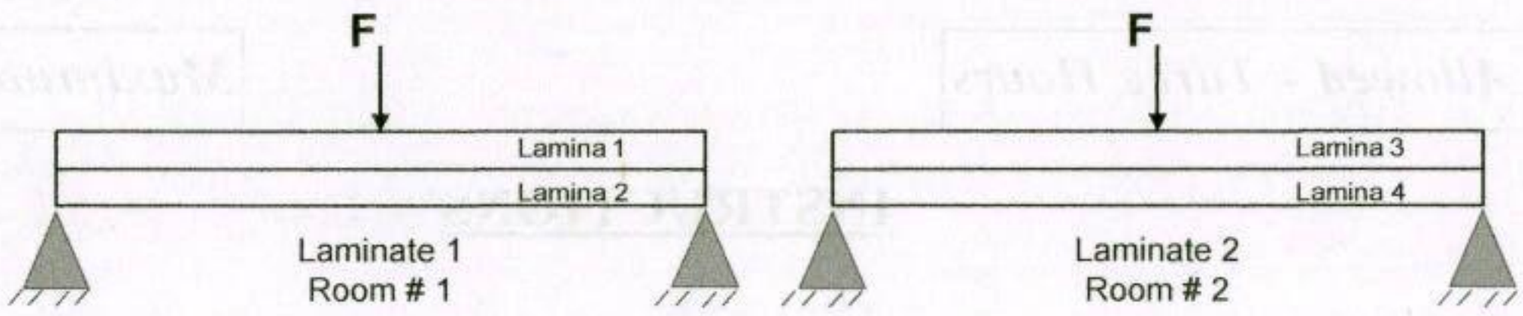


Figure 1

b) Consider a cube as shown below in Figure 2, subjected to tensile loading $(\sigma_1 = \sigma_2 = \sigma_3 = \sigma)$ in three mutual perpendicular directions. How the deformation of the cube will differ if the material properties of the cube are: **[10]**

(i) Anisotropic

(ii) Orthotropic

(iii) Isotropic.

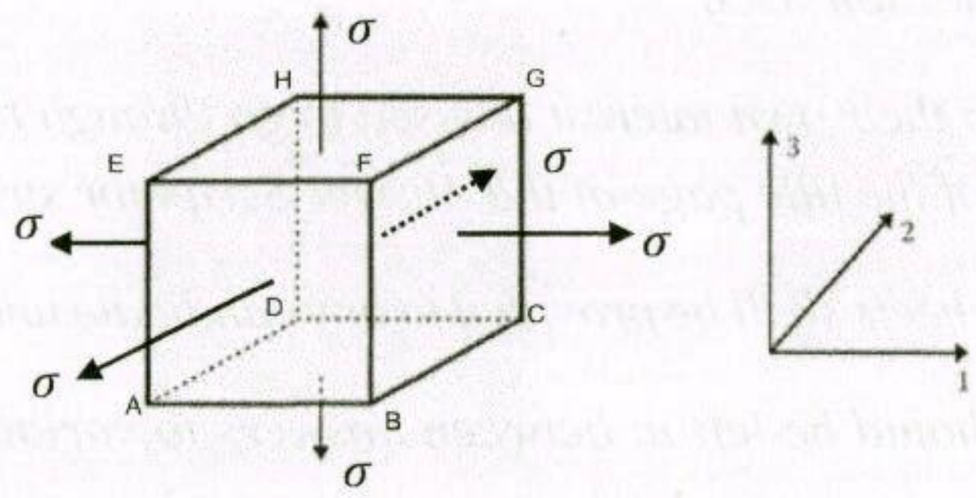


Figure 2

c) Determine the optimum winding angle $\pm\theta$ used in filament winding technique for fabricating the cylindrical pressure vessel subjected to internal pressure P. **[10]**

d) For an alloy with a composition of (**79.65 wt%**) *Fe* and (**0.35 wt%**) *C* at a temperature just below the eutectoid, determine the following:

(i) The fractions of total ferrite and cementite phases

(ii) The fractions of the proeutectoid ferrite and pearlite

(iii) The fraction of eutectoid ferrite **[10]**

e) The stress components at a point in a plate are $\sigma_{xx} = 80$ MPa, $\sigma_{yy} = 60$ MPa, $\sigma_{zz} = \tau_{xy} = 20$ MPa, $\tau_{xz} = 40$ MPa, and $\tau_{yz} = 10$ MPa.

(i) Determine the stress vector on a plane normal to the vector $(\hat{i} + 2\hat{j} + \hat{k})$.

(ii) Determine the principal stresses $\sigma_1 \geq \sigma_2 \geq \sigma_3$.

(iii) Determine the maximum shear stress and octahedral shear stress. **[10]**

2. a) A solid square rod (edge length = b) is cantilevered at one end as shown in the Figure 3. The rod is 0.8 m long and supports a completely reversing transverse load at the other end of ±1 kN. The material is AISI 1045 hot-rolled steel (S_{ut}=570 MPa and S_y=310 MPa). The rod was designed to support this load for upto 10^4 cycles with a factor of safety of 1.5, calculate the dimension of the square cross section? Neglect any stress concentrations at the support end and assume that fatigue strength fraction (f)= 0.9. Assume that endurance modification factors from load (k_c), temperature (k_d), reliability (k_e) and miscellaneous factor (k_f) as unity, whereas factor account for surface (k_a = 0.606). **[20]**

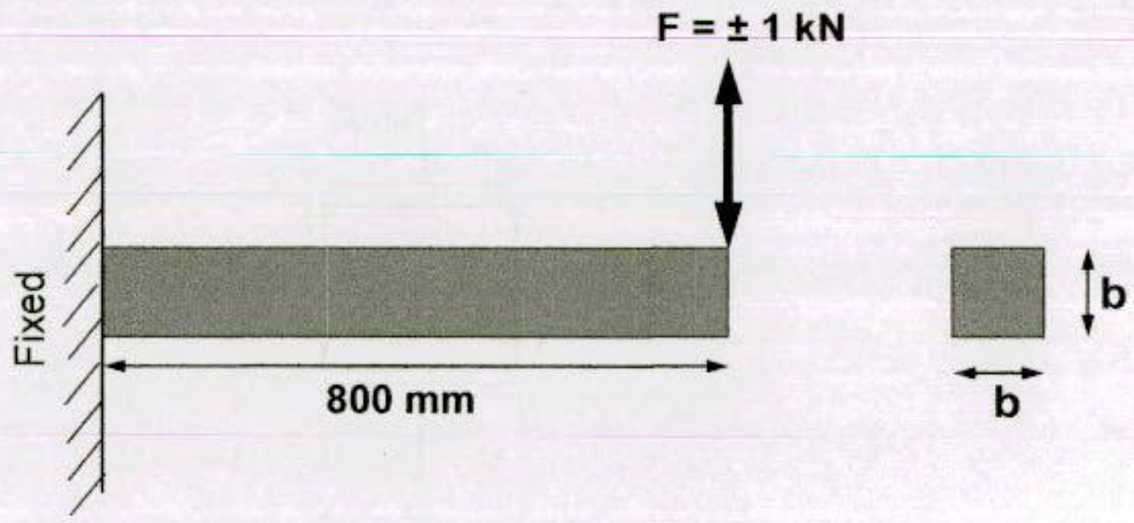


Figure 3

b) Determine the acceleration of point B on link 2 and the magnitude and direction of Coriolis component of acceleration for the mechanism shown in Figure 4. **[15]**

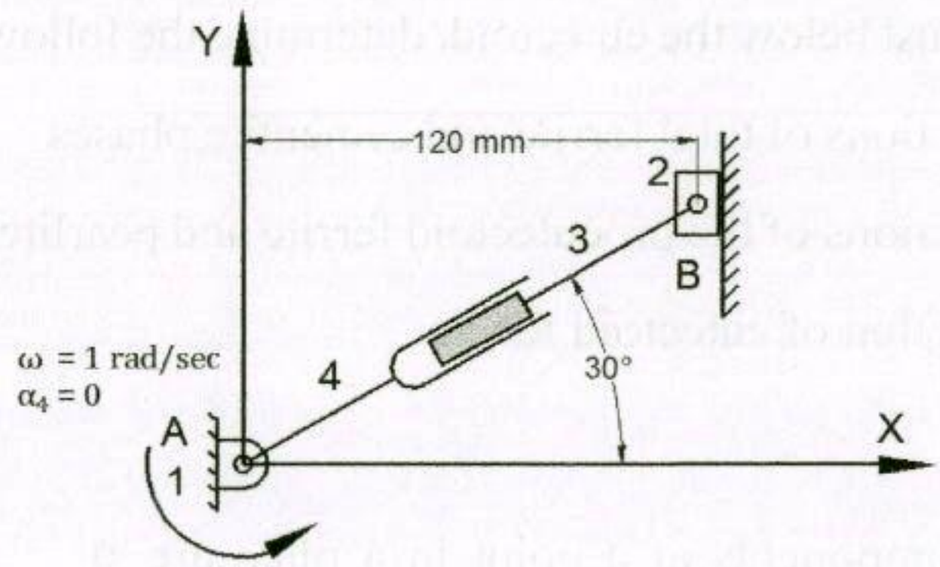


Figure 4

c) The maximum gauge pressure is known to be 8MPa in a spherical steel pressure vessel having a 200 *mm* outer diameter and a 6 *mm* wall thickness. Knowing that the ultimate stress in the steel is $\sigma_u = 400\text{Mpa}$.. Determine the factor of safety with respect to tensile failure. **[15]**

3. a) The state of plane stress occurs at a critical point of a steel machine component as shown in Figure 5. As a result of several tensile tests, it has been found that the tensile yield strength is $\sigma_t = 250\text{Mpa}$. for the grade of steel used. Draw Mohr's Circle and determine the factor of safety with respect to yield, using

(i) The maximum shearing stress criterion

(ii) The maximum distortion energy criterion. **[20]**

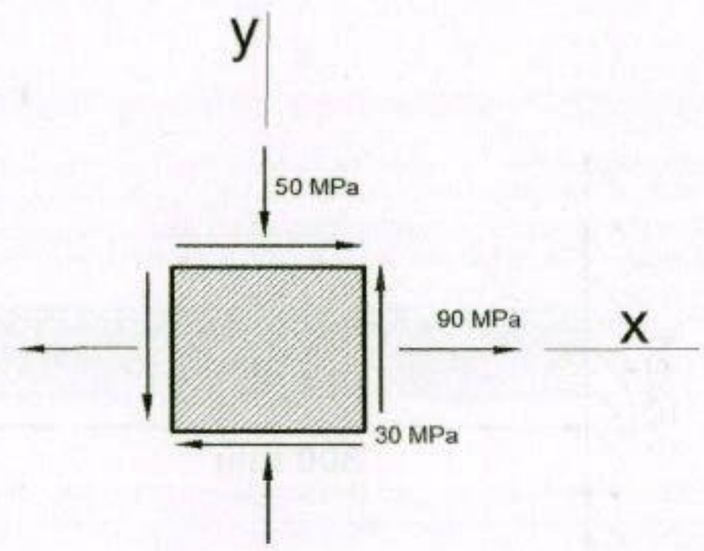


Figure 5

b) An epicyclic gear train consist of three gears A, B and C as shown in Figure 6. The gear A has 72 internal teeth and gear C has 32 external teeth. The gear B meshes with both A and C and is carried on an arm which rotates in anticlockwise direction about centre A at 18 rpm. If the gear A is fixed, determine the speed of gear B and C. **[15]**

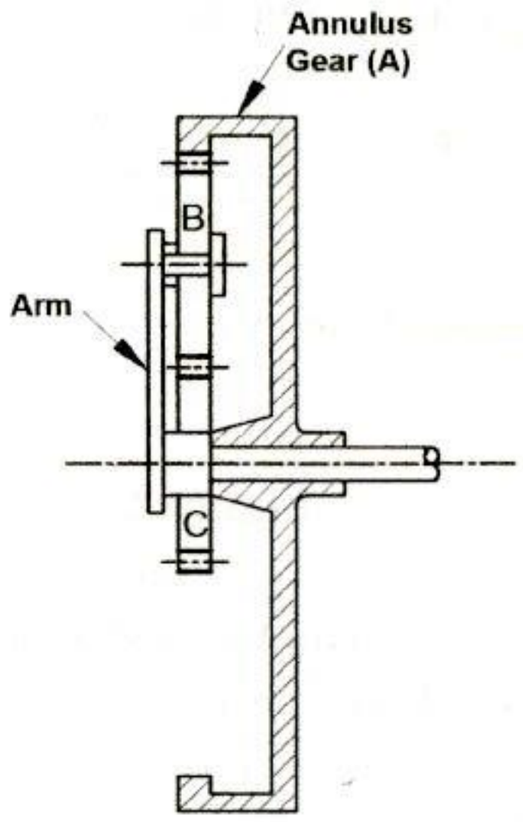


Figure 6

c) The ladder and the person weighs 133.5 *N* and 800.6 *N*, respectively as shown in Figure 7. The center of mass of the 3.65 m ladder is at its midpoint (**G**). The angle 'α' between the ladder and the vertical is 30°. Assume that the wall exerts a negligible friction force on the ladder. If x =1.825 m, what will be the minimum coefficient of static friction between the ladder and the floor is necessary for the person to be able to climb to the top of the ladder without slipping? **[15]**

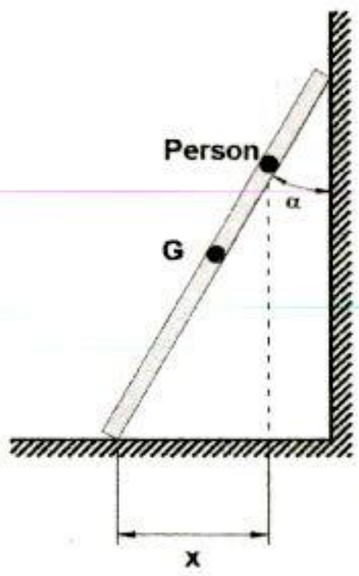


Figure 7

4. a) The beam as shown in Figure 8 has rectangular cross section 50 mm wide. Determine the value of depth 'd' of the beam if the midspan deflection of the beam is not to exceed 20 mm and the flexural stress is limited to 10 MPa. Use E = 10 GPa. **[20]**

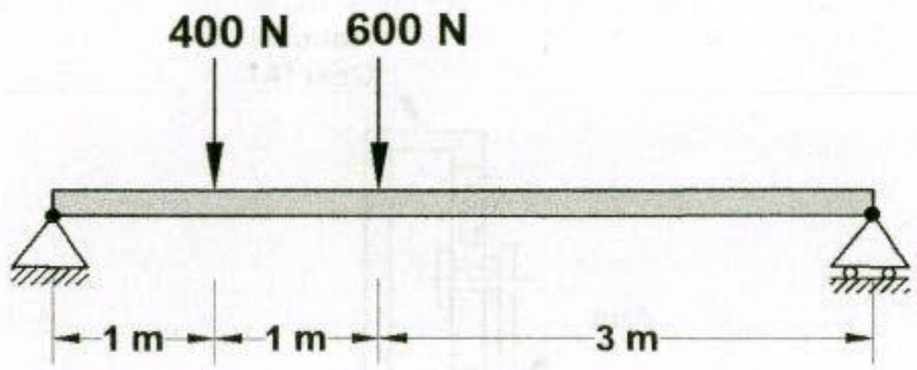


Figure 8

b) A right-angled bell-crank lever is designed to raise a load of 5.0 kN at the short arm end as shown in Figure 9. The lengths of short and long arms are 100 mm and 450 mm, respectively. The lever and pins are made of steel 30C8 (S_{yt} =yield in tension = 400 N/mm^2) and the factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of width to thickness is 3:1. The length to diameter ratio of fulcrum pin is 1.25:1. (Assume that the arm of bending moment on the lever extends up to axis of the fulcrum.) (Where, b and d are thickness and width of the rectangular cross-section of the lever, respectively as marked in the Figure 9)
Compute the following:

(i) The diameter and the length of fulcrum pin.

(ii) The shear stress in the pin

(iii) The dimensions of the cross-section of the lever. **[15]**

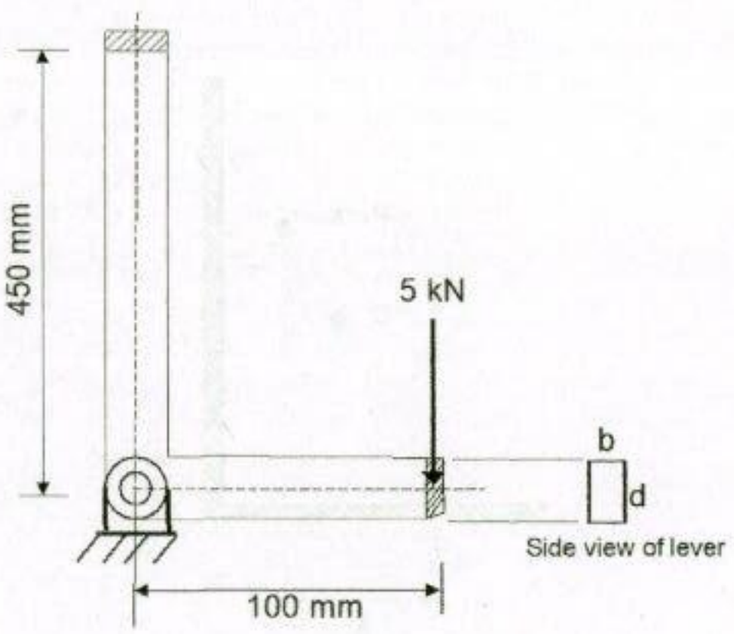


Figure 9

c) An aluminium shaft with constant diameter of 50 mm is loaded by torques applied to gear attached to it as shown in Figure 10. Using G=28 GPa, determine the relative angle of twist of gear D relative to gear A. **[15]**

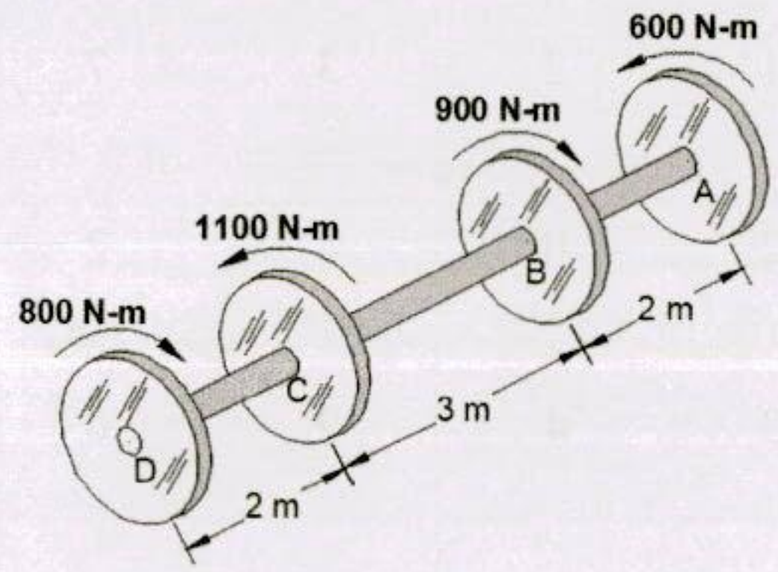
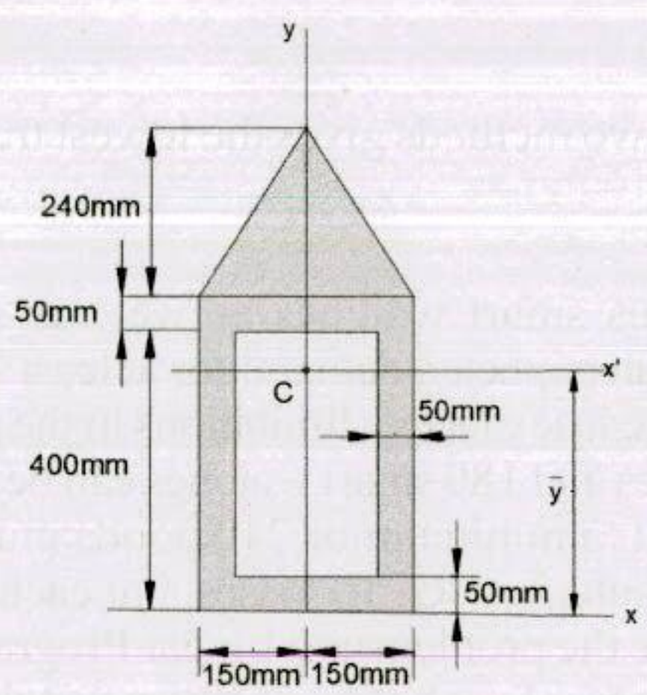


Figure 10

SECTION - B

5. a) Locate the centroid $\overline{y}$ of composite area as shown in Figure 11, then determine the moment of inertia of this area about the x' axis.



[10]

Figure 11

b) A transportation problem, involving three supply stations (S1, S2, S3) and three destination points (D1,D2,D3), is shown in the table below. The unit cost of transportation (Rs.) from one supply station to the respective destination is also shown in the table below. The demand of items at respective destination as well as supply of items available at respective supply stations are also shown in the table below:

		Destinations			
		D1	D2	D3	SUPPLY
Supply Stations	S1	2	3	7	7
	S2	0	4	2	12
	S3	4	2	6	11
DEMAND		10	10	10	

Find the initial basic feasible solution of the transportation problem by using

(i) North West Corner method

(ii) Least Cost method

Which of the above two methods gives the lowest transportation cost? **[10]**

c) A company produces smart watches as well as smart phones. The company's projections indicate an expected demand for at least 200 smart phones and 140 smart watches each day. Because of a few limitations in the production department, no more than 300 smart phones and 180 smart watches can be made daily. In order to facilitate the shipping contract, a minimum of 240 goods must be shipped each day. If each smart phone sold, results in a Rs. 10 losses, but each smart watch produced a Rs. 20 profit; then formulate the problem as a Linear Programming Problem (Do not solve) to determine how many of each type of smart watches and smart phones should be manufactured daily to maximise the net profit? **[10]**

d) Determine the machining time that will be required for plain milling a rectangular surface of length 200 mm and width 50 mm by a helical fluted plain HSS milling cutter of diameter 60mm, length 60 mm and 6 teeth. Assume approach and overrun of the tool to be 5mm each, feed per tooth is 0.2 mm/tooth and tool velocity to be 44 m/min. **[10]**

e) A company produces and installs energy-efficient window systems in commercial buildings. During the past ten years, sales revenue has increased from $25 million to $65 million.

(i) Calculate the company's growth rate in sales using the constant growth model with annual compounding.

(ii) What will be the sales forecast of the company five-year from now? **[10]**

6. a) The resisting torque on the crank of a riveting machine is shown in Figure 12. The duration of cycle is 3 sec. The motor driving the machine has a speed of 1800 rpm and it delivers a constant torque. The crank shaft of the machine is geared to the motor shaft. Neglecting frictional losses, determine:

(i) The power of the motor

(ii) The moment of inertia of flywheel mounted on the motor shaft to keep the speed fluctuation within $\pm$ 3% of the average speed.

(iii) The maximum angular acceleration of the flywheel. **[20]**

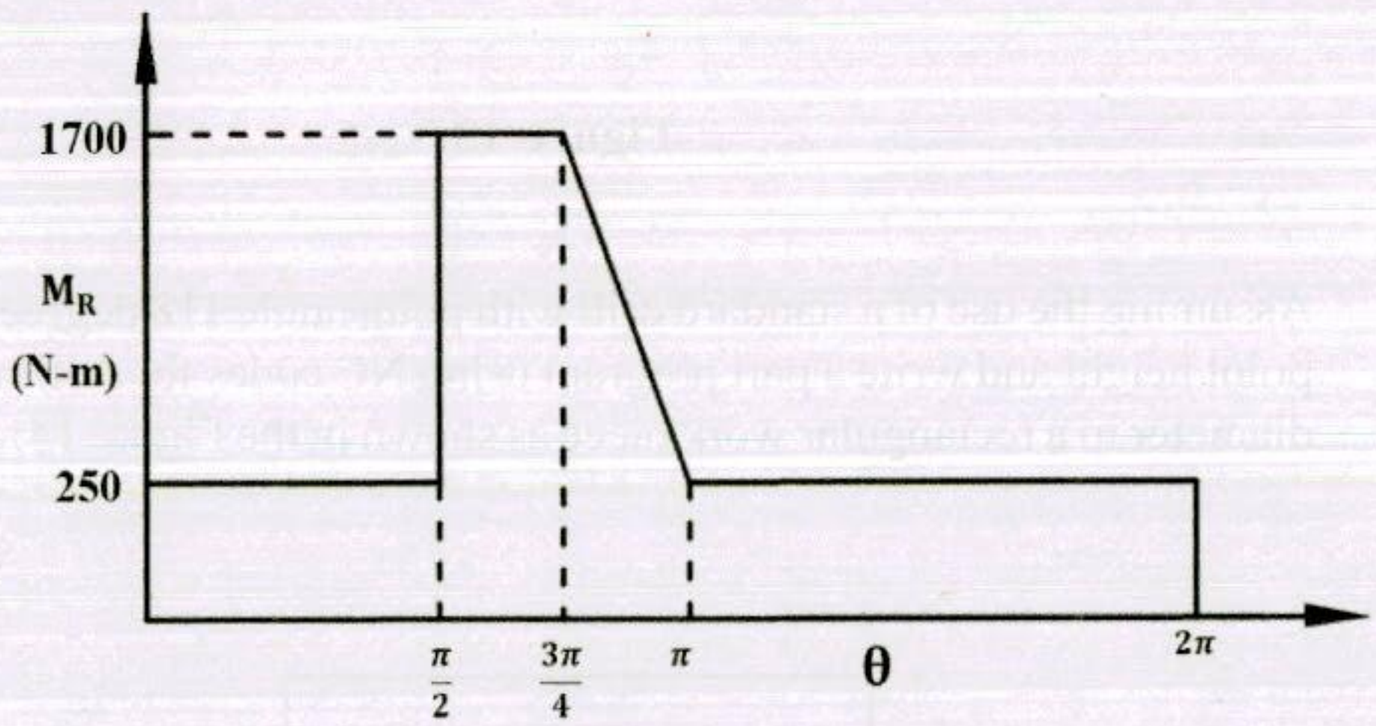


Figure 12

b) A porter governor has all the four arms 330 mm long. The upper arms are pivoted on the axis of rotation and the lower arms are attached to the sleeve at a distance of 40 mm from the axis. The mass of each ball and the sleeve are 8 kg and 60 kg respectively. If the extreme radii of rotation of the balls are 220 mm and 275 mm, determine the range of speed of the governor. **[15]**

c) The spring restored inverted pendulum as shown in Figure 13 is a slender rod of length 'l', mass 'm' and the mass moment of inertia '$I_o = \frac{ml}{3}$, about the axis 'O'. Each of the spring attached to the end of the rod has stiffness 'k'. Neglect the mass of the spring, determine the natural frequency of the pendulum using energy method. consider that the amplitude 'θ' of the oscillations to be very small. **[15]**

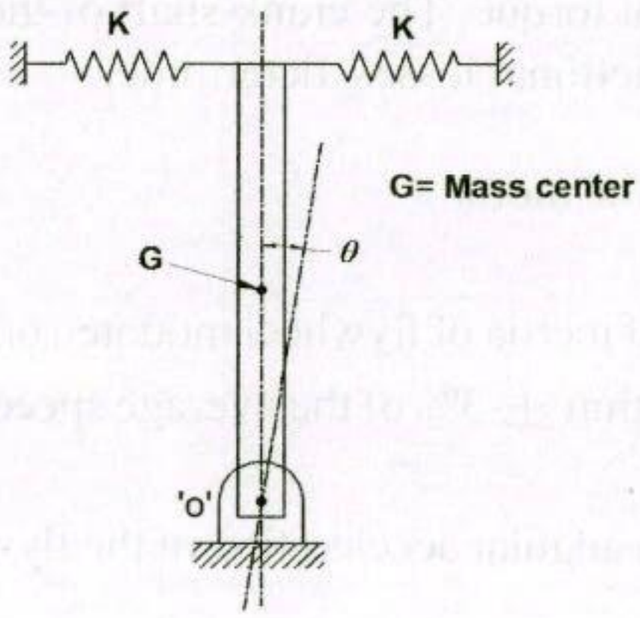


Figure 13

7. a) Assuming the use of a standard drill with point angle 118 degree. Determine the drill point height and write a part program using NC codes for drilling two holes of 8mm diameter in a rectangular work piece as shown in the Figure 14: **(20)**

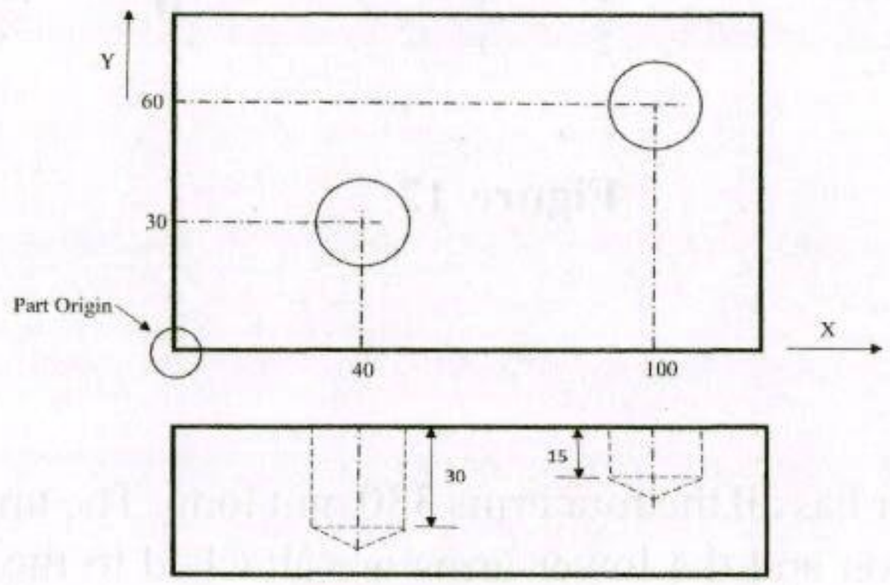


Figure 14

(10)

b) Evaluate the limits and fits for a pair of mating components of diameter 4H8/g7. Schematically show the disposition of tolerance around zero line and compute the type of fit for such a mating pair. Assume the following: **(15)**

For Hole : Standard tolerance = $25i$

where $i(micron) = 0.45\ D^{\frac{1}{3}} + 0.001D$

For Shaft : Standard tolerance =$16i$

Fundamental deviation for g shaft - $2.5D^{0.34}$

c) In a textile mill, cloth is inspected at a regular intervals for weaving defects. The results of ten samples are recorded and is given in the table below: **(15)**

Sample Number	1	2	3	4	5	6	7	8	9	10
Defects per square meter	2	1	0	2	1	1	3	4	1	0

(i) Determine the appropriate control chart statistics and interpret the process, whether in control or NOT?

(ii) If on an average 0.7 defects per square meters are expected, draw the appropriate control chart and interpret the process control status?

8. a) A company uses deterministic EOQ model to determine the order quantity for its various components. The Annual consumption of a particular component is 10,000 units, Cost to place one order of the component is Rs. 50, Cost of the item per unit is Rs. 2 and carrying cost is 8% of Unit cost of the item. **(20)**

(i) Determine EOQ, No. of orders per year, Total Ordering Cost, Total Carrying Cost and Total Cost of Inventory.

(ii) If the annual consumption of the component is reduced to 1/4, what will its effect on EOQ, No. of orders per year, Total Ordering Cost, Total Carrying Cost and Total Cost of Inventory.

b) A continuous hot rolling mill has two stands. Thickness of the starting plate is 25 mm and width is 300 mm. Final thickness is to be 13 mm. Roll radius at each stand is 250 mm. The rotational speed at the first stand is 20 rev/min and equal drafts of 6 mm are taken at each stand for this operation. The plate is wide enough relative to its thickness that no increase in width occurs. Under the assumption that the forward slip is equal at each stand, determine the following: **(15)**

(i) Speed v_r at each stand,

(ii) Forward slip s, if the entering speed at the first stand = 26 m/min.

(iii) Exiting speeds at each rolling stand, if the entering speed at the first stand = 26 m/min.

c) A company's data. for its actual demand of an item, for the past twelve months are given in the table below. Compute the monthly demand forecast from March through December using a 2 - month moving average method. Also, use exponential smoothing method with smoothing parameter as $\alpha = 0.5$ to compute the demand forecast for January 2023, assuming the forecast quantity for January 2022 is 37.**(15)**

MonthsYear 2022	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Demand Actual	37	40	41	37	45	50	43	47	56	52	55	54

(25)

Total No. of Printed Pages-4]

CC(M)

MEDICAL SCIENCE

(OPTIONAL)

PAPER - I

[41]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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SECTION - A

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

i) Kala-azar.

ii) Hypertensive emergency.

iii) Type 2 Diabetes mellitus.

b) A 40-year -old male came with complaints of tiredness, loss of appetite, nausea, and pain in the right upper abdomen. On examination, there was icterus, mild ascites, and bilateral pedal edema. He was consequently diagnosed as a case of cirrhosis of the liver. There is also a history of recurrent jaundice with fever and pain abdomen during childhood. His past medical records show Australian antigen positive. What could be the probable cause of cirrhosis in this case? What are the investigations required for the diagnosis? What treatment should be given to the patient? **(20)**

c) Define Blood pressure. Enumerate the determinants of blood pressure. Explain how baroreceptors aid in the regulation of blood pressure. **(1+4+10=15)**

2. a) Discuss Post-mortem findings and Medicolegal issues related to antemortem hanging. **(10)**

b) Describe the knee joint under the following headings. **(1+4+6+4=15)**

i) Articular surfaces.

ii) Ligaments.

iii) Movements possible, axes of movements, muscles causing these movements, nerve supply of these muscles.

iv) Applied Anatomy.

c) Describe the process of formation of the placenta. Describe the structure of the placental barrier. Add a note on anomalies related to the development of the placenta. **(5+3+2=10)**

d) Enumerate the various phases of the menstrual cycle. Explain the hormonal regulation of uterine endometrium during the menstrual cycle. **(5+10=15)**

3. a) Differentiate between the following: **(5+5+5+10=25)**

i) Spleen and thymus.

ii) Fundic and Pyloric gland of the stomach.

iii) Cutaneous innervation of the foot (sole & dorsum) and hand (palm & dorsum).

iv) Histology of cerebral and cerebellar cortex.

b) Describe the pancreas under the following headings **(4+8+8+5=25)**

i) Gross anatomy.

ii) Parts and their relations.

iii) Histology.

iv) Blood supply and applied anatomy.

4. a) Name two water-soluble vitamins. With the help of suitable examples, name the disorders caused due to deficiency of any two water-soluble vitamins, and the metabolic consequences. **(10)**

b) i) Explain the biochemical basis of folate trap and state its consequences. **(10)**

ii) Discuss the mechanisms of maintaining calcium homeostasis in the body. **(10)**

iii) Mention two conditions that can lead to hypercalcemia and explain the associated complications. **(2+3=5)**

c) With the help of two specific examples, explain the role of radioisotopes diagnosis/ treatment of cancers. **(15)**

SECTION - B

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

i) Metronidazole.

ii) Platinum compounds.

iii) Loop Diuretics.

b) Write briefly about the laboratory diagnosis and prevention of poliomyelitis. **(7+8=15)**

c) Describe various classes of Anti-retroviral medications with their example, mechanism of action and adverse effects. **(20)**

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

i) Invasive pulmonary aspergillosis

ii) Meningococcal meningitis

iii) Humoral Immunity

b) Enumerate the enzymes used to assess Liver function with specific examples and the associated conditions when their plasma levels are altered. **(10)**

c) State the principle and clinical applications of Restriction Fragment Length polymorphism (RFLP). **(10)**

[Turn Over

7. a) i) Discuss the pathogenesis of Diabetes Mellitus. What are the complications of diabetes mellitus? **(10)**

ii) Write a short note on the clinical features, pathogenesis, and diagnosis of acute myeloid leukemia. **(10)**

b) I) i) Define neoplasia.

ii) How will you differentiate between benign and malignant tumors?

iii) Write a brief note on Cellular and molecular hallmarks of cancer. **(2+5+8=15)**

II) Discuss the etiology, pathogenesis, and histopathology of liver cirrhosis. **(15)**

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

i) Lacerated Wound and Incised wound.

ii) Poisonous and Non-Poisonous Snakes.

iii) True and artificial Bruise.

iv) Lung Findings in Sea Water and Fresh Water Drowning.

b) Describe various types of tests used for forensic examination of seminal stains. **(10)**

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

i) Medicolegal aspects related to Carbon Monoxide Poisoning.

ii) Injuries caused during Torture.

iii) Genomic Sequencing.

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Total No. of Printed Pages-3|

CC(M)

PHILOSOPHY

(OPTIONAL)

PAPER - I

[43]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

1. a) Describe the nature of substance and qualities according to Locke. In this context also explain the difference between primary and secondary qualities.

b) Discuss Plato's conception of Forms along with Aristotle's criticism of it.

c) Discuss the main arguments presented by Hume against the notion of Self and causation.

d) Do you think Leibniz view of monads results in a deterministic worldview? Give reasons and justification for your answer.

e) Explain the mind-body problem as propounded by Descartes. How does Descartes address this in his philosophy?

2. a) "They must have something in common, or they would not be called 'games' but look and see whether there is anything common to all." In the light of this statement explain Wittgenstein's notion of language games.

b) What does Sartre mean by his statement - "existence precedes essence"? Explain with your own comments.

c) What according to Kierkegaard is the 'leap of faith'? Critically discuss.

3. a) Present a detailed account of Strawson's notion of Basic Particulars.

b) What according to Quine are Two Dogmas of Empiricism? Critically discuss.

c) "The reason that I call my doctrine logical atomism is because the atoms that I wish to arrive at as the sort of last residue in analysis are logical atoms and not physical atoms." In the light of above statement, present a detailed account of Russell's conception of Logical Atomism.

4. a) Critically discuss the main tenets of Logical Positivism. In this context discuss Cārvāka's rejection of transcendental entities.

b) What is phenomenological method as proposed by Husserl? Also discuss the role of *epoche* in Husserl's phenomenological method.

c) What according to Kant are the antinomies of reason? Critically discuss.

SECTION - B

5. a) Discuss Aurobindo's notion of Integral Yoga.

b) Discuss the nature of *Aprthaksiddhi* according to Rāmānuja .

c) Explain the difference between *mahat, ahaṁkara* and *manas* as three evolutes of Prakṛti .

d) Explain the notion of *anyathāsiddha* in Nyāya theory of causation.

e) Discuss the nature and role of God, Soul and atoms in the context of Nyāya theory of creation.

6. a) Explain the debate between Mīmāṁsā and Nyāya philosophy over the criteria for validity of knowledge. Which theory do you find more convincing? Give reasons and justifications in favour of your answer.

b) Explain the nature of Puruṣa according to Sāṁkhya philosophy along with its criticism as presented by *Śaṅkara*.

c) Explain the relation between of *Brahman* and *Jīva* according to Rāmānuja and Madhva.

7. a) Critically discuss Jaina's notion of bondage and liberation with special emphasis on the nature and role of *Karma*.

b) Explain the nature of *citta* and *vṛtti* and their role in bondage and liberation according to Yoga philosophy.

c) How do Naiyāyikas define *Vyāpti* ? What are the necessary conditions to obtain it? Critically discuss.

8. a) How is Buddhist notion of dependent origination connected with their notion of no-soul *(nairātmyavāda*)? Critically discuss.

b) Discuss the notion of *abhāva* as it is presented in Nyāya-Vaiśeṣika philosophy.

c) Discuss the Jaina's theory of Syādvāda and Anekāntvāda along with its criticism by other schools.

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Total No. of Printed Pages-7]

CC(M)

PHYSICS

(OPTIONAL)

PAPER - I

[45]

Time Allowed - Three Hours	*Maximum Marks-250*

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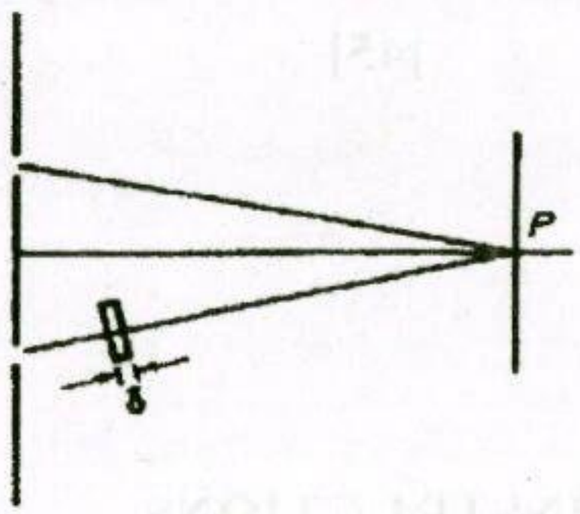
v) No continuation sheets shall be provided to any candidate under any circumstances.

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

vii) Non Programmable Calculators are allowed.

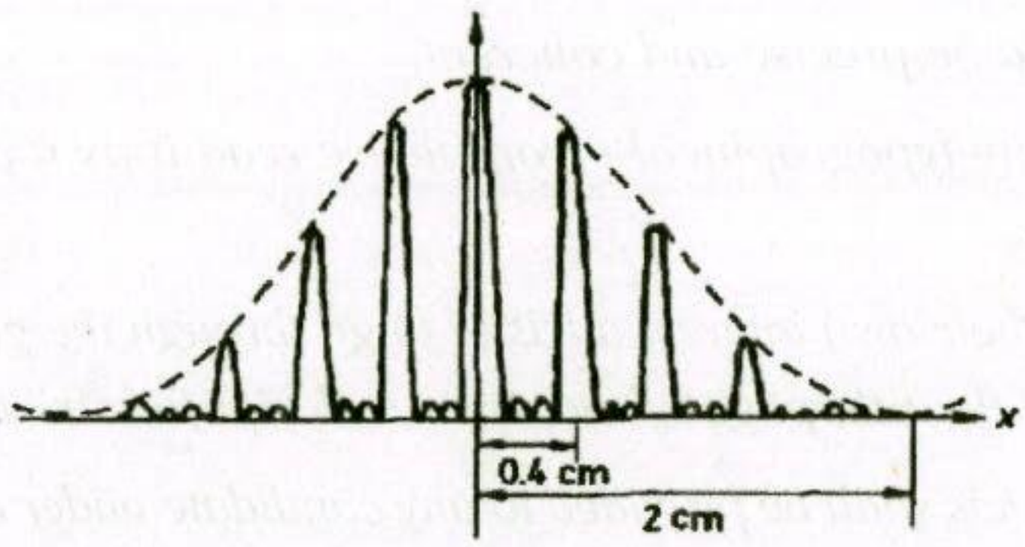
SECTION - A

1. a) Consider a double slit experiment in which coherent monochromatic light of wavelength λ, from a distant source is incident upon the slits, each with width, w ($w > \lambda$), the interference pattern being observed on a distant screen. A thin glass plate of thickness δ, with index of refraction n, is placed between one of the slits and screen, perpendicular to the light path. If intensity for $\delta = 0$ is I_0, then find the intensity at point P as a function of thickness δ, and find at what values of δ will the intensity at P be minimum. Assume that the glass neither absorb nor reflect any light. **(10)**



b) Deduce the Van der Waals' equation of state taking into consideration the corrections due to volume and molecular size. **(10)**

c) The pattern of Intensity, I Vs position as measured on a wall 20 metres from a set of N identical, parallel slits is shown in the diagram below. Light of wavelength $\lambda = 6000 A^0$ passes through the slits, each with width a and separated by a distance d. Obtain the values of N, a and d giving a valid reason for each. **(10)**



d) What were the key components of Michelson-Morley experiment that had been designed to detect the motion of Earth through ether. How did the experiment demonstrate that the speed of light is constant regardless of the observer's motion? **(10)**

e) Find the thickness of a soap film that gives constructive second order interference of reflected light $(\lambda = 7000A^0)$. The index of refraction n, of the film is 1.33. Assume that a parallel beam of incident light is directed at 30^0 to the normal. **(10)**

2. a) The ratio f'/f of the back and front lengths of the eye is 1.35, the index of refraction of vitreous humor.

i) Locate the positions of the focal points when the eye is focused on an object 25cm in front of principal plane. Assume that the principal plane is 2.3 cm in front of the retina. **(10)**

ii) Find the positions of the nodal points. **(5)**

b) What is a zone plate? Show that the radii of its half period zones are proportional to the square root of natural numbers. Hence, derive an expression for its focal length. **(20)**

c) Derive the relation for total energy and effective potential energy of a reduced mass under the action of central force, prove that the total energy is conserved. **(15)**

3. a) i) What do you mean by isotropic solids? Explain the four elastic constants used to describe their mechanical behaviour. **(10)**

ii) Derive the expressions for Young's modulus and modulus of rigidity and hence, find the relation between them. **(15)**

b) How does Lorentz transformation account for length contraction and time dilation in the context of Special Theory of Relativity. What happens to the Lorentz transformation equations as the relative velocity between the two observers approaches the speed of light. **(10)**

c) State the theorems of parallel axis and perpendicular axis for moment of inertia. Hence, determine the moment of inertia of a circular disc about

(i) a diameter, and

(ii) a tangent. **(15)**

4. a) Give the Kelvin Planck and Clausius statements for second law of thermodynamics. Show that both the statements are equivalent to each other using the concept of reversible Carnot engine and refrigerator. **(15)**

b) Using Maxwell's thermodynamic relations, prove that

$\left(\frac{\partial C_v}{\partial v}\right)_p = T^2\left(\frac{\partial^2 p}{\partial T^2}\right)$ Discuss the variation of C_v with volume for

i) a perfect gas, and ii) for a Van der Waals' gas.

Hence, show that C_v is independent of volume at a given temperature. **(20)**

c) Ten grams of water at temperature 20^0C is converted into ice at - 10^0C at constant atmospheric pressure. Assuming specific heat of ice at constant pressure to be 0.5 cal/g/^{0}C, find the total decrease in entropy of the system.

$\left(\log_{10}(263) = 2.42, \log_{10}(273) = 2.4362, \log_{10}(293) = 2.4669\right)$ **(15)**

SECTION-B

(5×10=50)

5. a) In Newton's rings experiment, show with the help of a diagram, what will happen if the lens is moved slightly up the plate. **(10)**

b) Show that $x = (A+bt)e^{-(r/2m)t}$ is the solution of the given differential equation

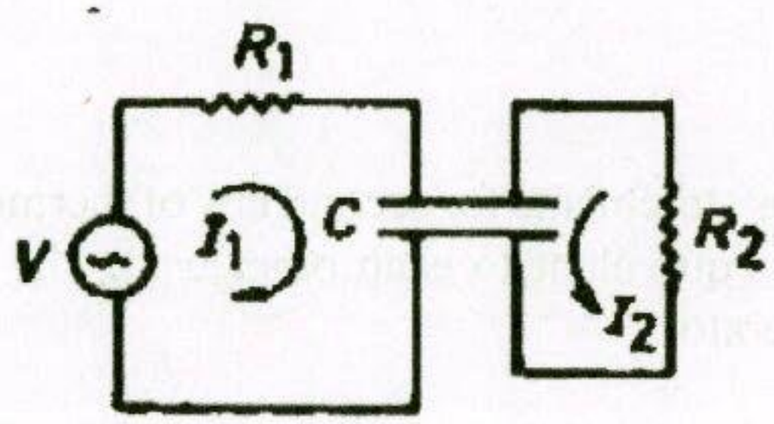
$$\frac{d^2x}{dt^2} + \frac{r}{m}\frac{dx}{dt} + \frac{s}{m}x = 0$$

for the critically damped oscillations. **(10)**

c) Show that the efficiency of a reversible Carnot engine is always greater than an irreversible engine, working between the same temperature limits. **(10)**

d) If an unpolarized light of intensity I_0 is incident on a polariser, what will be the intensity of light transmitted through the polariser? **(10)**

e) An electric circuit consists of two resistors R_1 and R_2, a single condenser C and a variable voltage source V joined together as shown in the figure below, when $V = V_0 \cos \omega t$, what is the amplitude of voltage drop across R_1? **(10)**



6. a) Explain the distinguishing features of Maxwell-Boltzman (MB), Bose-Einstein(BE) and Fermi-Dirac statistics (FD). What are the number of ways in which two particles *a* and *b* can be arranged in three energy states according to MB, BE and FD statistics? Write in tabular form and explain. **(25)**

b) Write down and briefly explain Maxwell's equations, assuming that no dielectrics or magnetic materials are present. State your system of units.

Justify your answer for the following:

i) If the signs of all the source charges are reversed, what will happen to the electric and magnetic fields, **E** and **B** respectively?

ii) If the system is space inverted, that is, $x \to x' = -x$, what will happen to the electric and magnetic fields, **E** and **B** respectively, and also charge and current densities, ρ and **j** respectively?

iii) If the system is time reversed, that is $t \to t' = -t$, what will happen to **E, B,** ρ and j? **(25)**

7. a) Explain with the help of a diagram, what do you mean by Ultraviolet Catastrophe? How did Planck resolve that? Show that Planck's radiation formula reduces to Rayleigh Jeans law for low frequency region. **(15)**

b) Two particles having masses *M* and *m* respectively are initially at rest and are far apart. Due to gravitational attraction they start to move towards each other. Show that at a distance *d* their relative velocity of approach will be $\sqrt{2}G(M+m)/d$, *where* G is the Gravitational constant. **(15)**

c) i) Find the Q-value of a resonating LCR circuit. Show that in LCR circuit, at resonance, maximum potential drop across inductance is Q times the applied emf. **(15)**

ii) A voltage of 200 volts is applied to a series LCR circuit with $L = 10\,\mu H$, $R = 20\Omega$, *and* $C = 0.01\mu F$. Calculate the bandwidth. **(5)**

8. a) Two charges +5 C and +15 C are located at points (2, -4,3) and (-3, 2, 1). Calculate force on +15C. **(10)**

b) How far should the two protons be if electric force between them is equal to the weight of a proton? **(10)**

c) Prove that the period of revolution of a particle carrying a charge $-q$ in the circular orbit of radius R around a fixed charge $+Q$ is given by $T = 16\pi^2 \varepsilon_0 m R^3 / qQ$. **(10)**

d) Using Biot-Savart Law, prove that $\vec{\nabla}.\mathbf{B} = 0$. If at any position, vector potential A, is given as $\mathbf{A} = 5\left(x^2 + y^2 + z^2\right)\hat{i}$, evaluate the magnetic field at that position. **(20)**

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	=	$1.76 \times 10^{11}\ C/kg$
$1\ u = 1\ amu = 1.660566 \times 10^{-27}\ kg$	=	$931.5\ MeV/c^2$
Rest mass energy of electron $m_e c^2$	=	$0.511\ MeV$
Permittivity in free space $\in_0$	=	$8.8542 \times 10^{-12}\ C^2/N/m^2$
Permeability of free space μ_0	=	$4\pi \times 10^{-7}\ N/A^2$
Gas constant R	=	$8.314\ J/mol/K$
Boltzman constant k_B	=	$1.381 \times 10^{-23}\ J/K$
Planck constant h	=	$6.626 \times 10^{-34}\ Js$
$\hbar$	=	$1.0546 \times 10^{-34}\ Js$
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	=	$1.0072766\ u = 1.6726 \times 10^{-27}\ kg = 938.3\ MeV$
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	=	$6.673 \times 10^{-11}\ Nm^2/kg^2$

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Total No. of Printed Pages-3]

CC(M)

POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

(OPTIONAL)

PAPER - I

[47]

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

INSTRUCTIONS

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SECTION - A

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

1. a) 'Each political theory is advanced in response to some specific situation'.Comment. **(10)**

   b) Write a note on 'Post-Colonial Theory of State'. **(10)**

   c) 'Human rights are Universal and Inalienable; Indivisible; Interdependent and Interrelated'.Elucidate. **(10)**

   d) 'Justice is a dynamic idea'. Discuss. **(10)**

   e) Examine the relevance of Machiavelli's conception on religion and politics. **(10)**

2. a) 'A functioning, robust democracy requires a healthy educated, participatory follower-ship and an educated, morally grounded leadership'. Comment. **(20)**

   b) Explain the Gandhian Idea of 'greatest good of all' and strategies for its realization. **(15)**

   c) 'Authority and legitimacy are complimentary to each other'. Discuss. **(15)**

3. a) In the words of J.S.Mill, 'A person may cause evil to others not only by his actions but by his inaction, and in either case, he is justly accountable to them for the injury'. Discuss. **(20)**

   b) Analyze the contribution and influence of the thoughts of Sir Syed Ahmed Khan on Indian society. **(15)**

   c) Elucidate the distinctiveness and central aspects of Radical Humanism of M.N.Roy? **(15)**

4. a) 'Aristotle's theory of revolution offers valuable insights into the causes and consequences of political upheaval'.Comment. **(20)**

   b) Critically examine the tenets of Eco feminism? **(15)**

   c) Discuss the changing contours of Affirmative Action in India? **(15)**

SECTION-B

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

5. a) Examine the rise and effects of peasants' and workers' movements on Indian National Movement. **(10)**

   b) Relevance of Satyagraha as a means of conflict resolution. **(10)**

   c) Discuss the debate centered around 'One Nation-One Election'? **(10)**

   d) 'In India caste needs politics as much as politics need caste'. Comment. **(10)**

   e) Enumerate the basic challenges involved in the implementation of 106th Constitution Amendment Act. **(10)**

6. a) 'The Indian National Movement played a pivotal role in transforming mosaic of identities into a cohesive force'. Critically examine the major perspectives on Indian National Movement? **(20)**

b) Trace the various stages in the making of the Indian Constitution, identifying the diverse institutions associated with the process? **(15)**

c) 'The emergence of regional parties is largely based on vested interests than the ideology'. Comment. **(15)**

7. a) 'The basic structure doctrine is implicit in Indian Constitution; the supreme court has only given an explicit form'. Discuss. **(20)**

b) Examine the functioning of National Commission for Backward Classes(NCBC) in the light of its constitutional status? **(15)**

c) 'The rise and continuance of Bharatiya Janata Party (BJP) represents another phase of one-party dominant system in Indian politics which is different from the one led by congress prior to the era of coalition politics. Discuss. **(15)**

8. a) Discuss the role of Panchayat Extension in Schedule Areas (PESA) Act in ensuring self-governance in tribal areas? **(20)**

b) Identify the major contested areas in Centre-State relations hindering the spirit of cooperative federalism and suggest measures to address the issues of concern. **(15)**

c) 'The social transformation in India could be characterized as 'revolutionary' in content and 'evolutionary' in strategy'. In the light of the statement, discuss the role of social movements in India? **(15)**

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Total No. of Printed Pages-3]

CC(M)

PSYCHOLOGY

(OPTIONAL)

PAPER - I

[49]

Time Allowed - Three Hours	*Maximum Marks-250*

INSTRUCTIONS

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

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SECTION-A

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

1. a) How does declarative knowledge interact with procedural knowledge?

b) Discuss the altered states of consciousness induced by hypnosis and drug use.

c) Differentiate between the terms "internal validity" and "external validity" in experimental research.

d) What is understood by causal supersession in causal reasoning?

e) How does metamemory influence learning strategies?

2. a) Explain the key features of a well-designed survey. What are the common pitfalls to avoid, and how can researchers ensure clarity and precision in their survey questions? **(20)**

b) Compare and contrast the elaboration likelihood model (ELM), the theory of planned behaviour (TPB), and the social identity theory (SIT) in explaining how attitudes are formed and modified. **(15)**

c) Compare and contrast projective and objective personality tests. **(15)**

3. a) Discuss the key components of effective communication training, and provide examples of successful interventions or programs. **(20)**

b) Discuss how motivational and emotional factors influence decision-making. **(15)**

c) How do different brain regions contribute to language comprehension and production, and how might this knowledge inform language-related therapies? **(15)**

4. a) Discuss the epistemological challenges associated with applying scientific methods to study psychological phenomena. Provide examples of areas within psychology where the scientific method encounters inherent limitations. **(20)**

b) Critically assess the concept of multiple intelligence. How does the recognition of diverse intelligences challenge traditional views of intelligence? **(15)**

c) What factors influence intrinsic motivation? Discuss the role of autonomy, competence and relatedness in fostering or hindering intrinsic motivation. **(15)**

SECTION-B

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

5. a) Contrast Skinner's operant conditioning theory with Chomsky's nativist theory regarding language development.

b) How is distributed representation related to the multidimensional nature of experience?

c) Discuss how the pandemic lockdown affected face processing in infants.

d) Discuss the significance of using a Likert scale in the measurement of attitudes.

e) Contrast the processes of extinction and generalization in classical conditioning.

6. a) Using suitable examples, differentiate between theory, construct, hypothesis and operational definition. **(20)**

b) How is quasi-experimental research design useful in psychological research? Elaborate using suitable research examples. **(15)**

c) How is self related to culture? Discuss in light of research on self-construal. **(15)**

7. a) Explain the fundamental principles of signal detection theory and how it is applied to the analysis of perceptual decision-making. **(20)**

b) Explain the key components of a Two-Way ANOVA design, including main effects and interaction effects. **(15)**

c) Discuss how the different brain structures and networks contribute to various facets of cognitive functioning and intelligence using evidence from brain imaging studies. **(15)**

8. a) Discuss the strengths and challenges associated with mixed-method research in psychology. Provide examples of research questions where using both qualitative and quantitative methods could enhance the study. **(20)**

b) Discuss the potential benefits of incorporating artificial intelligence in psychological testing using suitable examples. **(15)**

c) Examine the psychological mechanisms underlying the effectiveness of different types of reinforcement in behaviour modification. **(15)**

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Total No. of Printed Pages-3]

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CC(M)

PUBLIC ADMINISTRATION

(OPTIONAL)

PAPER - I

[51]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

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

1. a) Briefly examine the different paradigms, which contributed to the evolution of public administration as a discipline. **(10)**

   b) Analyse the Managerial and Integral view of Public administration and explain their relevance in the changing system of governance. **(10)**

   c) Modern state is often described as an Administrative State. Examine the significance of the statement in the contemporary times. **(10)**

   d) The 'Hawthrone Experiments' have made significant impact on the administrative theory. Discuss. **(10)**

   e) What do you understand by Bureaucracy? Briefly discuss the types of bureaucracy, as classified by Max Weber. **(10)**

2. a) Name the popular model of Decision Making? Which model of decision making is mostly used while making administrative decisions in developing countries and why? Examine. **(20)**

   b) Interest Groups are an integral part of participatory democracy. In the light of the above statement, evaluate the role of the interest groups in administration and shaping of public policy. **(15)**

   c) Critically examine the relationship between public sector and private sector entities in the public private partnership model. **(15)**

3. a) How does citizens' charter ensure empowerment of the citizens and the stakeholders in relation to public service delivery? Discuss. **(20)**

   b) What is development administration? Evaluate the time and space dimensions of development administration. **(15)**

   c) Briefly explain the concept of delegated legislation. Elaborate how delegated legislation guarantees administrative efficiency and productivity. **(15)**

4. a) Globalisation has a profound impact on public administration. Comment on the above statement with reference to the changing character of New-Age Administration. **(20)**

   b) Women Self-Help Groups [WSHGs] are seen as agents of change in the contemporary times. Explain their contribution towards livelihood income and financial inclusion in the rural areas. **(15)**

   c) Public policies are contextual. In the light of the above statement, explain the concept of public policy with reference to its distinct stages. **(15)**

SECTION-B

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

5. a) 'Scaling of the economy is linked to skilling up the human resources'. Explain the above statement with reference to Skill India Mission. **(10)**

   b) 'Public Administration influences politics, society and economy and in turn is influenced by them'. Examine the statement with reference to the Ecological Approach of Fred. W. Riggs. **(10)**

   c) Discuss Maslow's Theory of Motivation and examine its impact on organizational behavior. **(10)**

   d) Briefly examine the major provisions of Right to Information [RTI] in India. Give your suggestions to make it more effective. **(10)**

   e) What do you understand by Good Governance? How does Good Governance add valuc and substance to the process of administration? Discuss. **(10)**

6. a) 'Digital Governance' has changed the Citizen-Government interface in the modern times. Comment. **(20)**

   b) Briefly examine the two major methods of Recruitment Policy to Civil Services in India. **(15)**

   c) 'Promotion is an incentive for motivation in discharging public service'. Explain briefly the three principles of promotion and suggest reform if any. **(15)**

7. a) Prompt redressal of citizen complaints is the hallmark of effective public administration. In the light of the above statement, discuss the main features of an efficient Public Grievance Redressal System. **(20)**

   b) How does the executive incorporate the tenets of ethical governance to ensure good governance? Give your answer with reference to transparency, impartiality, accountability and inclusivity. **(15)**

   c) Examine the concept of Performance Budget. Why it is considered as an improvement over Line Item Budget? Elaborate **(15)**

8. a) What are the various ways through which the legislature exercises its control over the executive in a democracy? Examine. **(20)**

   b) Do you think there is an increasing role of Civil Society Organizations (CSOs) in the process of governance today? Give suitable examples to justify your answer. **(15)**

   c) Critically evaluate the gradual transformation of the state's approach and orientation towards public administration in the era of neo-liberal market economy. **(15)**

Total No. of Printed Pages-3]

CC(M)

PUNJABI

PAPER - I

[34]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

ਪ੍ਰਸ਼ਨ:1

ੳ. ਸਵਰ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਪੰਜਾਬੀ ਸਵਰ ਧੁਨੀਆਂ ਦੇ ਵਰਗੀਕਰਨ 'ਤੇ ਨੋਟ ਲਿਖੋ। **(10)**

ਅ. ਅਖੰਡੀ ਧੁਨੀਆਂ ਤੋਂ ਕੀ ਭਾਵ ਹੈ ? ਪੰਜਾਬੀ ਦੀਆਂ ਅਖੰਡੀ ਧੁਨੀਆਂ ਕਿਹੜੀਆਂ ਹਨ ? ਸੰਖੇਪ ਚਰਚਾ ਕਰੋ। **(10)**

ੲ. ਭਾਸ਼ਾ ਅਤੇ ਉਪਭਾਸ਼ਾ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਇਨ੍ਹਾਂ ਵਿਚਲੇ ਅੰਤਰ ਸੰਬੰਧ ਦੀ ਚਰਚਾ ਕਰੋ। **(10)**

ਸ. ਵਧੇਤਰ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ ਸੰਬੰਧੀ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਨੋਟ ਲਿਖੋ। **(10)**

ਹ. ਗੁਰਮਤਿ ਸਾਹਿਤ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ 'ਤੇ ਚਾਨਣਾ ਪਾਓ। **(10)**

ਪ੍ਰਸ਼ਨ: 2

ੳ. ਕਿੱਸਾ ਕਾਵਿ ਦੇ ਆਰੰਭ ਬਾਰੇ ਚਰਚਾ ਕਰਦੇ ਹੋਏ ਇਸ ਦੇ ਵਿਕਾਸ 'ਤੇ ਚਾਨਣਾ ਪਾਓ। **(15)**

ਅ. ਮਾਝੀ ਉਪਭਾਸ਼ਾ ਦੇ ਖੇਤਰ ਦੱਸਦੇ ਹੋਏ ਇਸ ਦੀਆਂ ਪ੍ਰਮੁੱਖ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ 'ਤੇ ਰੋਸ਼ਨੀ ਪਾਓ। **(15)**

ੲ. ਰੂਪ ਵਿਗਿਆਨ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਵਰਤੋਂ ਦੇ ਆਧਾਰ 'ਤੇ ਰੂਪਗ੍ਰਾਮ ਦੀ ਵਰਗ ਵੰਡ ਕਰੋ। **(20)**

ਪ੍ਰਸ਼ਨ: 3

ੳ.ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੇ ਜਨਮ ਤੇ ਵਿਕਾਸ 'ਤੇ ਵਿਸਥਾਰ ਨੋਟ ਲਿਖੋ। **(20)**

ਅ. ਸੂਫ਼ੀਮੱਤ ਅਨੁਸਾਰ ਅਧਿਆਤਮਕ ਵਿਕਾਸ ਦੀਆਂ ਕਿੰਨ੍ਹੀਆਂ ਮੰਜ਼ਲਾਂ ਹਨ ? ਵਿਸਥਾਰ ਵਿਚ ਲਿਖੋ। **(15)**

ੲ. ਪੰਜਾਬੀ ਨਾਂਵ ਵਾਕੰਸ਼ ਅਤੇ ਕਿਰਿਆ ਵਾਕੰਸ਼ ਦੀ ਉਦਾਹਰਨਾਂ ਸਹਿਤ ਵਿਸਥਾਰ ਚਰਚਾ ਕਰੋ। **(15)**

ਪ੍ਰਸ਼ਨ:4

ੳ. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਵਿਕਾਸ ਦੇ ਵੱਖ ਵੱਖ ਪੜਾਅ ਦੱਸਦੇ ਹੋਏ ਇਸ ਦੀ ਵਰਤਮਾਨ ਸਥਿਤੀ 'ਤੇ ਚਾਨਣਾ ਪਾਓ। **(20)**

ਅ. ਮੱਧਕਾਲ ਵਿਚ ਕਿਹੜੀਆਂ ਜਨਮ ਸਾਖੀਆਂ ਲਿਖੀਆਂ ਗਈਆਂ ਹਨ। ਉਨ੍ਹਾਂ ਸੰਬੰਧੀ ਵਾਰਤਕ ਕਲਾ ਦੀ ਦ੍ਰਿਸ਼ਟੀ ਤੋਂ ਚਰਚਾ ਕਰੋ। **(15)**

ੲ. ਲਿੰਗ ਤੋਂ ਕੀ ਭਾਵ ਹੈ ? ਲਿੰਗ ਕਿੰਨ੍ਹੀ ਤਰ੍ਹਾਂ ਦੇ ਹੁੰਦੇ ਹਨ ? ਪੰਜਾਬੀ ਵਿਚ ਲਿੰਗ ਪਰਿਵਰਤਨ ਦੇ ਕੀ ਨਿਯਮ ਹਨ ? **(15)**

SECTION - B

ਪ੍ਰਸ਼ਨ: 5

ੳ. ਪੰਜਾਬੀ ਦੇ ਪ੍ਰਮੁੱਖ ਕਵਿਤਰੀ ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ ਦੀ ਕਵਿਤਾ ਦੇ ਕਾਵਿ ਪੜਾਅ ਨਿਸ਼ਚਿਤ ਕਰੋ। **(10)**

ਅ. ਬੁਝਾਰਤਾਂ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦਿੰਦੇ ਹੋਏ ਇਨ੍ਹਾਂ ਦੀ ਬਣਤਰ ਸੰਬੰਧੀ ਵਿਚਾਰ ਚਰਚਾ ਕਰੋ। **(10)**

ੲ. ਨਾਨਕ ਸਿੰਘ ਨੂੰ ਸੁਧਾਰਵਾਦੀ ਨਾਵਲਕਾਰ ਕਿਉਂ ਕਿਹਾ ਜਾਂਦਾ ਹੈ ? ਨਾਵਲਾਂ ਦੀਆਂ ਉਦਾਹਰਨਾਂ ਦੇ ਕੇ ਦੱਸੋ। **(10)**

ਸ. ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ ਦੀਆਂ ਪੰਜਾਬ ਸੰਕਟ ਨਾਲ ਸੰਬੰਧਤ ਕਹਾਣੀਆਂ ਦੀ ਸੰਖੇਪ ਚਰਚਾ ਕਰੋ। **(10)**

ਹ. ਪੰਜਾਬੀ ਆਲੋਚਨਾ ਵਿਚ ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ ਦਾ ਕੀ ਸਥਾਨ ਹੈ ? ਚਰਚਾ ਕਰੋ। **(10)**

ਪ੍ਰਸ਼ਨ: 6

ੳ. ਨਿਬੰਧ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦਿੰਦੇ ਹੋਏ ਪੂਰਨ ਸਿੰਘ ਦੀ ਨਿਬੰਧ ਕਲਾ 'ਤੇ ਨੋਟ ਲਿਖੋ ? **(15)**

ਅ. ਲੋਕ ਕਹਾਣੀ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦਿੰਦੇ ਹੋਏ ਲੋਕ ਕਹਾਣੀਆਂ ਦਾ ਵਰਗੀਕਰਣ ਕਰੋ। **(20)**

ੲ. ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ ਪ੍ਰਯੋਗਸ਼ੀਲ ਪੰਜਾਬੀ ਕਵਿਤਾ ਦੇ ਮੋਢੀ ਵਜੋਂ ਜਾਣੇ ਜਾਂਦੇ ਹਨ। ਚਰਚਾ ਕਰੋ। **(15)**

ਪ੍ਰਸ਼ਨ: 7

ੳ. ਆਈ.ਸੀ. ਨੰਦਾ ਨੇ ਪੰਜਾਬੀ ਨਾਟਕ ਨੂੰ ਆਦਰਸ਼ਕ, ਧਾਰਮਿਕ, ਇਤਿਹਾਸਕ ਅਤੇ ਮਿਥਿਹਾਸਕ ਘੁੰਮਣਘੇਰੀ ਵਿਚੋਂ ਕੱਢ ਕੇ ਯਥਾਰਥਵਾਦ ਦੀ ਲੀਹ 'ਤੇ ਚਾੜਿਆ। ਚਰਚਾ ਕਰੋ। **(15)**

ਅ. ਮਹਾਂਕਾਵਿ ਦੀ ਪਰਿਭਾਸ਼ਾ ਦੇਂਦੇ ਹੋਏ ਅਵਤਾਰ ਸਿੰਘ ਆਜ਼ਾਦ ਦੇ ਲਿਖੇ ਮਹਾਂਕਾਵਿ 'ਤੇ ਵਿਸਥਾਰ ਨੋਟ ਲਿਖੋ। **(20)**

ੲ. ਨਜ਼ਮ ਹੁਸੈਨ ਸੱਯਦ ਦੀ ਪੰਜਾਬੀ ਆਲੋਚਨਾ 'ਤੇ ਨੋਟ ਲਿਖੋ। **(15)**

ਪ੍ਰਸ਼ਨ: 8

ੳ. ਪੰਜਾਬੀ ਸਾਹਿਤ ਉਤੇ ਪਏ ਵਿਦੇਸ਼ੀ ਪ੍ਰਭਾਵਾਂ 'ਤੇ ਚਾਨਣਾ ਪਾਓ। **(20)**

ਅ. ਜਸਵੰਤ ਸਿੰਘ ਕੰਵਲ ਦੇ ਮਾਰਕਸਵਾਦੀ ਵਿਚਾਰਧਾਰਾ ਪ੍ਰਭਾਵ ਅਧੀਨ ਲਿਖੇ ਨਾਵਲਾਂ ਬਾਰੇ ਚਰਚਾ ਕਰੋ। **(15)**

ੲ. ਪੰਜਾਬੀ ਕਵਿਤਾ ਵਿਚ ਪ੍ਰਗੀਤ ਸੰਬੰਧੀ ਚਰਚਾ ਕਰਦੇ ਹੋਏ ਸੁਰਜੀਤ ਪਾਤਰ ਦੀ ਪ੍ਰਗੀਤ ਕਾਵਿ ਨੂੰ ਦੇਣ ਉੱਤੇ ਰੋਸ਼ਨੀ ਪਾਓ। **(15)**

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Total No. of Printed Pages-3]

CC(M)

SOCIOLOGY

(OPTIONAL)

PAPER - I

[53]

Time Allowed - Three Hours	*Maximum Marks-250*

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SECTION - A

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

1. a) What is Science? **(10)**
   b) What is reliability? **(10)**
   c) What is social equilibrium? **(10)**
   d) What is beliefs and rites? **(10)**
   e) What is anticipatory socialization? **(10)**

2. a) Critically discuss Talcott Parsons idea of Social Systems. **(20)**
   b) Discuss S.M.Lipset's idea of legitimacy with suitable examples. **(15)**
   c) What is Static and Dynamic in Sociology according to August Comte? **(15)**

3. a) Discuss Max Weber's idea of class, status and party. **(20)**
   b) Discuss various theories of origin of state. **(15)**
   c) Discuss Randal Collins's idea of stratification by education. **(15)**

4. a) Discuss the role of Enlightenment and rise of Sociology in Europe. **(20)**
   b) Discuss the relationship between Psychology and Sociology. **(15)**
   c) What is relative deprivation? Discuss with suitable examples. **(15)**

SECTION - B

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

5. a) What is religious revivalism? **(10)**
   b) What is *Social fact*? **(10)**
   c) What is *Retreatism*? **(10)**
   d) What is "significant others"? **(10)**
   e) What is status group? **(10)**

6. a) Discuss the critique of Positivism. **(20)**
   b) Discuss C.Wright Mills idea of Power Elite. **(15)**
   c) Discuss and differentiate between subjectivity and objectivity in social research. **(15)**

7. a) Discuss Robert K Merton's paradigm for functional analysis. **(20)**

b) What is ideological class domination? Illustrate. **(15)**

c) Critically discuss Ogburn's idea of Cultural lag with suitable examples. **(15)**

8. a) Emile Durkheim considers suicide is not an individual phenomenon rather a social phenomenon. Critically discuss. **(20)**

b) Discuss and differentiate between animism, monism and pluralism. **(15)**

c) What is Hierarchy of Sciences? **(15)**

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(33)

Total No. of Printed Pages -3

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

[55]

[Maximum Marks - 250] *[Time Allowed - 3 Hours]*

سوالات سے متعلق خاص ہدایات

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

۱۔ اس پرچے میں آٹھ سوالات ہیں جو دو حصوں (سیکشن) پر مشتمل ہیں۔

۲۔ امیدوار کو کل پانچ سوالوں کے جواب دینے ہیں۔

۳۔ صرف پانچ سوالوں کے جواب لکھئے۔ سوال نمبر 1 اور 5 کے جواب لازمی ہیں۔ دونوں سیکشن کے باقی سوالات میں سے صرف تین سوالوں کے جواب دینے ہیں لیکن ہر سیکشن کے سوالات میں سے کم از کم ایک سوال کا انتخاب ضروری ہے۔

۴۔ ہر سوال یا سوال کے حصے کے نمبر اس کے سامنے درج کر دیئے گئے ہیں۔

۵۔ جوابات اُردو میں ہی مطلوب ہیں۔

۶۔ سوالات کے جوابات کے لئے الفاظ کی جو تعداد مقرر کی گئی ہے اس کی پابندی لازمی ہے۔

۷۔ سوالات کے جوابات کو ترتیب وار اہمیت دی جائے گی۔ جب تک کوئی جواب یا اس کا حصہ کاٹ کر مسترد نہ کر دیا گیا ہو سوال کا جواب تصور کیا جائے گا اگر چہ 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) وسطی ہند آریائی دور (10)

(ب) مغربی ہندی کی بولیاں اور ان کی خصوصیات (10)

(ج) اُردو کی سماجی و تہذیبی بنیادیں (10)

(د) اُردو زبان رسم الخط اور اس کے امتیازی پہلو (10)

(ہ) جدید ہند آریائی زبانیں اور اُردو (10)

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

(الف) اُردو کی ابتداء سے متعلق اہم نظریات (200 الفاظ میں) (20)

(ب) ہندی زبان سے اُردو کا رشتہ (150 الفاظ میں) (15)

(ج) اُردو کا صرفی و نحوی نظام (150 الفاظ میں) (15)

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

(الف) دکنی ادب کی خصوصیات (200 الفاظ میں) (20)

(ب) دکنی اُردو پر مقامی زبانوں اور ثقافت کے اثرات (150 الفاظ میں) (15)

(ج) گولکنڈہ کی لسانی و ادبی خدمات (150 الفاظ میں) (15)

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

(الف) دکن میں فروغ پانے والی اہم ادبی اصناف (200 الفاظ میں) (20)

(ب) دکن میں اُردو نثر کا آغاز و اِرتقاء (150 الفاظ میں) (15)

(ج) ولی دکنی کی شاعری کی خصوصیات (150 الفاظ میں) (15)

SECTION - B

5. درج ذیل پر مختصر تنقیدی نوٹ (100 الفاظ میں) لکھئے۔ (5×10=50)

(الف) اُردو میں قصیدہ نگاری کی روایت (10)

(ب) دبستان دلّی کی ادبی خدمات (10)

(ج) مرثیہ نگاری اور دبستانِ لکھنؤ (10)

(د) عہد میرؔ میں غزل گوئی (10)

(ہ) اُردو میں داستان نگاری (10)

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

(الف) اُردو میں افسانہ نگاری کی روایت (200 الفاظ میں) (20)

(ب) ڈراما ''انارکلی'' کی خصوصیات (150 الفاظ میں) (15)

(ج) ترقی پسند تحریک کی ادبی خدمات (150 الفاظ میں) (15)

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

(الف) اُردو میں انشائیہ نگاری کی روایت (200 الفاظ میں) (20)

(ب) شبلی کی سوانح نگاری (150 الفاظ میں) (15)

(ج) اُردو ناول نگاری میں گئودان کی اہمیت (150 الفاظ میں) (15)

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

(الف) الطاف حسین حالیؔ کی نثری خدمات (200 الفاظ میں) (20)

(ب) شبلی کی تنقید نگاری (150 الفاظ میں) (15)

(ج) جدیدیت کے بنیادی تصورات (150 الفاظ میں) (15)

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Total No. of Printed Pages-3]

CC(M)

ZOOLOGY

(OPTIONAL)

PAPER - I

[57]

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

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

1. a) Describe Sulphur cycle and explain the effect of human activities on it. **(10)**

   b) What are the causes and symptoms of cholera? Add a note on its prevention and treatment. **(10)**

   c) Explain the Sol-gel hypothesis of Protozoan locomotion. **(10)**

   d) With suitable examples, explain the difference between a predator and a parasite. Add a note on the key aspects governing predator-prey relationship. **(10)**

   e) Give an account of the general characteristics of monotremes. **(10)**

2. a) Describe modifications in the structure of insect mouthpart, giving specific examples of each type. Discuss the adaptive significance of these modifications in feeding strategies. **(20)**

   b) Explain the concepts of polyethism and polymorphism in the social organization of insect colonies using suitable examples and discuss their contribution to the efficiency, adaptability, and overall success of these insects. **(15)**

   c) With the help of suitable diagrams, explain skull types in reptiles. **(15)**

3. a) Define sustainable development and discuss the application of sustainable development principles in the conservation and management of natural resources. **(20)**

   b) Define and compare Protostomes and Deuterostomes, emphasizing their embryonic development patterns, morphological characteristics, and providing examples for each. **(15)**

   c) Give a detailed account of the changes occurring in ovary and uterus during menstrual cycle in human females. Highlight the role of hormones in initiating and orchestrating these changes. **(15)**

4. a) Describe various sources of air pollution. What are its harmful effects on the environment? Add a note on the steps are being taken by the government to reduce the vehicular emission? **(20)**

   b) Give a general structure of a typical tetrapod limb. Explain various adaptations in the tetrapod limb with suitable diagrams and examples. **(15)**

   c) Discuss the life cycle, habitat, and significance of stable flies in transmitting cattle diseases. Analyze the impact of vector-borne diseases on livestock health and productivity. Add a note on the current control methods and suggest strategies for effective disease management in cattle and other livestock. **(15)**

SECTION-B

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

5. a) Write a brief note on the parental care in Amphibians. **(10)**

   b) Explain metagenesis in cnidarians, and discuss its ecological significance and adaptive advantages. **(10)**

   c) Explain the concept of DNA fingerprinting in forensics and discuss how DNA fingerprints aid in identifying individuals in criminal cases. **(10)**

   d) Outline the key steps involved in sericulture and explain the different aspects of rearing technology crucial for ensuring the production of high-quality silk. **(10)**

   e) Explain reciprocal altruism with example? How it is different from altruism? **(10)**

6. a) With the help of suitable examples, explain diadromous migration in fishes. Comment on the other types of migration seen in fishes. How is migration in fishes different from that in birds? **(20)**

   b) What is conditioning? Describe different types of conditioning with suitable examples. **(15)**

   c) Explain the principles of experimental design. Discuss with the help of examples how randomization and replication are essential components in designing experiments. Add a note on the concept of null and alternate hypothesis and their role in hypothesis testing. **(15)**

7. a) Define parasitism. Explain the life cycle of Wuchereria bancrofti and discuss its parasitic adaptations and pathogenicity. Add a note on control strategies for the disease it causes. **(20)**

   b) Explain the principles and applications of transmission electron microscopy (TEM) and scanning electron microscopy (SEM). Highlight the differences in specimen preparation and imaging between TEM and SEM. **(15)**

   c) Discuss the concept of climax community in ecological succession. What factors contribute to the establishment of a climax community, and how does it maintain stability over time. **(15)**

8. a) What are genetic disorders? Classify them according to their inheritance patterns and molecular origins. Describe the role of genetic counseling and assisting individuals and families affected by genetic disorders. **(20)**

   b) With the help of a labelled diagram, explain the structure and functions of respiratory organ of Lamellidens branchiata. **(15)**

   c) Give an account of life history and parasitic adaptations of leech. **(15)**
