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

CC(M)

AGRICULTURE

(OPTIONAL)

PAPER-II

[08]

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

## INSTRUCTIONS

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## SECTION - A

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

   a) Importance of Post harvest technology of Fruits and Vegetables.                         (10)

   b) Define recurrent selection? Give the classification of recurrent selection schemes and explain the scheme used for improving two populations simultaneously. (10)

   c) National Food security Act, 2013 and its salient features?                         (10)

   d) Explain in brief the role of biological control in managing native and invasive alien pests.                         (10)

   e) Write the importance of photoperiodism in agriculture and classify the plants based on photoperiodic response.                         (10)

2. a) Define distant hybridization. Explain the barriers encountered in the production of distant hybrids and techniques to overcome the barriers with applications in crop improvement.                         (15)

   b) What is growth and development? Explain in detail about the factors affecting growth and development.                         (15)

   c) Discuss in brief the impact of storage pests on Indian economy and explain the different traditional and modern approaches that can be followed for management of these pests.                         (20)

3. a) What is linkage? Explain different types of linkages.                         (15)

   b) What is Protected cultivation and write the advantages, Scope and Status of Protected cultivation in world and In India.                         (20)

   c) Describe seed testing procedures for quality assessment.                         (15)

4. a) Write about Marker Assisted Selection, DNA finger printing and their applications in crop improvement.                         (15)

   b) Classify the pests based on ETL duly explaining the concepts of integrated pest management with successful programme across the world and discuss the bottlenecks for its implementation at field level.                         (20)

   c) Explain law of homologous series and give the classification of centers of origin.                         (15)

(08)                                              (2)

## SECTION - B

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

   a)  Define Plant Breeding? Describe various objectives of plant breeding with examples.                                                                    (10)

   b)  Write the classification of spices based on botanical classification, plant part used, Longevity, type of plant and economic importance.              (10)

   c)  Briefly explain the modes of action of different novel insecticides and differentiate how the novel insecticides are different from old chemical insecticides.                                                                  (10)

   d)  Describe Metabolism, Physiologic functions clinical application and sources of trace elements Manganese, Cobalt, Selenium and Molybdenum in human nutrition?                                                                    (10)

   e)  Define IPDM. Write tools or components of IPDM and its advantages.  (10)

6. a)  Explain various factors affecting seed longevity in storage.          (20)

   b)  Explain the various mechanisms and causes of disease resistance in crop plants?                                                                    (20)

   c)  Write about plant/ seed additional declarations for freedom of pests  (10)

7. a)  Write the morphological and cytological features of auto and allopolyploids with their applications in crop improvement.                              (15)

   b)  Write about world declaration and plan of action for nutrition        (10)

   c)  Explain the characters related to sex linked, sex influenced and sex limited with examples.                                                            (10)

   d)  Explain different types of self incompatibility and relevance in plant breeding.                                                                    (15)

8. a)  Explain cell cycle alongwith cell division.                           (20)

   b)  Write various morphological, physiological and biochemical changes during seed development                                                          (10)

   c)  Write the Importance of Fruits and vegetables in Human Nutrition      (10)

   d)  Describe about plant quarantine measures with examples.               (10)

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(08)                                        (3)

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

# CC(M)

## ANIMAL HUSBANDRY AND VETERINARY SCIENCE

### (OPTIONAL)

### PAPER-II

### [10]

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

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## SECTION-A

1. Write about the following in about **150** words each

    a) Grading of raw milk (**10**)

    b) Integumentary system (**10**)

    c) Chemotherapy of Neoplastic diseases. (**10**)

    d) By - Products in the meat industry and their utilization (**10**)

    e) Disease free zone (**10**)

2. a) Write the topographic anatomy & clinical importance of the following viscera

        i) Lungs of ox

        ii) Female genetalia (Internal) (**20**)

    b) What are the dissociate anesthetics? Write their pharmacological properties. Mechanism of action and efficacy ? (**15**)

    c) Describe different slaughter methods commonly used in India and what are the chemical changes associated with slaughtering of animal? (**15**)

3. a) Explain in detail etiology. Epidemiology, Clinical findings, diagnosis screening diagnostic procedures and control of Brucellosis in cattle ? (**20**)

    b) Describe Preparation and standardization of flavoured milk (**15**)

    c) Discuss different occupational zoonotic diseases and their control (**15**)

4. a) Discuss Rules and Regulations for improvement of animal quality and prevention of animal diseases. (**20**)

    b) Explain in detail acceleration of cheese ripening in commercial dairies? (**15**)

    c) Suggest suitable housing systems for different regions of the country and give animal housing requirements for specific categories of dairy & poultry houses (**15**)

## SECTION-B

5. Write about the following in about **150** words.

    a) Effect of climate in relation to animal health (**10**)

    b) Abattoir requirements and design (**10**)

    c) Clinical findings control and prevention of Swine influenza (**10**)

    d) Drugs acting on Autonomic nervous system (**10**)

    e) Grading of wool (**10**)

(10)                        (2)

6. a) Standardize about 10,000 kgs of milk having 3% fat and 8.5% SNF using available sources (raw milk 5% fat 9% SNF & skim milk 0.5% fat & 8.7% SNF) . Find out the quantity of raw milk, skim milk and water required ?**(20)**

   b) Briefly describe how do you proceed with different materials to be collected for laboratory investigation in outbreak of diseases and vetrolegal cases. **(15)**

   c) Explain classification of tissues and their functions **(15)**

7. a) What are the different methods of preservation of meat ? Explain **(20)**

   b) Describe causes and defects of milk and their prevention **(15)**

   c) Explain clinical manifestation of production diseases and their management. **(15)**

8. a) What are the toxic residues present in milk and meat ? Suggest suitable steps to prevent toxicity/ residues in milk and meat. **(20)**

   b) Describe deficiency symptoms of B complex vitamins in birds **(15)**

   c) Explain surgical interference in fractures and dislocations of small animals in Detail. **(15)**

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Total No. of Printed Pages-**2**                                    Roll No. _____

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**CC(M)**

**ANTHROPOLOGY**

**(OPTIONAL)**

**PAPER-II**

**[12]**

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

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**INSTRUCTIONS**

</div>

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**(12) /2019**                                         1                                        **[Turn Over**

## SECTION-I

1. Write short notes on the following in about **150** words each:          (5×10=50)
   a)   Neolithic revolution                                                    (10)
   b)   Varna and Ashrama as regulators of social life                          (10)
   c)   Constitutional safeguards for religious and linguistic minorities.      (10)
   d)   Globalization                                                           (10)
   e)   Ethnoarchaelogy                                                         (10)

2. a)   Discuss the chronology, habitats, economy, and technology of Mesolithic cultures found in India.                                        (20)
   b)   Examine the debates related to Ramapithecus.                            (15)
   c)   What are the factors affecting high fertility rate leading to population growth? Add a note on population Policy in India.                     (15)

3. a)   What are the various theories on origin of caste in India?             (20)
   b)   Examine the concept of agrarian social structure.                       (15)
   c)   Evaluate the contribution of L.P. Vidyarthi to Indian anthropology.     (15)

4. a)   Assess the significance of concepts developed by Robert Redfield in the study of Indian civilization.                                       (20)
   b)   What do you understand by 'Jajmani system? Explain its disintegration? (15)
   c)   Discuss the growth and development of Indian anthropology.              (15)

## SECTION-II

5. Write short notes on the following in about **150** words each:          (5×10=50)
   a)   Discuss the problems involved in defining 'tribe'.                      (10)
   b)   Regionalism-a threat to national integration.                           (10)
   c)   Polyandry in India.                                                     (10)
   d)   Social and educational backwardness indicators of Mandal commission.   (10)
   e)   Impact of Jainism on Indian society.                                    (10)

6. a)   Discuss the Social disabilities suffered by scheduled castes and the constitutional safeguards and welfare measures undertaken for them.       (20)
   b)   Discuss the problem of land alienation in tribal areas and the functioning of legislations enacted for dealing with the problem.              (15)
   c)   Discuss the racial and linguistic classification of Indian tribes.      (15)

7. a)   Discuss the role played by anthropology in tribal development in India. (20)
   b)   Discuss the British Policy towards tribal in India.                     (15)
   c)   Discuss the special problems of hunting and food gathering tribes and measures taken for their welfare.                                    (15)

8. a)   Discuss the major issues of national integration with reference to North-East India.                                                  (20)
   b)   Discuss the significance of cultural and administrative factors in tribal development.                                                 (15)
   c)   Examine the significance of tribal people's participation in forest management?                                                        (15)

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(12)                                    2

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

CC(M)

BOTANY

(OPTIONAL)

PAPER-II

[14]

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

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## SECTION - A

1. Describe the following in about 150 words each.

   a) Describe the structure and function of Lysosomes. **(10)**

   b) What is genetic code? Explain the features of genetic code. **(10)**

   c) Explain the significance of t-test and chi-square test. **(10)**

   d) Describe photoperiodism. **(10)**

   e) What is environmental impact assessment. **(10)**

2. a) Describe the structure and functions of mitochondria. (300 words) **(20)**

   b) Give an account of the procedure used in preparation of chromosome map with the help of three-point test cross. (200 words) **(15)**

   c) Explain the use of apomixis in plant breeding. (200 words) **(15)**

3. a) What are the phytogeographical regions of India. (300 words) **(20)**

   b) Write an account on mass flow hypothesis. (200 words) **(15)**

   c) Describe Lipid metabolism. (200 words) **(15)**

4. a) What is cytoplasmic inheritance? Explain with suitable examples. (300 words) **(20)**

   b) Write an account on Transgenic crops. (200 words) **(15)**

   c) What are macro and micro nutrients? Explain the symptoms caused by the deficiency of N, Fe and Bo. (200 words) **(15)**

## SECTION - B

5. Describe the following in about 150 words each.

   a) What is Red data book. **(10)**

   b) Describe anerobic respiration including fermentation. **(10)**

   c) Explain gene amplification through PCR and application of PCR technology. **(10)**

   d) What are pseudoalleles. **(10)**

   e) Describe the structure and behaviour of B-chromosomes. **(10)**

(14)                                                      (2)

6.  a)  What are sex chromosomes? Describe the Sex-linked inheritance. (300 words)
                                                                                          **(20)**

    b)  What are the methods of plant breeding. (200 words)                               **(15)**

    c)  Write an account on stress physiology. (200 words)                                **(15)**

7.  a)  Describe dormancy, storage and factors for germination of seeds. (300 words)
                                                                                          **(20)**

    b)  Write about the effect of radio active waste on living organisms. (200 words)
                                                                                          **(15)**

    c)  Write an account on evidences, mechanism and theories of organic evolution.
        (200 words)                                                                       **(15)**

8.  Describe the following in about 150 words each.

    a)  Describe molecular basis of mutations.                                            **(10)**

    b)  What is DNA finger printing and its significance.                                 **(10)**

    c)  Explain the role and application of Agri-horticulture.                            **(10)**

    d)  Write in brief about social forestry.                                             **(10)**

    e)  Write about nitrogen cycle.                                                       **(10)**

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**(14)**                                **(3)**

Total No. of Printed Pages-7                    Roll No. _____

CC(M)

CHEMISTRY

(OPTIONAL)

PAPER-II

[16]

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

## INSTRUCTIONS

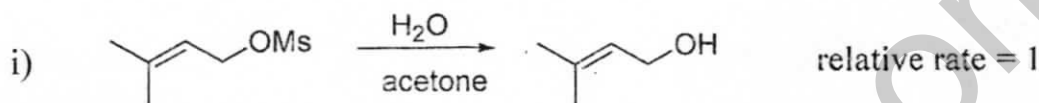### *Please read each of the following Instructions carefully before attempting the paper.*

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(16)   /2019                         (1)                         [Turn Over

# SECTION-A

1. a) Arrange the following in increasing order of acidity of hydrogens shown and justify your answer. **(10)**

     PhCH$_2$-H,
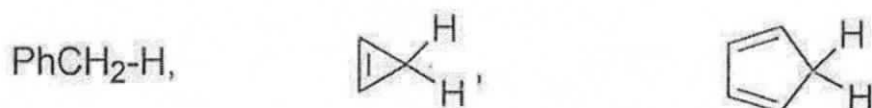
b) Observe the following set of reactions. **(10)**

     i)    (structure) OMs $\xrightarrow[\text{acetone}]{H_2O}$ (structure) OH    relative rate = 1

     ii)   (structure) CF$_3$, OMs $\xrightarrow[\text{acetone}]{H_2O}$ (structure) CF$_3$ OH    relative rate = $1.8 \times 10^{-6}$
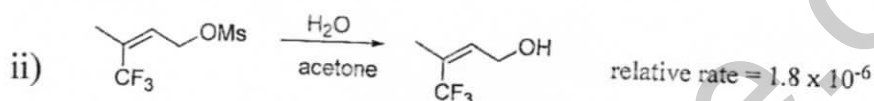
     Suggest a mechanism that could account for the observed difference in the rates of reactions.

c) Both cis and trans-2-acetoxycyclohexyl tosylates on acetolysis (solvolysis) gave same product i.e. trans-cyclohexane-1, 2-diacetate. Explain with equations. **(10)**

d) What are X, Y in the following reaction sequence and give the mechanism for the formation of Y. **(10)**

     (cyclohexanone structure) $\xrightarrow{SeO_2}$ X $\xrightarrow{NaOH}$ Y
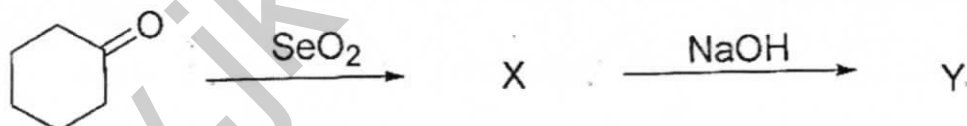
e) Identify A, B in the following reaction sequence and explain the mechanism for the formation of B. **(10)**

     2-Butyne $\xrightarrow{A}$ (alkene structure: Me, H / H, Me) $\xrightarrow{Br_2}$ B
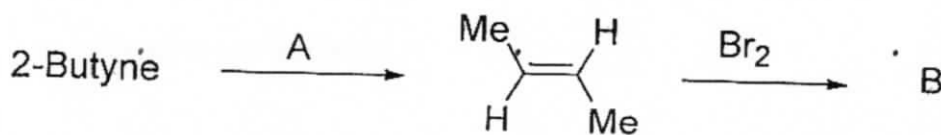
2. a) Predict the structures of A, B and C in the following reaction sequence. **(15)**

     (cyclohexene) $\xrightarrow[\text{ROOR, hv}]{NBS}$ A $\xrightarrow{NaOMe}$ B $\xrightarrow{\triangle}$ C
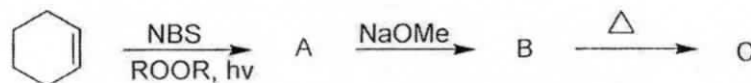
(16)                       (2)

b)  Arrange the following in increasing order of reactivity towards electrophilic Substitution and explain. **(10)**

Toluene          Benzene          Cumene

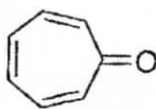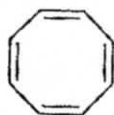i                      ii                      iii

c)  Predict the products X, Y with the correct configuration in the following reactions and give explanation for the stereochemistry observed in the products. **(15)**
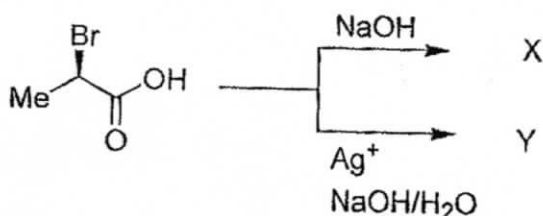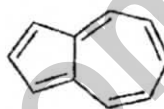


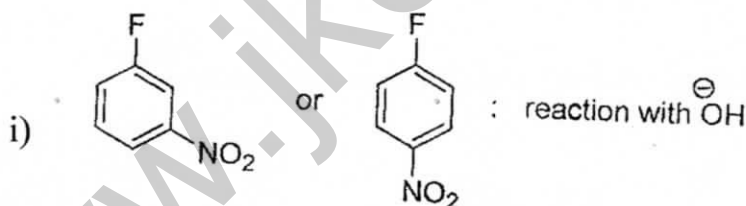d)  Group the following into aromatic and anti aromatic and give reasons. **(10)**



3.  a)  Which among each pair is more reactive against the reaction mentioned and why? **(15)**



i)  ⬡ with F and NO₂   or   ⬡ with F and NO₂   : reaction with $\overset{\ominus}{O}H$

ii)  cyclopentyl–Br   or   cyclopentadienyl–Br   : solvolysis

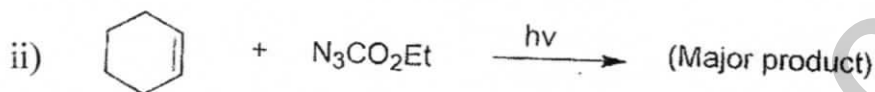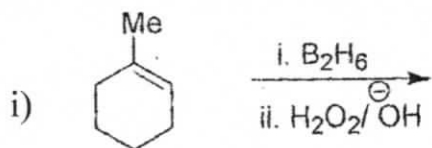iii)  $CH_3CH(OEt)_2$ or $ClCH_2CH(OEt)_2$ : acid catalysed hydrolysis

b)  $\pi_s^2 + \pi_s^2$ cycloadditions are allowed photochemically but forbidden thermally. Explain by FMO approach. **(10)**
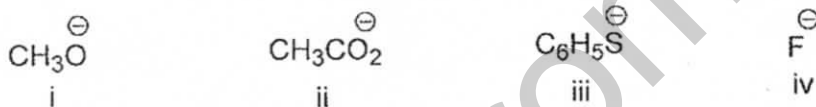
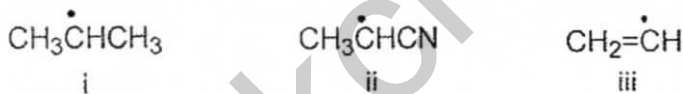c) What are A, B in the following reaction sequence and give the mechanism for the formation of B. **(15)**

$$PhCH_2CN \xrightarrow[H_2O]{LAH} A \xrightarrow[\text{ii. POCl}_3]{\text{i. CH}_3\text{COCl}} B$$
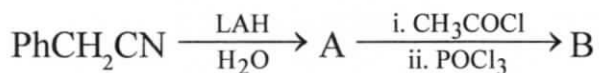
d) Complete the following reactions and give mechanism. **(10)**

i)    $\xrightarrow[\text{ii. H}_2\text{O}_2/\ ^{\ominus}\text{OH}]{\text{i. B}_2\text{H}_6}$

ii)    $+ \quad N_3CO_2Et \xrightarrow{hv}$ (Major product)

**4.** a) Arrange the following nucleophiles in decreasing order of reactivity with methyl iodide and justify your answer. **(15)**

$$\overset{\ominus}{CH_3O} \qquad\qquad CH_3\overset{\ominus}{CO_2} \qquad\qquad C_6H_5\overset{\ominus}{S} \qquad\qquad \overset{\ominus}{F}$$

    i                    ii                    iii                    iv

b) Predict the increasing order of stability of the following radicals and explain. **(10)**

$$CH_3\overset{\bullet}{C}HCH_3 \qquad\qquad CH_3\overset{\bullet}{C}HCN \qquad\qquad CH_2=\overset{\bullet}{C}H$$

    i                    ii                    iii

c) Predict the major product from the following reactions. **(15)**

i)    $\xrightarrow[\text{AlCl}_3]{\text{CH}_3\text{COCl}}$

ii)    $\xrightarrow{Et_3COK}$

iii)    $\xrightarrow{\overset{\ominus}{O}Me}$
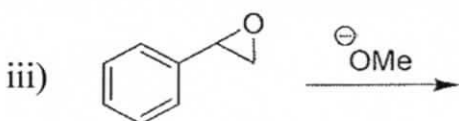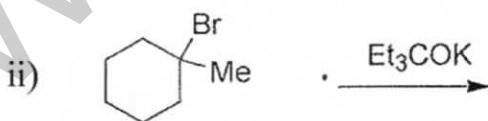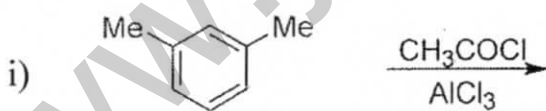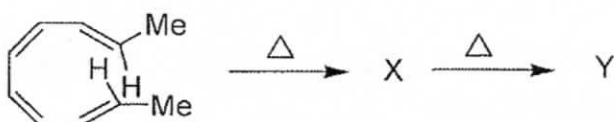
(16)                                   (4)

d) Identify Y in the following reaction sequence and explain the mechanism of its formation. **(10)**
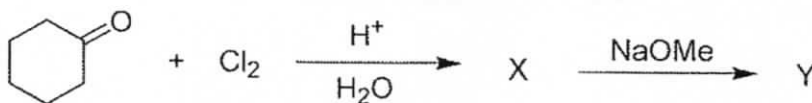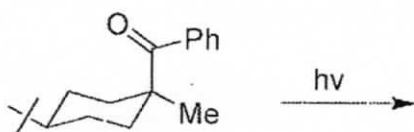


**SECTION-B**

5. a) Find out X, Y with correct stereochemistry in the following reaction sequence.**(10)**



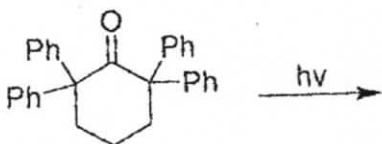b) Complete the following reaction and give the mechanism. **(10)**



c) What is benzoin condensation? Explain its mechanism. **(10)**

d) A compound X $(C_8H_8O)$ when treated with $NH_2$-$NH_2$/$^-$OH gave xylene isomer, which displayed only two signals in $^1$H-NMR spectrum. Find out the structure of X. **(10)**

e) Predict the major product from the following reaction and explain. **(10)**
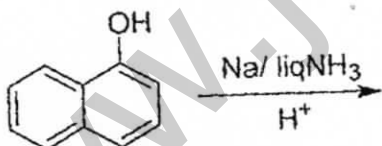


6. a) What are the bases common to both DNA and RNA? Draw their structures. **(15)**

b) In $SN^2$ reactions the order of reactivity of halides is $I > Br > Cl > F$, but in $ArSN^2$ it is reverse. Explain. **(10)**

c) Mass spectrum of 2-pentene showed peaks at m/z = 70, 55 (100%), 42, 41, 39, 29. Provide fragmentation for these peaks. **(15)**

**(16)** **(5)** **[Turn Over**

d) Give the possible products from the following reaction. **(10)**



7. a) Identify the products X, Y (major) and two name reactions in the following and give their mechanism. **(15)**

2, 3–Dimethyl butane-diol $\xrightarrow{H^+}$ X $\xrightarrow{mCPBA}$ Y
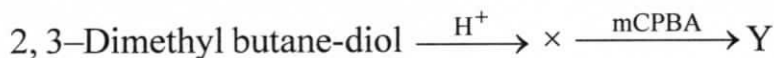
b) The rotational constant of $^{13}C^{16}O$ is 1.836 cm$^{-1}$. Calculate the moment of inertia (I) for this dia atomic molecule. **(10)**

c) Explain the following. **(15)**

    i) P-Nitroanilinium ion is more acidic than p-nitrobenzoic acid.

    ii) Nitrosonium ion reacts with N, N-dimethylaniline but not with benzene.

    iii) THF can be prepared by Williamsons synthesis but not diphenyl ether.

d) How is Polystyrene prepared? Explain. **(10)**

8. a) How do you distinguish the following by IR spectroscopy? Explain. **(15)**

    i) $PhCOCH_2CH_3$ from $PhCH_2COCH_3$

    ii) $PhCHOHCH_3$ from $PhCH_2OCH_3$

    iii) $PhCH_2CH_2NH_2$ from $Ph\,N(CH_3)_2$

b) Differentiate the following with proper examples. **(10)**

    i) Chromophore from auxochrome.

    ii) Bathochromic shift from hypsochromic shift.

c) Find out the structures of the following. **(15)**

    i) The ${}^{1}$H-NMR spectrum of organic compound with molecular formula $C_5H_{12}O_2$ has two singlets at $\delta$ 1.3 and 3.2 with an area ratio of 1:1 integration.

**(16)**                  **(6)**

ii) The IR spectrum of organic compound with molecular formula $C_5H_6O_2$ has peaks at 3270, 2118, 1730 cm$^{-1}$ and $^1$H-NMR spectrum has three signals at δ 1.35 (t,3H), 2.95 (s,1H), 4.3 (q,2H).

d) Explain the mechanism of the following two reactions.      **(10)**



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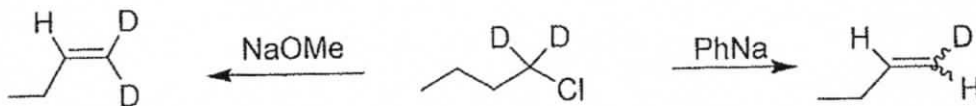
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## CC(M)
## CIVIL ENGINEERING
## (OPTIONAL)
## PAPER-II
## [18]

<br>

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

## INSTRUCTIONS

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

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ii)  Your answer should be precise and coherent.

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

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

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

# SECTION-A

1. a) Draw a comparison between CPM and PERT. **(10)**

   b) What do you meant by "Workability"? What are the various factors affecting of workability? Enlist different test for workability and discuss one of them in detail. **(10)**

   c) Design a circular settling tank unit for a primary treatment of sewage at 12 million litres per day. Assume suitable values of detention period (presuming that trickling filters are to follow the sedimentation tank). and surface loading. **(10)**

   d) Rainfall intensities in mm/hr at a half-hour intervals during a 4-hour storm were. 5, 9, 20, 13, 6, 8, 16 and 3 mm/hr. If the corresponding observed runoff is $27.45 \times 10^6 m^3$ from a basin having an area 1830 km², determine the values of $W_{index}$ and $\Phi_{index}$ for the storm. **(10)**

   e) Determine the effective height of a stack, with the following given data : **(10)**

      i) Physical stack is 180 m tall with 0.95 m inside diameter.

      ii) Wind velocity is 2.75 m/sec.

      iii) Air temperature is 20°C.

      iv) Barometric pressure is 1000 millibars.

      v) Stack gas velocity 11.12 m/sec.

      vi) Stack gas temperature is 160°C.

2. a) Design an Imhoff tank to treat the sewage from a small town with 30,000 population. The rate of sewage may be assumed as 150 litres per head per day. Make suitable assumptions, wherever needed. **(20)**

   b) The one-hour unit hydrograph of a small rural catchment is triangular in shape with a peak of 3.6 m³/s occurring at 3 hours from the start and a base time of 9 hours. Following urbanisation over a period of two decades the infiltration index Φ has decreased from 0.7 cm/h to 0.4 cm/h. Also, the one-hour unit graph has now a peak of 6.0 m³/s at 1.5 hours from the start. The time base has shortened of 6 hour. If a design storm has intensities of 4 cm/h and 3 cm/h for two consecutive one-hour intervals, estimate the percentage increase in the peak storm runoff and in the volume of direct runoff due to urbanisation. **(20)**

   c) On a straight B.G. track, a turn out takes off at an angle of 6⁰ 42' 35", design the turn when it is given, angle of switch is 1⁰34'27", the length of switch-rails is 4.73 m, heel divergence, i.e. d=11.43 cm and straight arm i.e. x=0.85 m. **(10)**

(18)            (2)

3. a) Information on the activities required for a medium size civil engineering project is as follows. **(20)**

| Activity | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Node number | 1-2 | 1-3 | 1-4 | 2-5 | 3-5 | 3-6 | 3-7 | 4-6 | 5-7 | 6-8 | 7-8 |
| Duration (in months) | 02 | 07 | 08 | 03 | 06 | 10 | 04 | 06 | 02 | 05 | 06 |

Draw the network and calculate the following :

   i)   Earliest and latest event time
   ii)  Earliest and latest start time
   iii) Earliest and latest finish time
   iv)  Total, Free and independent float
   v)   Critical path

   b) The speed of overtaking and overtaken vehicles is 80 km/h and 60 km/h respectively. If the acceleration of the overtaking vehicle is 2.5 km/h per second. Calculate the safe passing sight distance for : **(10)**

   i)  Single lane one way traffic
   ii) Three lane both way traffic assume perception time of driver = 2s

   c) Determine the following. **(20)**

   i)   The maximum vertical stresses at the heel and toe of the dam.
   ii)  The major principal stress at the toe of the dam.
   iii) The intensity of shear stress on a horizontal plane near the toe.

Assume unit weight of concrete 23.5 kN/m$^3$, and unit length of dam. Allowable stress in concrete may be taken 2500 kN/m$^2$.
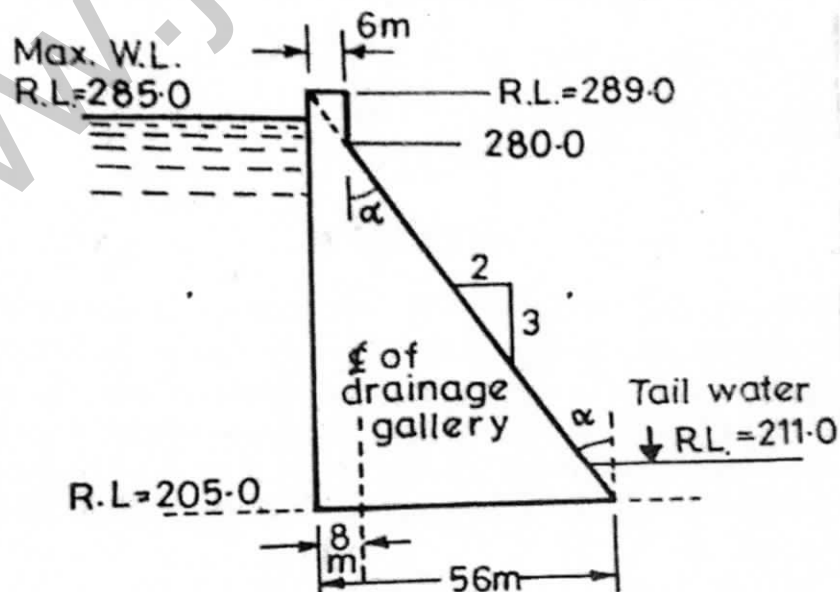
4.    a)    A waste water effluent of 560 l/s with a BOD=50 mg/l, DO=3.0 mg/l and temperature of 23°C enters a river where the flow is 28 m³/sec, and BOD=4.0 mg/l, DO=8.2 mg/l, and temperature of 17°C. $k_1$ of the waste is 0.10 per day at 20°C. The velocity of water in the river downstream is 0.18 m/s and depth of 1.2 m. Determine the following after mixing of waste water with the river water: **(10)**

       i)    Combined discharge;

       ii)    BOD

       iii)    DO; and

       iv)    Temperature.

   b)    The following bearings were observed in running a closed traverse. Determine the correct magnetic bearings of the lines. **(20)**

| Line | F.B. | B.B. |
|------|------|------|
| AB | 71°05 | 250°20 |
| BC | 110°20 | 292°35 |
| CD | 161°35 | 341°45 |
| DE | 220°50 | 40°05 |
| EA | 300°50 | 121°10 |

   c)    The mass curve of rainfall in a storm of total duration 270 minutes is given below. **(20)**

       i)    Draw the hyetograph of the storm at 30 minutes time step.

       ii)    Plot the maximum intensity duration curve for this storm.

       iii)    Plot the maximum depth duration curve for the storm.

| Times since Start in Minutes | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cumulative Rainfall(mm) | 0 | 6 | 18 | 21 | 36 | 43 | 49 | 52 | 53 | 54 |

## SECTION-B

5.    a)    A valley curve of a state highway is formed by a descending gradient of 1 in 20 meeting an ascending gradient of 1 in 30. Design the length of valley curve to fulfil both comfort condition and head light sight distance requirement for a design speed of 80 km/h. Assume allowable rate of change of centrifugal acceleration C=0.60 m/s². Suggest the best suitable shape of valley curve. Consider reaction time = 2.5 s. Coefficient of longitudinal friction f = 0.35. **(10)**

b) For the network diagram shown below, the estimated time in days for each activity is shown in the network diagram. Determine the critical path. Also determine the probability of completing the work in 35 days. **(10)**
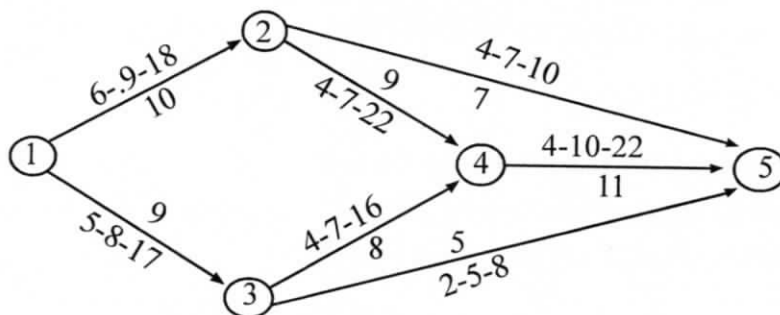


The value of Z and corresponding probability are given in the table.

| Z | 1.0 | 1.1 | 1.2 | 1.5 | 2.0 | 3.0 |
|---|---|---|---|---|---|---|
| Probability (%) | 84.13 | 86.43 | 88.90 | 93.92 | 97.92 | 99.87 |

c) A 225 mm dia sewer is to discharge 0.005 cumecs at a velocity as self-cleansing as a sewer flowing full at 0.80 m/sec. Find the depth, velocity generated, and the required gradient. Use Manning's rugosity coefficient as 0.013. **(10)**

d) 800 m³/s of water is applied to a farmer's rice field of 0.6 hectares. When the moisture content in the soil falls to 40% of the available water between the field capacity (36%) of the soil and permanent wilting point (15%) of the soil crop combination. Determine the field application efficiency. The root zone depth of rice is 60 cm. Assume porosity = 40%. **(10)**

e) Discuss the geological classification of rocks. How to perform the test for determination of specific gravity of aggregates? **(10)**

6. a) An unconfined aquifer (K=5 m/day) situated on the top of a horizontal impervious layer connects two parallel water bodies M and N which are 1200 m apart. The water-surface elevations of M and N, measured above the horizontal Impervious bed, are 10m and 8m, if a uniform recharge at the rate of 0.002 m³/day per m² of horizontal area occurs on the ground surface. Estimate,

i) The water table profile,

ii) The location and elevation of the water table divide.

iii) The seepage discharges into the lakes, and

iv) The recharge rate at which the water table divide coincides with the upstream edge of the aquifer and the total seepage flow per unit width of the aquifer at this recharge rate. **(25)**

b) An average operative data for conventional activated sludge treatment plant is as follows : **(10)**

Waste water flow = 35000 m³/d, Volume of aeration tank = 10900 m³. Influent BOD 250 mg/l, Effluent BOD = 20 mg/l, Mixed Liquor Suspended Solids (MLSS)=2500 mg/l, Elluent suspended solids=30 mg/l, Waste sludge suspended solids = 9700 mg/l, Quantity of waste sludge = 220 m³/d. Based on the information above, determine.

    i)     Aeration period(hrs)

    ii)    Food to microorganisms ratio (F/M) (kg BOD per day/kg MLSS)

    iii)   Percentage efficiency of BOD removal

    iv)   Sludge age (days)

c)    It was required to ascertain the elevation of the two points P and Q. The levelling was then continued to a bench mark of 83.500, the reading obtained being below. Obtained the R.I., of P and Q.    **(15)**

| B.S. | I.S. | F.S. | R.L. | Remarks |
|------|------|------|------|---------|
| 1.622 | | | | P |
| 1.874 | | 0.354 | | |
| 2.032 | | 1.780 | | |
| | 2.362 | | | Q |
| 0.984 | | 1.122 | | |
| 1.906 | | 2.824 | | |
| | | 2.036 | 83.500 | B.M. |

7.   a)    Calculate optimum cost and optimum duration for jbs of network given in the table below.    **(15)**

| Activity | Normal duration (in days) | Normal cost (in Rs.) | Crash duration (in Days) | Crash cost (in Rs.) |
|----------|---------------------------|----------------------|--------------------------|---------------------|
| 1-2 | 5 | 4000 | 4 | 5000 |
| 1-3 | 7 | 8000 | 3 | 10000 |
| 2-3 | 6 | 6000 | 2 | 8400 |

Indirect cost = Rs. 1000 per day. Sketch project time-cost diagram.

b)    Design a suitable cross drainage work, given the following data at the crossing of a canal and drainage.    **(25)**

Canal :    Full supply discharge = 32 cumecs, Full supply level = R.L. 213.5 m, Canal bed level = R.L. 212.0 m. Canal bed width = 20 m. Trapezoidal canal section with 1.5 H : I V slopes. Canal water depth = 1.5 m.

Drainage: High flood discharge = 300 cumecs. High flood level = 210.0 m. High flood depth 2.5 m. General ground level = 212.5 m.

**(18)**                                        **(6)**

c) Design a diamond crossing between two B.G. tracks crossing each other at an angle 1 in 10 which is the flattest angle permissible for a diamond crossing.**(10)**

8. a) The length of a survey line was measured with a tape having nominal length 20 m and was found to be 246.4 meter. As a check the length was again measured with a 30 m tape and was found to 250.5 meter. On testing, it was found that the 20 meter tape is 6 cm too short. Estimate the true length of 30 m tape. **(15)**

b) Design an irrigation channel to carry 40 cumecs of discharge, with B/D, i.e. base width to depth ratio as 2.5. The critical velocity ratio is 1.0. Assume a suitable value of kutter's rugosity coefficient and use Kennedy's methods.**(20)**

c) The ordinates of a 6-hour unit hydrograph of a catchment are given below.**(15)**

| Time (h) | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ordinate of 6-h UH | 0 | 25 | 50 | 85 | 125 | 160 | 185 | 160 | 110 | 60 | 36 | 25 | 16 | 8 | 0 |

Derive the flood hydrograph in the catchment due to the storm given below :

| Time from start of storm (h) | 0 | 6 | 12 | 18 |
|---|---|---|---|---|
| Accumulated rainfall (cm) | 0 | 3.5 | 11.0 | 16.5 |

The storm loss rate ($\Phi$-index) for the catchment is estimated as 0.25 cm/h. The base flow can be assumed to be 15 m³/s at the beginning and increasing by 2.0 m³/s for every 12 hours till the end of the direct-runoff hydrograph.

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**(18)**                                    **(7)**

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

# CC(M)
# COMMERCE AND ACCOUNTANCY
## (OPTIONAL)
## PAPER-II
### [20]

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

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

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vi)   *No blank page be left in between answer to various questions*

## SECTION-A

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

    a)  Line and Staff                                                    (10)

    b)  Mechanistic and organic cultures                                  (10)

    c)  Relevance of matrix organizational structure                      (10)

    d)  Big five factors - Extrovert                                      (10)

    e)  Change agents                                                     (10)

2.  a)  Why is a change in political external environment important to you as a civil service authority? How do you respond to such change?                    (20)

    b)  'The contingency approach is the latest thought in management' - Analyse the statement in the context of earlier approaches to management.              (20)

    c)  'Politics are a part of the organizational behavior and individuals tend to use various tactics to play politics in organizations'. What are the suitable ways of regulating the politics ?                                             (10)

3.  a)  'Individuals can perceive accurately if they can eliminate or control the barriers to perceptual accuracy' - Discuss.                                  (20)

    b)  Distinguish content theories from process theories of motivation. 'Vroom's expectancy theory focuses on desired goal and the strength of achieving the goal'. What are the important managerial implications of this theory?      (20)

    c)  'The transformational leadership is a value driven approach'. What is the relevance of this approach to modern India?                                (10)

4.  a)  'Poor delegation of authority often causes managerial failure'. Examine the given statement and suggest suitable guide lines to overcome the weak delegation.                                                            (20)

    b)  What is organizational effectiveness? How is it different from efficiency? What are the causes of effectiveness at individual, group and organization levels?(20)

    c)  'Change is always resisted, but still if approached properly, change can be implemented successfully' - Explain                                       (10)

(20)                                (2)

## SECTION-B

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

   a) Job description **(10)**

   b) Living wages **(10)**

   c) Compulsory adjudication **(10)**

   d) Labour turnover **(10)**

   e) Vestibule training **(10)**

6. a) 'Identifying the training needs is a major issue in the development of effective training programme'. If you are assigned the job, how do you assess the training needs? **(20)**

   b) A company wishes to implement 360 - degree appraisal system. Discuss the steps involved. **(20)**

   c) Do organizations really get important information through exit interviews? What course of actions should organisations take to get right information? **(10)**

7. a) What are the causes and effects of Absenteeism? How do you manage absenteeism? **(20)**

   b) Are the strikes by driver partners of Ola and Uber Justifiable? Give your arguments and also suggest a suitable government policy regarding such strikes. **(20)**

   c) 'Trade unions do not have any role in information technology industry'.Do you agree with the statement? **(10)**

8. a) 'Employment of women in organizations requires certain welfare facilities'. Examine the statement from the perspective of women employed in manufacturing and service industries. **(20)**

   b) A good selection process matches the right people with right jobs and right organization. What are the probable tests which an organization might use to recruit the individuals? **(20)**

   c) What steps are required to make collective bargaining more successful in India? **(10)**

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**(20)**

(3)

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

## CC(M)
## ECONOMICS
## (OPTIONAL)
## PAPER-II
## [22]

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

## INSTRUCTIONS

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## SECTION-A

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

   a) Compare the merits and demerits of Prime minister Samman Nidhi over farmer's loan waives in India. Explain in detail.

   b) Explain the methods of poverty estimates in India. Highlight the more appropriate method of measuring poverty.

   c) Do you think Start-ups are important for economic growth in India? Give reasons for your answers.

   d) Will Direct Cash Transfer scheme improve the performance and efficiency of various social welfare schemes? Give specific instances supporting your argument.

   e) Explain the effect of Managed floating exchange Rate on external sector of India.

2. a) How can Goods and Service Tax reduce tax burden on people and increase government revenue at the same time. Explain with suitable examples.    **(20)**

   b) "Current Account Deficit expected to be largely financed by Foreign Direct Investment flows". Do you agree with the statement in the Indian context? Justify your answer.    **(15)**

   c) Is Recapitalisation of Public Sector Banks will help to overcome financial distress of Indian Banks? Give specific instances supporting your argument.**(15)**

3. a) Discuss the scope and relevance of Most Favoured Nation (MFN) status under World Trade Organisation.    **(15)**

   b) Analyse the effect of Disinvestment on Research and Development (R&D) spending in Public Sector enterprises in India.    **(15)**

   c) Explain the implications of the Terms of reference of the 15th Finance Commission and the need for empowering local governments in the context of Central and State relations.    **(20)**

4. a) Discuss the Present Status of land records in the country and critically appraise the efforts made by state governments to improve it is maintenance through computerisation.    **(20)**

   b) In your opinion, what is relatively more important for economic development? Economic reforms, utilization of these resources or distribution pattern of income?    **(15)**

   c) "Indian agricultural market is fragmented and E-NAM, if implemented properly, can help the farmers and reach the goal of 'One Nation One Market". Do you agree with the statement? Justify your answer.    **(15)**

(22)                                          (2)

## SECTION-B

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

   a)  Critically evaluate the composition and contribution of service section in India.

   b)  Why do think government of India replaced Planning commission with NITI Aayog? Explain and give reasons for your answers.

   c)  What is the role Monetary Policy Committee (MPC) in determining the policy rates of Reserve Bank of India? Explain.

   d)  Point out the critical elements in typical Public Private Partnerships (PPP) agreements in infrastructure projects to safe guard the interest of the Public.

   e)  Discuss in detail the views of VKRV Rao on deficit financing? It is reliance today.

6.  a)  Discuss the role of renewable energy resources in order to maintain environmental sustainability with special reference to India.        **(20)**

   b)  "Good social and physical infrastructure facilities are crucial for rapid economic growth, rapid human development and Poverty reduction". Elucidate.   **(15)**

   c)  How far benefits of the globalisation have reached the villages of India? Give justification for your arguments.        **(15)**

7.  a)  Explain the main features of fiscal reforms undertaken in India during the last two decades. How far have these been successful in achieving the objectives of allocative efficiency and distributive justice?        **(20)**

   b)  "Indian Railways has always focused on adoption of new technologies to improve train operations and provide better passengers experience to it is customers". Discuss and comment on Government initiatives.        **(15)**

   c)  "Full convertibility current and capital accounts serve the purpose of integrating Indian economy with world economy". Critically examine.        **(15)**

8.  a)  What are the major impediments for extending financial services to rural India? Will Digital India initiative help to achieve the goals of financial inclusion? Explain.        **(20)**

   b)  Discuss the Trends in the Jute Industry Since Independence. What Measures should take to improve the performance of the Jute Industry.        **(15)**

   c)  "Attempts to ensure intellectual Property protection has resulted in the failure of knowledge spillovers from developed countries to developing countries like India'. Explain in detail.        **(15)**

_____

(22)                                (3)

Total No. of Printed Pages-**8**                                      Roll No. _____

## CC(M)

## ELECTRICAL ENGINEERING

### (OPTIONAL)

### PAPER - II

### [24]

| Time Allowed - 3 Hours | | Maximum Marks-250 |

## INSTRUCTIONS

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## SECTION - A

1.  a)  An admittance diagram for a two-bus network is shown in the figure below.
        Find

    i)   $Y_{bus}$                                                                        (04)

    ii)  Bus voltage vector $V_1$ at bus 1.                                               (03)

    iii) Bus voltage vector $V_2$ at bus 2.                                               (03)
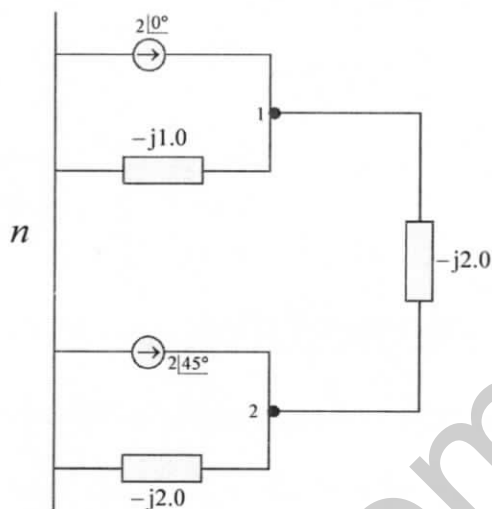


    b)  A sheet of bakelite 4.5mm thick is tested at 50Hz between electrodes 0.12 meter
        in diameter. The schering bridge employs a standard air capacitor $C_2$ of
        106 pico-Farad capacitance, a non-reactive resistance $R_4$ of $1000/\pi$ ohm in
        parallel with a variable capacitor $C_4 = 0.5$ micro Farad, and a non-reactive
        variable resistance $R_3$.

        Balance is obtained with $C_4$ as 0.5 micro-Farad and $R_3 = 260$ ohm. Obtain for
        sheet

    i)   Capacitance                                                                      (04)
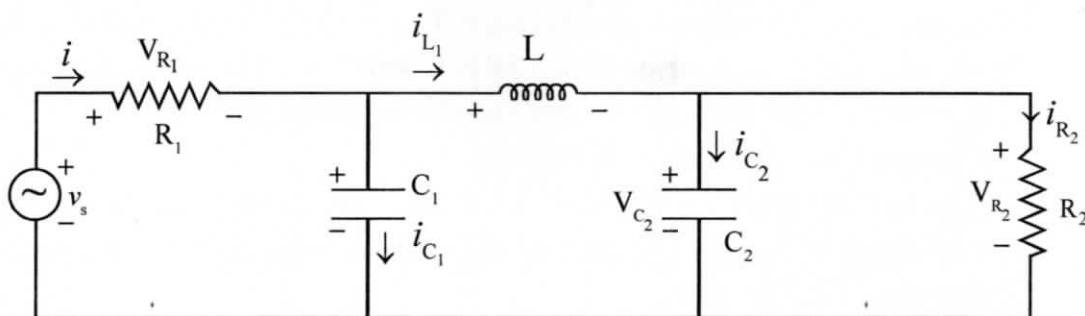
    ii)  Power factor                                                                     (03)

    iii) Relative Permittivity                                                            (03)
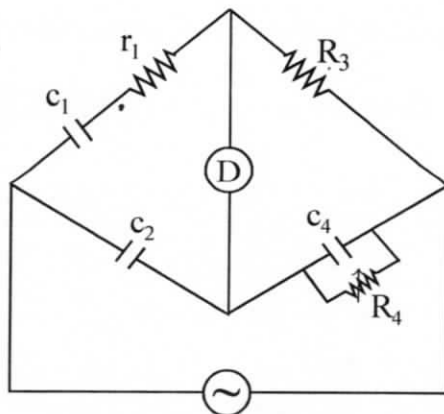
c) Write the state equations for the network shown below: **(10)**



d) Consider a DMS X with symbols $x_k$, k=1,2,3,4. Table below lists four possible binary codes. **(10)**

| $x_k$ | Code-A | Code-B | Code-C | Code-D |
|-------|--------|--------|--------|--------|
| $x_1$ | 00 | 0 | 0 | 0 |
| $x_2$ | 01 | 10 | 11 | 100 |
| $x_3$ | 10 | 11 | 100 | 110 |
| $x_4$ | 11 | 110 | 110 | 111 |

Show that all codes except Code-B satisfy the Kraft inequality.

2. a) Consider an audio signal with spectral components limited to the frequency band of 300 to 3300 Hertz. A PCM signal is generated with a sampling rate of 8000 samples per second. The required output to quantization noise ratio is 30 dB.
Calculate:

   i) Minimum number of uniform quantizing level needed, and what is the minimum no. of bits per sample needed? **(10)**

   ii) Minimum system bandwidth required **(10)**

b) Describing the related instructions give the set of contents of the accumulator to

   i) enable RST 6.5 **(05)**

   ii) disable RST 7.5 and 5.5 **(05)**

c) The incremental costs of two units are given by

$$\frac{dF_1}{dP_{G1}} = 0.2P_{G1} + 40 \ Rs. / MWhr$$

$$\frac{dF_2}{dP_{G2}} = 0.4P_{G2} + 30 \ Rs. / MWhr$$

The limits on generator outputs are as follows:

$30MW \le P_{G1} \le 175MW$ and

$20MW \le P_{G2} \le 125MW$

The load varies from 50 MW to 300 MW. How will the load be shared from minimum to maximum loading conditions? Assume that both units operate at all times and losses are neglected. **(10)**

d) The current coil of a dynamometer wattmeter is connected to a 24 volt DC source in series with a 6 ohm resistor. The potential circuit is connected through an ideal rectifier in series with a 50 Hertz source of 100 Volt. The inductance of pressure circuit and current coil resistance are negligible.
Compute the reading of Wattmeter. **(10)**

3.  a) The neutral point of 3-phase 20 mvA, 11kV alternator is earthed through resistance of 5 ohm. The relay is set to operate when there is an out of balance current of 1.5 Ampere.
What percentage of winding is protected against an earth fault? **(10)**

b) A thermistor has a resistance of 3980 ohm at the ice point (0°C) and 794 ohm at 50°C. The resistance temperature relationship is given by $R_T = a R_0 \exp(b/T)$.
Calculate:
   i)   Constants a and b. **(05)**
   ii)  Range of resistance to be measured in case the temperature varies from 40°C to 100°C. **(05)**

c) The open-loop transfer function of a unity feedback control system is

$$G(s) = \frac{K}{s(1+Ts)}$$

It is desired that all the roots of the closed loop system should lie in the region towards the left of the line s= –a. The origin of the new p-plane will be (–a,0)
Determine the values of
   i)   K **(10)**
   ii)  T **(10)**

d) The magnitude plot of the open loop transfer function G(s) of a certain system is shown below:
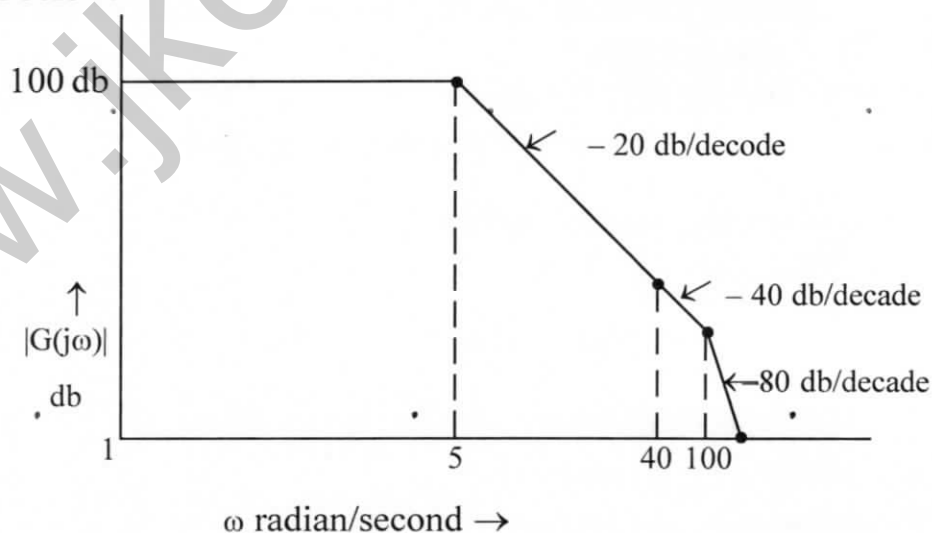


Based on above
   i)   Determine G(s) if it is known that the system is of minimum phase type. **(5)**
   ii)  Estimate the phase at corner frequency $\omega = 40$. **(5)**

(24)                                      (4)

**4.** **a)**



$$v_1 = s_1 \oplus s_2 \oplus s_3$$
$$v_2 = s_1 \oplus s_3$$

For the figure shown above. Find

i)    The encoded output sequence for input d=(1 0 1)    **(5)**

ii)   The impulse response and generator polynomials.    **(5)**
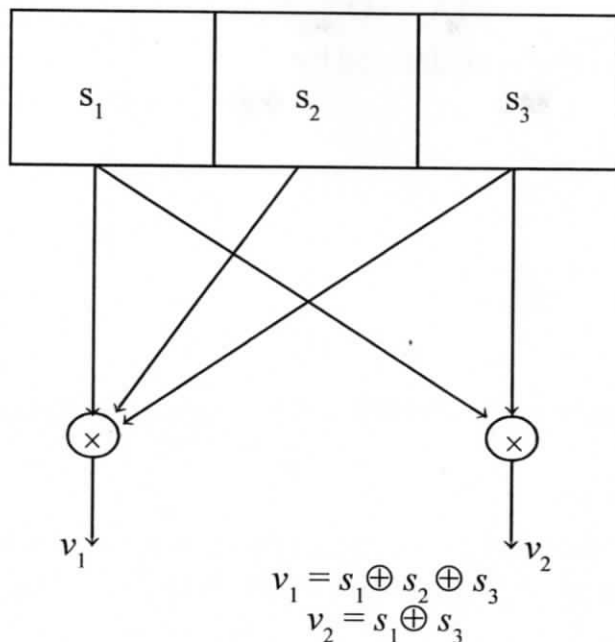
iii)  Code vector    **(5)**

**b)**   A generator is rated 10,000 kVA, 13.8kV, and has reactance $X_1 = X_2 = 10\%$ and $X_0 = 5\%$. Its neutral is grounded through a current limiting reactor of 8% (based on the generator rating). The generator is connected to a delta-star connected step-up transformer with a reactance of 6%, its neutral being solidly grounded. When the terminal voltage of the generator is 13.8 kilo volt. A single line-to-ground fault occurs on the open circuited high voltage side of the transformer.

Find the initial symmetrical r.m.s. current in all phases of the generator.    **(15)**

**c)**   Calculate the charging current drawn by a cable with three cores and protected by metal sheath if it is switched on to a 13.2 kilo volt, 50 Hertz supply.

When one core is connected to the sheath, the capacitance between two cores is 4.2 micro-Farad.    **(10)**

**d)**   A Synchronous motor of negligible resistance is receiving 25 percent of power, it is capable of receiving from an infinite bus. If the load on the motor is suddenly doubled, calculate the maximum value of power angle during the swinging of the motor around its new equilibrium position.    **(10)**

**(24)**                    **(5)**                    **[Turn Over**

## SECTION-B

**5.**  a)  Consider a lag-lead network defined by

$$G(s) = k \frac{\left(s + \dfrac{1}{T_1}\right)\left(s + \dfrac{1}{T_2}\right)}{\left(s + \dfrac{\beta}{T_1}\right)\left(s + \dfrac{1}{\beta T_2}\right)}$$

Show that at frequency $\omega_1$, where $\omega_1 = \dfrac{1}{\sqrt{T_1 T_2}}$, the phase angle of $G_{c(j\omega)}$ become zero. **(10)**

b)  Explain interfacing of any given input device with the 8086 microprocessor. For this use of any three-state buffer IC such as 74LS244 IC or else may be utilized. **(10)**

c)  A 110 kilo volt of 35 kilometer length is protected by impedance relay. The first stage of distance relay protects 90% of the line.

The line impedance is 0.24+j0.41 ohms per conductor per kilometer. CT ratio is 300/1 and VT ratio is 100 kV/100 Volt. Line angle $\theta$ is 60 degree.

   i)  Calculate setting of impedance relay **(05)**

   ii)  Draw the characteristic of line and the relay in R-X plane. Neglect the influence of arc resistance. **(05)**

d)  A delta modulator is designed to operate at 3 time the Nyquist rate for a signal with a 3 kilo Hertz bandwidth. The quantizing step size is 250 milli volt. Determine.

   i)  Maximum amplitude of one kilo Hertz input sinusoid for which the delta modulator does not show overload **(10)**

   ii)  Determine the post filtered output signal to quantizing noise ratio for the above part(i) **(10)**

**6.**  a)  A three-phase 66 kilo volt/11 kilo volt power transformer is connected in star/delta. The transformer is protected by merz-price circulating current system.

Protecting current transformers on the low voltage side have a ratio of 250/5.

Find the ratio of the current transformers on high voltage side. **(10)**

b)  In a deflectional frequency meter working on the principle of electrical resonance, there are two parallel circuits each consisting of an inductance and a capacitance in series. One circuit has $C_1$=1 micro farad, and is tuned to a frequency. $f_1$=60 Hertz. The other has $C_2$=1.5 micro Farad and is tuned to a frequency $f_2$ 50 Hertz (or slightly less). The resistance of each circuit $R_1$, $R_2$ both equal to 100 ohm.

In order that the current in both circuits shall be same at a frequency of 50 Hertz, what must be the inductance of the second circuit. **(10)**

c) What are the effects of tap changing on the percentage bias setting of differential relay? **(10)**

d) Obtain the transfer function C/R from the signal flow graph shown in the figure below **(10)**
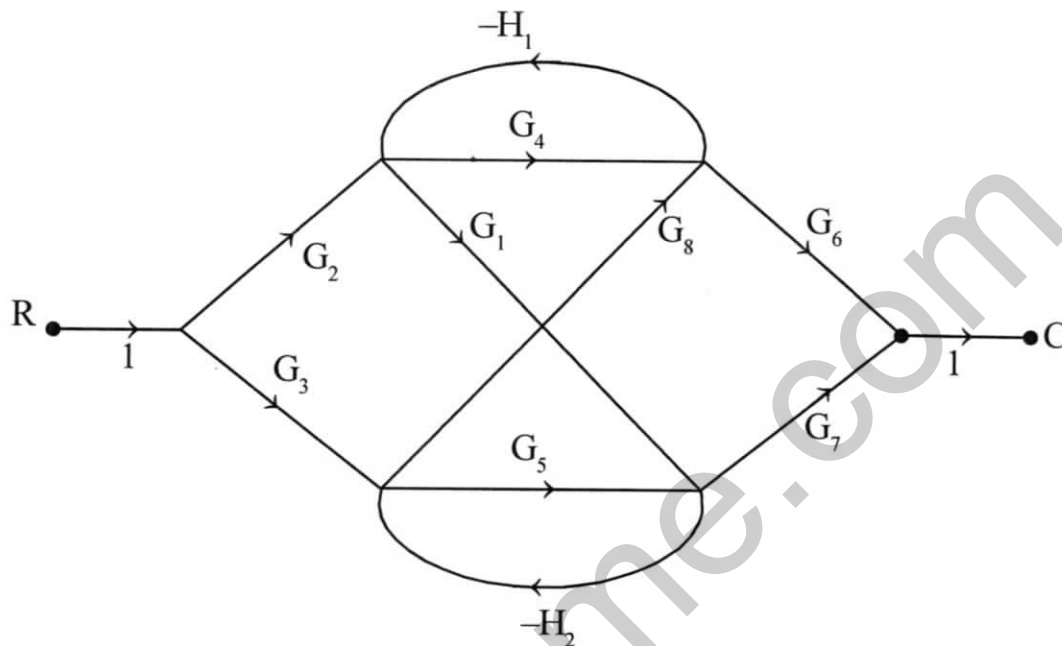


e) A 220 kilo volt 3-phase transmission line has an impedance per phase of 60+j200 ohms and an admittance of 0+j0.0015 mho. Using the convergent series method determine

i) The sending end voltage **(05)**

ii) The sending end current when the receiving end current is 200 amperes at 0.95 power factor lagging. **(05)**

7. a) i) Draw signal space diagram of M-ary FSK for M=3 and typical power spectral density diagram for M-ary FSK **(10)**

ii) Explain how bandwidth of the system for m-symbols will be **(10)**

b) Consider a unity feedback control system with the closed loop transfer function

$$\frac{C(s)}{R(s)} = \frac{ks + b}{s^2 + as + b}$$

Show that the steady state error in the unit ramp input response is given by

$$e_{ss} = \frac{(a-k)}{b}$$ **(10)**

c) The transmission line section AB and BC of system shown below are protected by distance relays. If the current transformer ratio is 300/5 Ampere, and PT ratio is 166000/110 volt, and a three-phase short circuit fault of zero impedance occurs at 'F' in figure below. Find

i) The impedance seen by the relays at the end of line AB. **(08)**

ii)   The setting of the relays for high speed protection of line AB and back-up protection for line BC, when the relays are located at end A.   **(06+06)**
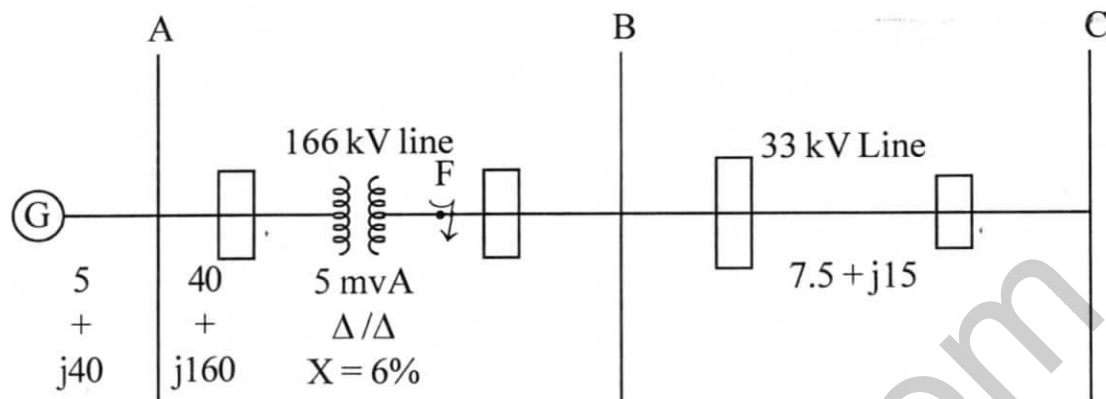


8.   a)   Describe
  i)   The basic constructional features of static overcurrent relays   **(05)**
  ii)   Area of applications of static overcurrent relays   **(05)**
  iii)   Give a 90° (90 degree) scheme for directional overcurrent relay and explain   **(05)**
  b)   Find the error probability for coherent FSK when
  i)   Frequency offset is small   **(05)**
  ii)   Frequencies used are orthogonal   **(05)**
  iii)   Find probability for non-coherent detection.   **(05)**
  c)   i)   Applying the angle condition determine whether the point s=-2+j2 is on the root locus plot for
  $$s(s+2)+k(s+4)=0$$   **(03)**
  ii)   If in (i) above, the above point s is on the root locus, determine the value of k at this point and the factored form of the characteristic equation.   **(07)**
  d)   An industrial customer has a merz-price maximum demand indicator fitted with an integrating device. Over a month, the following readings are recorded:   **(10)**

  $kVAR\hbar$=125,000, $kw\hbar$=150,000

  maximum kVAR demand=180

  maximum kW demand=200

  If the tariff for the consumer is Rs.20 per kVA+Rs.0.15 per $KVA_\hbar$ what are
  i)   the average power factor of the consumer's load.   **(05)**
  ii)   the monthly bill.   **(05)**

  **(24)**                                    **(8)**

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

## CC(M)

## ENGLISH

## LITERATURE

## (OPTIONAL)

## PAPER-II

## [26]

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

## INSTRUCTIONS

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

## SECTION - A

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

    a)  The Stream of Consciousness Novel.

    b)  Post-colonial literature.

    c)  Marxist criticism.

    d)  Psychoanalysis and interpretation of literature.

    e)  Meaning in the Post-modernist framework.

2.  Answer all of the following:

    a)  Explore "Leda and the Swan" as a poem that talks about fate and free will. **(15)**

    b)  Write a note on the poem "The love song of Alfred J. Prufrock" as a modernist Poem. **(15)**

    c)  Make an analysis of the poems of A.K Ramanujan as an attempt to capture Indianness. **(20)**

3.  Answer all of the following :

    a)  Analyse Beckett's Waiting for the Godot as a postmodern play. **(15)**

    b)  Comment on the cyclical nature of time as depicted in the poem "The Second Coming". **(20)**

    c)  Explore "Journey of the Magi" as a poem about spiritual quest. **(15)**

4.  Answer all of the following:

    a)  Explain the poem "Sailing to Byzantium" as a metaphorical journey. **(15)**

    b)  Explain Ramanujan's "A River" as a typical example of Indian Writing in English. **(20)**

    c)  Is the Poem "Among School Children" only about the journey of the poet along memory lanes? Comment on any other dominant theme one can identify in the poem. **(15)**

## SECTION - B

5.  Study the following piece of writing and answer all the questions which follow. Each answer should be in around **80-100** words;                    (5×10=50)

The evidence from most Western, "free market economy" countries (France, United Kingdom, USA, etc ) is that the dominant language has been established, as an essential element in the state-building process, often without any constitutional provisions or legislation specifically decreeing use of an official, state language in particular domains or restrictions on the use of other languages. These have de facto been stigmatized and marginalized, deprived of resources for their development and use. The results of such long-term processes can be seen in the extinction of many of the indigenous languages of North America and some in Europe (linguistic genocide, i.e. The extermination of a group's language, or linguicide, i.e. the death of a language), and massive language shift to the dominant language. This is the case with speakers of minority languages, both indigenous and immigrant, in France, Britain and lreland, and in North America. This process has often been deliberate and not left to chance. It has not been totally successful, as much of the evidence of ethnic revival and attempts to reverse language shift demonstrate. Linguistic hegemony is not a static phenomenon. It constantly needs renewal and can be contested. Language is a key dimension, along with class, gender and "race", in the complex processes of hierarchizing groups in society and maintaining patterns of dominance. (Phillipson and kangas, linguistic Genocide. Paper at the conference titled "Language policy in the Baltic states" Dec, 1992)

a)  What, according to this piece of writing, is the fate of non-dominant languages in a free market economy?

b)  What is Linguicide? Can you give examples of it from the Indian context?

c)  According to you, how is the dominant language made a part of the state building process? Has it happened in India?

d)  Is the factor of language hegemony permanent? Explain with reference to one dominant language in India.

e)  Do you agree that language is a key factor in maintaining dominance in a society? What according to you are the mechanisms through which this is achieved?

6.  Answer all of the following:

a)  Give an account of how, Lawrence in his *Sons and Lovers* offers an insight into complex psychological problems.                    (15)

b)  What is E.M. Forster's *Passage to India* about? Write a note about your interpretation of the Novel.                    (15)

c)  Analyze the novel kanthapura as a commentary on the Indian Nationalist movement.                    (20)

7.  Answer all of the following:

    a)   Comment on the use of symbolism in Forster's *Passage to india*　　(20)

    b)   Analyze the novel *A house for Mr Biswas* as a diasporic allegory.　　(15)

    c)   Make a Colonial and Post-Colonial reading of Conrad's *Lord Jim.*　　(15)

8.  Answer all of the following:

    a)   Do you think the novel Portrait of the *Artist as a Young Man* is about the psychological and moral growth of the protagonist? Explain　　(15)

    b)   What is a Stream of Consciousness novel? Make an analysis of Virginia Woolf's *Mrs. Dalloway* as one.　　(20)

    c)   Comment on the use of symbolism, imagery and allegory in *Lawrence's Sons and Lovers.*　　(15)

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

CC(M)

GEOGRAPHY

(OPTIONAL)

PAPER-II

[28]

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

### INSTRUCTIONS

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## SECTION-A

1.  a) On the outline map of India provided to you, mark the location of all of the following. Write in your QCA Booklet the significance of theses location, whether physical/commercial/economic/ecological/environmental/cultural, in not more than 30 words for each entry:  **(10×2=20)**

   i)    Damodar River

   ii)   Chhotonagpur Plateau

   iii)  Chilka Lake

   iv)   Shillong

   v)    Darjeeling

   vi)   Ujjain

   vii)  Shirdi

   viii) Tawang

   ix)   Kozhikode

   x)    Guwahati

   b) Why the intensity of thunderstorms across India is increasing day by day - Explain. **(10)**

   c) Write a note on the wetland management in India. **(10)**

   d) Non-conventional energy is the need of the hour in India due to energy crisis and environmental pollution - Comment. **(10)**

2.  a) Critically assess the ecological implications of *Green Revolution* in India. (20)

   b) Highlight the characteristics of major industrial regions of India. **(15)**

   c) PMGSY is considered to be the lifeline of rural development in India - Comment. **(15)**

**(28)**                    **(2)**

3.  a) Critically comment on the salient features of *Population Policy, 2000*.  (20)

    b) Describe the problems associated with slums in Indian cities and suggest how these problems can be resolved.  (15)

    c) Watershed management is considered as the best strategy for improving agricultural productivity and overall development in rural India – Comment with examples.  (15)

4.  a) Explain how *Panchayati Raj* and decentralized planning has strengthened the economy of rural India.  (20)

    b) Cross border terrorism is a serious threat to internal security in India-Comment.  (15)

    c) Liberalization, Globalization and Privatization have brought a change in the nature of Indian economy-Critically analyze.  (15)

## SECTION-B

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

    a) Is *Crop Combination* relevant today in augmenting agricultural productivity in India-Explain.

    b) Write a note on the problems and prospects of tourism development in India.

    c) Discuss the emerging problems of urban sprawls in present-day India.

    d) Explain the role of SAARC in improving the bilateral relations of South Asian countries.

    e) Export Processing Zones (EPZ) play a vital role in the promotion of international trade in India-Justify.

6.  a) Critically analyze the major problems of urbanization in the developing countries with special reference to India. Suggest some remedial measures.  (20)

    b) Explain different methods of agricultural regionalization.  (15)

    c) India is a country of unity in diversity-Explain it from the perspective of cultural geography.  (15)

7.  a)  Explain the role of IRDP in the socio-economic development of rural India. Comment on the success and failure of the same. **(20)**

    b)  How *Social Exclusion* in India can be reduced by *Inclusive Development*- Give a critical comment. **(15)**

    c)  Increasing air pollution has made the Capital City of Delhi uninhabitable - Comment. **(15)**

8.  a)  Prepare a planning proposal for the development of hill areas with special reference to Kashmir Himalaya. **(20)**

    b)  Cottage industry can generate employment opportunities for the youths of rural India. **(15)**

    c)  Write a note on Tribal Livelihood and sustainable development in Indian perspective. **(15)**

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Total No. of Printed Pages-**2**                    **Roll No.** _____

**CC(M)**

**GEOLOGY**

**(OPTIONAL)**

**PAPER - II**

**[30]**

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

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## SECTION – A

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

   a) Explain the Bowen's Reaction Series. (10)

   b) What is Provenance? Explain the significance of provenance. (10)

   c) Discuss the environmental impact of Urbanization. (10)

   d) Explain the controls of Ore deposition. (10)

   e) What is 'Isomorphism' and 'Polymorphism' – Explain with examples. (10)

2. a) Explain the silicate structures with neat sketches and examples. (20)

   b) Discuss the origin and distribution of Indian Chromite deposits. (15)

   c) Discuss the significance of structures and textures in sedimentary rocks. (15)

3. a) Explain in brief the Mineralogy and chemistry of Amphibole group minerals. (20)

   b) Discuss the Greenstone belts of India and their importance. (15)

   c) What is a Crystal? Explain the symmetry elements of a crystal. (15)

4. a) Discuss the origin of Granulitic rocks of Eastern Ghats. (20)

   b) What is the significance of Siwalik fauna. (15)

   c) Explain the 'Uniaxial' and 'Biaxial' minerals with examples. (15)

## SECTION – B

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

   a) Explain the contact metamorphism and its products. (10)

   b) What is retrograde metamorphism- Explain. (10)

   c) What is metasomatism? How it differs from metamorphism. (10)

   d) Discuss the Kethri Copper deposits. (10)

   e) Explain the origin of Charnokites in India. (10)

6. a) Write an essay on the methods of mineral prospecting. (20)

   b) Explain the structure and composition of Earth. (15)

   c) Write a brief note on the classification of Clastic rocks. (15)

7. a) Write an essay on 'Metallogenic Epochs and Provinces of India'. (20)

   b) Discuss the ore estimation methods. (15)

   c) Write an essay on the Petroleum Basins of India. (15)

8. a) Explain the types of Volcanoes and their products. (20)

   b) Discuss the environmental impact of Mining. (15)

   c) Explain the causes and effects of Groundwater pollution. (15)

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(30)                                    (2)
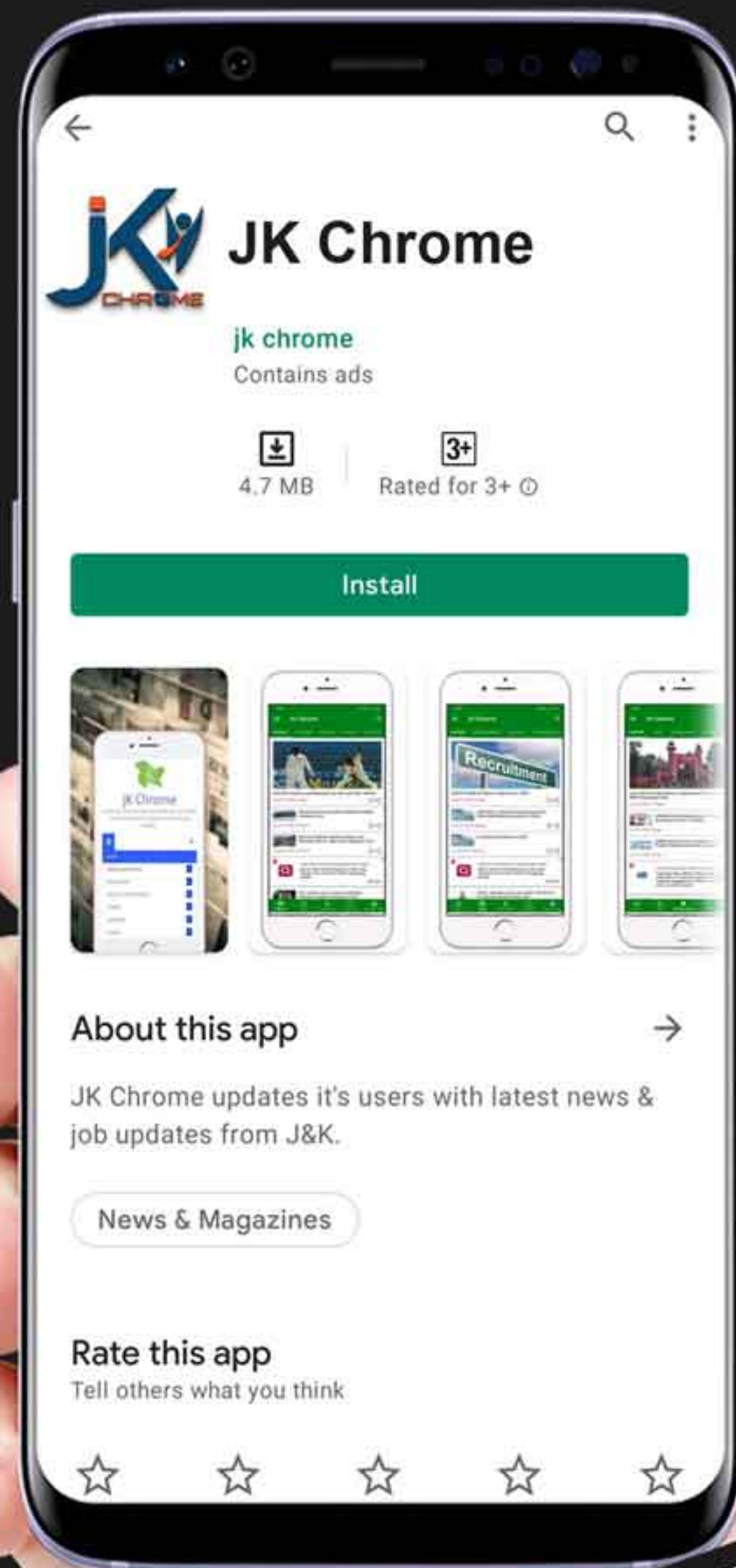
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**CC(M)**

**HISTORY**

**(OPTIONAL)**

**PAPER-II**

**[32]**

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

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(32)/2019                              (1)                              [Turn Over

## SECTION - A

1. Answer the following questions.                                              (5×10 = 50)

   a) "Divide and conquer". Discuss British policy during the Anglo-Mysore Wars.

   b) "The Downward Filtration theory of Education benefitted the elites of India".
      Elucidate

   c) "The Bengal Renaissance was nurtured by none other than Raja Rammohan
      Roy" Discuss with examples.

   d) "JotibaPhule was the first social revolutionary of modern India". Explain his
      role in social reform movements.

   e) Do you agree with the statement that the Moderate Congress leaders were the
      "political mendicants".

2. Answer the following questions.

   a) "The Vandemataram movement in Bengal was a combination of nationalist and
      revolutionary ideologies". Illustrate with examples.                      (20)

   b) "The Quit India movement was a Spontaneous Revolution as well as the
      culmination of Gandhian Satyagraha movements." Elucidate.                 (20)

   c) The Annihilation of Caste written by Dr. B.R. Ambedkar was considered as
      the Manifesto of Social Revolution in India. Do you agree?                (10)

3. Answer the following questions.

   a) "British Colonialism led to the complete but complex integration of India's
      economy with the world capitalist system but in a subservient position". Explain.
                                                                                 (20)

   b) "The wheels of fate will someday compel the English to give up their Indian
      Empire". Discuss the impact of anti-British movements between 1930-47.
                                                                                 (20)

   c) "The Government of India Act of 1935 provided for Provincial Autonomy,
      the overriding powers of the Governor were detrimental for the exercise of
      autonomy by the Elected Government". Examine.                             (10)

(32)                                    (2)

4. Answer the following questions.

a) "The Nehruvian model of economic development led to the growth of mixed economy in post-independent India" . Illustrate with examples. **(20)**

b) "The politics of reservations for Backward Castes has more to do with sharing the loaves and fishes of office and power than with a struggle for social justice". Critically examine the statement. **(20)**

c) "The prevalence of large-scale corruption, growth of crime and criminalization of politics have become major threats to India's development and democracy". Discuss with examples. **(10)**

## SECTION - B

5. Answer the following questions.　　　　　　　　　　　　　**(5×10 = 50)**

a) "The mass production of goods with the help of the newly invented machines ushered in a new era in the history of mankind" Examine the results of Industrial Revolution

b) "The American War of Independence was the forerunner to the French Revolution". Discuss

c) "One should always be the first to attack". Explain Hitler's Attack on Poland in 1939

d) Robespierre said, "Justice without terror is useless". Discuss the consequences of Reign terror in the French Revolution

e) "Cold War was a serious ideological and power struggle between USA and USSR". Illustrate with examples.

6. Answer the following questions.

a) "It is more dangerous for a soldier to desert the Red Army than to serve in combat". Describe the role of Stalin in defeating the German Forces in the Second World War. **(20)**

b) "It is more important for a leader to be feared than loved". Explain it with reference to the rise of Fascism in Italy. **(20)**

c) "There must be one king with absolute authority". Account for the rise of Absolute Monarchy in Germany in the 18th century. **(10)**

(32)　　　　　　　　　　　　　　　(3)　　　　　　　　　　　　　[Turn Over

7.  Answer the following questions.

    a)  Napoleon remarked that "At home as abroad, I reign only through the fear I inspire". Substantiate the statement with examples. **(20)**

    b)  "NATO is the most important military alliance in world history". Examine the role of USA in the Military Alliances. **(20)**

    c)  "The Turkish Nationalism was a product of the destruction of the Ottoman Empire". Explain the role of Young Turks. **(10)**

8.  Answer the following questions.

    a)  "Imperialism was the highest stage of Capitalism". Discuss the colonization of Africa by Europe. **(20)**

    b)  Can you agree with the statement that "The Treaty of Versailles paved the way for the Second World War"? **(20)**

    c)  "The rise of uni-polar world was the consequence of the end of Cold War". Discuss with examples. **(10)**

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**(32)**             **(4)**

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

**CC(M)**

**LAW**

**(OPTIONAL)**

**PAPER - II**

**[34]**

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

### INSTRUCTIONS

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

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

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

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

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

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

vi)     *No blank page be left in between answer to various questions*

## SECTION - A

1. Answer the following questions in about 150 words each. Substantiate your answer with concerned legal provisions and the case law. **(5×10=50)**

   a) Discuss the defence of *volenti non fit injuria* in rescue cases in tort. How is it different from contributory negligence?

   b) What are the circumstances under which the right to private defence extends to cause death under Indian Penal Code (IPC) 1860?

   c) What is false imprisonment? What are the remedies available against the false imprisonment?

   d) Write a short note on the crime of voyeurism.

   e) What is theft? How is it different from extortion?

2. a) What are the exceptions given for offence of murder under section 300 of the IPC. Discuss grave and sudden provocation as an exception to murder with the help of case law. **(20)**

   b) Write a short essay on plea bargaining and its efficacy in the administration of criminal justice system. **(15)**

   c) Elucidate vicarious liability of the state under the Law of Torts with the help of decided cases. **(15)**

3. a) "Section 34 of the IPC does not create specific offence but only lays down rule of evidence that if two or more persons commit a crime in furtherance of a common intention, each of them will be liable jointly for the acts done". Discuss the principle of joint criminal liablity with the help of decided cases. **(20)**

   b) What is innuendo? Discuss in brief the defences against an action for defamation under the Law of Torts. **(15)**

   c) What are the basic features of Prevention of Corruption Act, 1988. Do you think that this Act is effective in addressing the cases of corruption? **(15)**

4.    a)    Discuss the essential ingredients of tort of nuisance. Is it right to say that nuisance connote state of affairs?      (20)

     b)    What is criminal conspiracy? How is it different from abetment?      (15)

     c)    How one can differentiate between preparation and attempt? Discuss.      (15)

## SECTION - B

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

     a)    When does a contract is said to be induced by 'undue influence'? What is the effect of 'undue influence' on the contract?

     b)    Discuss the essential conditions that must be fulfilled for getting patent.

     c)    "To create a contract there must be a common intention of the parties to enter into legal obligations". Discuss the importance of intention to contract in family and social matters.

     d)    Discuss the rights and obligations of partner against other partners.

     e)    What do you understand by frustration of contract?

6.    a)    What is consideration? Can a valid contract be made without consideration? Discuss with the help of relevant provisions and the decided case laws.    (15)

     b)    Critically evaluate the rational of quasi contracts. Discuss with the help of decided case laws.      (15)

     c)    What do you mean by alternative dispute resolution? Discuss the differences between arbitration and conciliation.      (20)

7.    a)    Is the data new oil? Discuss issues surrounding data protection with reference to the Draft Personal Data Protection Bill 2018.      (20)

     b)    What is the trial by the media? How can freedom of the press be balanced with the right of a citizen to have free and fair trial in a court of law?    (15)

     c)    Evaluate working of the Right to Information Act 2005 with reference to the kinds of information exempted under it.      (15)

**8.** a) Critically evaluate role of the Supreme Court of India in the development of the right to environment protection through public interest litigation in India.**(20)**

b) India has declared intention to eliminate single use plastics by 2022. What relevant legal provisions can be invoked for the purpose. Do we need a special law? **(15)**

c) Examine prohibition of 'abuse of dominant position' under the Competition Act 2002. Does this Act protects the interest of consumers and ensures freedom of trade? **(15)**

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Total No. of Printed Pages-**8**

Roll No. _____

# CC(M)
# MANAGEMENT
# (OPTIONAL)
# PAPER-II
## [36]

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

## INSTRUCTIONS

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## SECTION-A

1.    a)    The customer accounts at a certain departmental store have an average balance of Rs. 480 and a standard deviation of Rs. 160. Assuming that the account balances are normally distributed.     **(2.5+2.5+2.5+2.5=10)**

     i)     What proportion of the accounts is over Rs 600 ?

     ii)     What proportion of the amounts is below Rs. 300?

     iii)     What proportion of the accounts is between Rs 400 and Rs 600 ?

     iv)     What proportion of the accounts is between Rs 240 and Rs 360 ?

   b)    The manager of an oil refinery has to decide on the optimal mix of two possible blending processes. The inputs and the outputs per production run of the blending process are as follows:

| Process | Input | | Output | |
| --- | --- | --- | --- | --- |
| | Crude A | Crude B | Gasoline $G_1$ | Gasoline $G_2$ |
| 1 | 5 | 3 | 5 | 8 |
| 2 | 4 | 5 | 4 | 4 |

The maximum amounts of availability of crude A and B are 200 units and 150 units, respectively. Market requirements show that at least 100 units of gasoline $G_1$ and 80 units of gasoline $G_2$ must be produced. The profits per production run from process 1 and process 2 are Rs. 3,00,000 and Rs 4, 00,000, respectively. Formulate this problem as a Linear Programming model to determine the number of production runs of each process such that the total profit is maximized.     **(10)**

   c)    Briefly discuss the history of Quality before and after the industrial revolution. Why was the industrial revolution a key turning point? Do you feel that the "Japanese revolution" will be viewed as a similar turning point?     **(10)**

   d)    In what ways do you think organisation structure influences Management Information Systems (MIS) and in turn MIS influence the organisational structure?     **(10)**

(36)                 (2)

e)    i)    What the steps involved in Information systems planning? Discuss with suitable examples.      **(5)**

     ii)    Why Relational Data Base Management Systems is considered to be a strategic need of management today?      **(5)**

2.   a)   i)    Solve the following Linear Programming Problem by using simplex method:

Maximize $Z = 60X_1 + 90X_2$

Subject to          $X_1 + 2X_2 \le 40$

                $2X_1 + 3X_2 \le 90$

                $X_1$ and $X_2 \ge 0$      **(10)**

     ii)    What is sensitivity analysis? Explain it with the help of an example in Linear Programming Problem.      **(5)**

  b)   i)    Two salesmen A and B, are employed by a company. Recently, it conducted a sample survey yielding the following data.

|  | Salesman A | Salesman B |
|---|---|---|
| Number of sales | 20 | 22 |
| Average Weekly sales (Rs. lakh) | 30 | 25 |
| Standard deviation (Rs. lakh) | 10 | 7 |

Is there any significant difference between the average sales of the two salesmen ? (for 40 degrees of freedom and 5% significance level, t critical value for a two tail test is 2.021)      **(10)**

ii) A company has two factories - one located in Hyderabad and another in Chennai. It is interested to know whether the distribution of job satisfaction for workers at both the places is same or not. To get proper and reliable information, it has undertaken a survey at both the factories, and the data obtained are shown as follows.

|  | Hyderabad | Chennai | Total |
|---|---|---|---|
| Fully satisfied | 50 | 70 | 120 |
| Moderately satisfied | 90 | 110 | 200 |
| Moderately dissatisfied | 160 | 130 | 290 |
| Fully dissatisfied | 200 | 190 | 390 |
| Total | 500 | 500 | 1000 |

From the above data, can it be concluded that the distribution of job satisfaction for workers at both the factories is same? (for 3 degrees of freedom and 5% significance level, $\chi^2$ critical value for a two tail test is 7.815) **(10)**

c) Some individuals argue that globalization has been the single most important driving force behind Supply Chain Management. Do you agree? Why or why not? What changes have companies made to respond to the supply chain management concept? Explain with the support of suitable examples. **(15)**

3. a) Why is Enterprise Resource Planning (ERP) important to a company? List any three ERP implementation strategies and explain it in detail with the help of examples. How ERP implementation in Government is different from Private organizations? **(15)**

b) i) "Knowledge of statistics is like the knowledge of algebra; it may prove of use at any time under any circumstances". Discuss the above statement with suitable managerial illustrations. **(10)**

ii) Two shipments of machine parts are received. the first shipment contains 1000 parts with 10 per cent defectives and the second shipment contains 2000 parts with 5 per cent defectives. One shipment is selected at random. Two machine parts are tested and found good. Find the probability (a posterior) that the tested parts were selected from the first shipment. **(10)**

c) A firm is considering replacement of a machine, whose cost price is Rs. 12,200 and the scrap value is Rs. 200. The running (maintenance and operating) cost in rupees are found from experience to be as follows: **(15)**

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------|-----|-----|-----|-------|-------|-------|-------|-------|
| Running cost | 200 | 500 | 800 | 1,200 | 1,800 | 2,500 | 3,200 | 4,000 |

When should the machine be replaced?

4. a) i) "Modern organizations necessarily need an information system to function". Substantiate the statement highlighting the importance of an information system in the functioning of an organization. **(10)**

ii) What do you understand by Decision Support Systems and Expert systems? Explain their role in decision making. **(10)**

b) i) Explain the criteria on the basis of which information systems could be evaluated. **(5)**

ii) Discuss the role of e-governance in improving transparency in government organisations. **(5)**

c) i) Discuss the importance of security and the steps needed to ensure security while conducting e-commerce transactions. **(10)**

ii) What is system software? Explain its significance in on-line system design. **(10)**

## SECTION-B

5. a) Discuss various features of e-governance. What are its advantages and limitations? **(10)**

b) "Government Regulations are blocking the innovations in private business". Critically evaluate the statement. **(10)**

**(36)**                              **(5)**                              **[Turn Over**

c) What is the role of environment analysis in strategy formation? Characterize five forces model, strategic group analysis and stakeholder analysis. **(10)**

d) What are the salient features of Consumer Protection Act (CPA) and discuss the role of Voluntary Organizations in protecting the rights of consumers. **(10)**

e) What are the ethical dilemmas faced by marketers in emerging global markets? Explain responsible marketing practices that should be followed in emerging foreign markets. **(10)**

6. a) Discuss the nature of International Business Environment? How it is different from Indian business environment? **(10)**

b) i) Critically evaluate India's Foreign Trade policy and give suitable suggestions to improve India's visibility in international business scenario. **(15)**

ii) Discuss the various sources of funding available in International Business? **(10)**

c) Critically evaluate the functioning of public distribution system in India ? How technology can enhance its functioning? **(15)**

7. a) What are the problems faced by the small scale industries in India? What are the various measures taken by the government to overcome them? **(15)**

b) Write a short notes on the following: **(5+5+5+5=20)**

i) Ethical Dilemmas in business

ii) Triple Bottom Line Approach of Corporate Social Responsibility

iii) Corporate Citizenship

iv) Business Ethics and Strategy

c) What are the various derivative instruments available for hedging against exchange rate variation? Discuss them in detail. **(15)**

(36)                                    (6)

8.    a)    What is value chain analysis? How is it useful in managerial decision making?

                                                        **(20)**

   b)    Do Mergers and Acquisitions and really improve the performance of acquiring/merged entities? Explain the Major Challenges.    **(15)**

   c)    What is BCG Matrix ? How does it help analyse business portfolio of a firm? Illustrate BCG Matrix with a product wise/Industry wise categorisation with a company of your choice.    **(15)**

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(36)                                  (7)                                 [Turn Over

# Table of the standard normal distribution values (z)

| z | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.50000 | 0.50399 | 0.50798 | 0.51197 | 0.51595 | 0.51994 | 0.52392 | 0.52790 | 0.53188 | 0.53586 |
| 0.1 | 0.53983 | 0.54380 | 0.54776 | 0.55172 | 0.55567 | 0.55962 | 0.56356 | 0.56749 | 0.57142 | 0.57535 |
| 0.2 | 0.57926 | 0.58317 | 0.58706 | 0.59095 | 0.59483 | 0.59871 | 0.60257 | 0.60642 | 0.61026 | 0.61409 |
| 0.3 | 0.61791 | 0.62172 | 0.62552 | 0.62930 | 0.63307 | 0.63683 | 0.64058 | 0.64431 | 0.64803 | 0.65173 |
| 0.4 | 0.65542 | 0.65910 | 0.66276 | 0.66640 | 0.67003 | 0.67364 | 0.67724 | 0.68082 | 0.68439 | 0.68793 |
| 0.5 | 0.69146 | 0.69497 | 0.69847 | 0.70194 | 0.70540 | 070884 | 0.71226 | 0.71566 | 0.71904 | 0.72240 |
| 0.6 | 0.72575 | 0.72907 | 0.73237 | 0.73565 | 0.73891 | 0.74215 | 0.74537 | 0.74857 | 0.75175 | 0.75490 |
| 0.7 | 0.75804 | 0.76115 | 0.76424 | 0.76730 | 0.77035 | 0.77337 | 0.77637 | 0.77935 | 0.78230 | 0.78524 |
| 0.8 | 0.78814 | 0.79103 | 0.79389 | 0.79673 | 0.79955 | 0.80234 | 0.80511 | 0.80785 | 0.81057 | 0.81327 |
| 0.9 | 0.81594 | 0.81859 | 0.82121 | 0.82381 | 0.82639 | 0.82894 | 0.83147 | 0.83398 | 0.83646 | 0.83891 |
| 1.0 | 0.84134 | 0.84375 | 0.84614 | 0.84849 | 0.85083 | 0.85314 | 0.85543 | 0.85769 | 0.85993 | 0.86214 |
| 1.1 | 0.86433 | 0.86650 | 0.86864 | 0.87076 | 0.87286 | 0.87493 | 0.87698 | 0.87900 | 0.88100 | 0.88298 |
| 1.2 | 0.88493 | 0.88686 | 0.88877 | 0.89065 | 0.89251 | 0.89435 | 0.89617 | 0.89796 | 0.89973 | 0.90147 |
| 1.3 | 0.90320 | 0.90490 | 0.90658 | 0.90824 | 0.90988 | 0.91149 | 0.91308 | 0.91466 | 0.91621 | 0.91774 |
| 1.4 | 0.91924 | 0.92073 | 0.92220 | 0.92364 | 0.92507 | 0.92647 | 0.92785 | 0.92922 | 0.93056 | 0.93189 |
| 1.5 | 0.93319 | 0.93448 | 0.93574 | 0.93699 | 0.93822 | 0.93943 | 0.94062 | 0.94179 | 0.94295 | 0.94408 |
| 1.6 | 0.94520 | 0.94630 | 0.94738 | 0.94845 | 0.94950 | 0.95053 | 0.95154 | 0.95254 | 0.95352 | 0.95449 |
| 1.7 | 0.95543 | 0.95637 | 0.95728 | 0.95818 | 0.95907 | 0.95994 | 0.96080 | 0.96164 | 0.96246 | 0.96327 |
| 1.8 | 0.96407 | 0.96485 | 0.96562 | 0.96638 | 0.96712 | 0.96784 | 0.96856 | 0.96926 | 0.96995 | 0.97062 |
| 1.9 | 0.97128 | 0.97193 | 0.97257 | 0.97320 | 0.97381 | 0.97441 | 0.97500 | 0.97558 | 0.97615 | 0.97670 |
| 2.0 | 0.97725 | 0.97778 | 0.97831 | 0.97882 | 0.97932 | 0.97982 | 0.98030 | 0.98077 | 0.98124 | 0.98169 |
| 2.1 | 0.98214 | 0.98257 | 0.98300 | 0.98341 | 0.98382 | 0.98422 | 0.98461 | 0.98500 | 0.98537 | 0.98574 |
| 2.2 | 0.98610 | 0.98645 | 0.98679 | 0.98713 | 0.98745 | 0.98778 | 0.98809 | 0.98840 | 0.98870 | 0.98899 |
| 2.3 | 0.98928 | 0.98956 | 0.98983 | 0.99010 | 0.99036 | 0.99061 | 0.99086 | 0.99111 | 0.99134 | 0.99158 |
| 2.4 | 0.99180 | 0.99202 | 0.99224 | 0.99245 | 0.99266 | 0.99286 | 0.99305 | 0.99324 | 0.99343 | 0.99361 |
| 2.5 | 0.99379 | 0.99396 | 0.99413 | 0.99430 | 0.99446 | 0.99461 | 0.99477 | 0.99492 | 0.99506 | 0.99520 |
| 2.6 | 0.99534 | 0.99547 | 0.99560 | 0.99573 | 0.99585 | 0.99598 | 0.99609 | 0.99621 | 0.99632 | 0.99643 |
| 2.7 | 0.99653 | 0.99664 | 0.99674 | 0.99683 | 0.99693 | 0.99702 | 0.99711 | 0.99720 | 0.99728 | 0.99736 |
| 2.8 | 0.99744 | 0.99752 | 0.99760 | 0.99767 | 0.99774 | 0.99781 | 0.99788 | 0.99795 | 0.99801 | 0.99807 |
| 2.9 | 0.99813 | 0.99819 | 0.99825 | 0.99831 | 0.99836 | 0.99841 | 0.99846 | 0.99851 | 0.99856 | 0.99861 |
| 3.0 | 0.99865 | 0.99869 | 0.99874 | 0.99878 | 0.99882 | 0.99886 | 0.99889 | 0.99893 | 0.99896 | 0.99900 |

(36)                                          (8)

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

# CC(M)
# MATHEMATICS
# (OPTIONAL)
# PAPER-II
## [38]

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

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**(38)/2019**                    **(1)**                    **[Turn Over**

## SECTION - A

1. a) Show that the set of matrices (10)

$$A_n = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$$

where $\alpha$ is a real number, form a group under matrix multiplication.

b) Show that (10)

$$\lim_{n\to\infty} \left[ \frac{1}{\sqrt{n^2+1}} + \frac{1}{\sqrt{n^2+2}} + \frac{1}{\sqrt{n^2+3}} + \ldots + \frac{1}{\sqrt{n^2+n}} \right] = 1.$$

c) Suppose $f(z)$ is defined by the integral. (10)

$$f(z) = \oint_C \frac{3\zeta^2 + 7\zeta + 1}{\zeta - z} d\zeta,$$

where $C : |\zeta| = 3$, then find $f'(1+i)$.

d) Prove the inequality : (10)

$$\frac{v-u}{1+v^2} < \tan^{-1}v - \tan^{-1}u < \frac{v-u}{1+u^2}; if\ 0 < u < v,$$

and deduce that

$$\frac{\pi}{4} + \frac{3}{25} < \tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}.$$

e) Find a partial differential equation by eliminating $a$, $b$, $c$ from the relation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1. \tag{10}$$

2. a) If $H$ be a normal subgroup of a group $G$ and $K$ a normal subgroup of $G$ containing $H$, then prove that. (15)

$$G/K \cong (G/H)/(K/H).$$

b) If $f(z) = u + iv$ is an analytic function of $z = x + iy$ and

$u - v = e^x (\cos y - \sin y)$, find $f(z)$ in terms of $z$. (15)

c) Show that a necessary and sufficient condition for the integrability of a bounded function $f$ is that to every $\varepsilon > 0$, there corresponds $\delta > 0$ such that for every partition P of $[a, b]$ with norm $\mu(P) < \delta$. (20)

$$U(P,f) - L(P,f) < \varepsilon$$

3. a) Prove that the volume of the greatest rectangular parallelopiped, that can be

inscribed in the ellipsoid $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$, is $\dfrac{8abc}{3\sqrt{3}}$. (15)

b) Show that every finite integral domain is a field. (15)

(38)            (2)

c)  Prove that the function defined by $f(z) = \begin{cases} \dfrac{x^2 y^5 (x+iy)}{x^4 + y^{10}} & , \ z \neq 0 \\ 0 & , \ z = 0 \end{cases}$ is not

analytic at the origin although Cauchy-Riemann equations are satisfied at the origin. **(20)**

4.  a)  Using Newton's iterative method, find the real root of equation $x \log_{10} x = 1.2$ correct to five decimal places. **(15)**

b)  Find the different expansions of $\dfrac{1}{(z-1)(z-3)}$ in powers of $z$ which are valid

for regions: **(15)**

i)     $|z| < 1$          ii)    $1 < |z| < 3$          iii)   $|z| > 3$

c)  Prove that the ring of Gaussian integers is a Euclidean ring. **(20)**

## SECTION - B

5.  a)  Show that there exists no feasible solution of the following linear programming problem: **(10)**

*Max*      $z = 3x_1 + 2x_2$
*s.t.*       $2x_1 + x_2 \leq 2$
            $3x_1 + 4x_2 \geq 12$
*and*      $x, y \geq 0$

b)  Find solution of two dimensional Laplace's equation. **(10)**

c)  Using Newton's forward difference formula, find the sum
$S_n = 1^3 + 2^3 + ... + n^3$. **(10)**

d)  Using Gauss elimination method, solve the equations :
$x + 2y + 3z - u = 10, 2x + 3y - 3z - u = 1, 2x - y + 2z + 3u = 7$ and
$3x + 2y - 4z + 3u = 2$. **(10)**

e)  For a two dimensional flow the velocities at a point in a fluid may be expressed in the Eulerian coordinates by
$u = x + y + 2t, v = 2y + t$.
Determine the Lagrange coordinates as functions of the initial position $x_0$ and $y_0$, and the time $t$. **(10)**

6.  a)  Show that the integral $\displaystyle\int_0^\infty \log \sin x \ dx$ is convergent and hence evaluate it. **(15)**

b)  The mode of certain frequency curve $y = f(x)$ is very near to $x = 9$ and the value of the frequency density $f(x)$ for $x = 8.9, 9.0$ and $9.3$ are respectively equal to 0.30, 0.35 and 0.25. Calculate the approximate value of the mode. **(15)**

**(38)**                                   **(3)**                                   **[Turn Over**

c)    Solve the following transportation problem :      **(20)**

|  |  | A | B | C | D |  |
|---|---|---|---|---|---|---|
|  | I | 21 | 16 | 25 | 13 | 11 |
| Source | II | 17 | 18 | 14 | 23 | 13 |
|  | III | 32 | 27 | 18 | 41 | 19 |
| Requirement |  | 6 | 10 | 12 | 15 | 43 |

(Availability shown on the right of the matrix; Requirement in the bottom row.)

7.   a)   I.   Find the decimal number corresponding to the binary number 1101001.1110011. Also, evaluate the following :

    II.   Evaluate :     .6756E4 + .7644E6

    III.   Evaluate :     .6543E11 × .5123E − 14      **(15)**

  b)   A rod, of length $2a$ revolves with uniform angular velocity $\omega$ about a vertical axis through a smooth joint at one extremity of the rod so that it describe a cone of semi-vertical angle $\alpha$; show that $\omega^2 = 3g/(4a \cos \alpha)$. Prove also that direction of reaction at the hinge makes with the vertical an angle

$$\tan^{-1}\left(\frac{3}{4}\tan \alpha\right).$$      **(15)**

  c)   Use the method of contour integration to prove that

$$\int_0^{\pi} \frac{\cos 2\theta}{1 - 2a\cos\theta + a^2}\, d\theta = \frac{\pi a^2}{1 - a^2}\left(a^2 < 1\right).$$      **(20)**

8.   a)   Solve : $r + s - 6t = y\cos x$.      **(15)**

  b)   The particles of fluid move symmetrically in space with regards to a fixed centre; prove that the equation of continuity is

$$\frac{\partial \rho}{\partial t} + u\frac{\partial \rho}{\partial r} + \frac{\rho}{r^2}\frac{\partial}{\partial r}\left(r^2 u\right) = 0,$$

where $u$ is the velocity at a distance $r$.      **(15)**

  c)   Using Runge-Kutta method of fourth order, solve

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$$

with y(0) = 1 at x = 0.2, 0.4.      **(20)**

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**(38)**                       **(4)**

Total No. of Printed Pages-7                          **Roll No.** _____

## CC(M)
## MECHANICAL ENGINEERING
## (OPTIONAL)
## PAPER-II
## [40]

| 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 be left in between answer to various questions.

vii)   Steam Table, Refrigerant tables and Psychrometric charts must be supplied to students.

(40)/2019                          (1)                          [Turn Over

# SECTION - A

1. a) A fluid is confined in a cylinder by a spring-loaded, friction less piston so that the pressure in the fluid is a linear function of the volume ($p = a + bv$). The Internal energy of the fluid is given by the following equation $U = 34 + 3.15\, pV$. Where U is in kJ, p in $kP_a$ and V in cubic meter. If the fluid changes from an initial state of 170 $kP_a$, $0.03\,m^3$ to a final state of 400 $kP_a$, $0.06\,m^3$, with no work other than that done on the piston, find the direction and magnitude of the work and heat transfer. **(10)**

   b) A pipe of 25 cm in diameter and 400 m long is carrying oil whose sp gr = 0.82 and $\mu = 0.075$ poise. The oil flow rate is 100 L/sec. Find the head lost in the pipe and power required to maintain the flow. Use this equation to find $f = 0.079/(R_e)^{0.25}$ where $R_e$ is Reynold no. **(10)**

   c) A multi-stage air compressor takes in air at 1 bar, 298K and delivers at 36 bar. The maximum temperature in any stage is not to exceed 390 K. If the Law of compression and expansion is $pv^{1.3} = $ Constant, find the number of stages for minimum power input. Estimate the power required. What would have been the power required for single-stage compression? What would be the maximum temperature in any stage? **(10)**

   d) The exterior wall of a building is constructed of four materials: 12 mm thick gypsum board, 75 mm thick fiber glass insulation between 2 inch × 4 inch studs, 16 inch apart, 20 mm thick plywood, and 20 mm thick hard board siding. The inside and outside air temperatures are 20°C and – 10°C respectively. The surface heat transfer coefficients associated with the inner and outer surfaces of the walls are 8.3 $w/m^2\,°C$ and 34 $w/m^2\,°C$ respectively. Determine the heat flux and the overall heat transfer coefficient. (Given $K_1$ (gypsum plaster board) = 0.176 w/m K; $K_2$ (fiber glass) = 0.036 w/m K, $K_3$ (plywood) = 0.115 w/mK; $K_4$ (hard board siding) = 0.215 w/m K. **(10)**

   e) Water flows inside a tube 5 cm in diameter and 3m long at a velocity 0.8m/s. Determine the heat transfer coefficient and the rate of heat transfer if the mean water temperature is 50°C and the wall is isothermal at 70°C. For water at 60°C, take K=0.66 w/mK, $\gamma = 0.478 \times 10^{-6}\,m^2/s$ and $P_r = 2.98$. **(10)**

2. a) In figure given below a boiler furnishes heat $Q_1$ at the high temperature $T_1$. This heat is absorbed by a heat engine, which extracts work W and rejects the waste heat $Q_2$ into the house at $T_2$. Work W is in turn used to operate a mechanical refrigerator or heat pump, which extracts $Q_3$ from outdoors at temperature $T_3$ and reject $Q_2'$ (where $Q_2' = Q_3 + w$) into the house. As a result of this cycle of operations a total quantity of head equal to $Q_2 + Q_2'$ is liberated in the house, against $Q_1$ which would be provided directly by the ordinary combustion of the

**(40)**          **(2)**

fuel. Thus the ratio $(Q_2 + Q_2')/Q_1$ represents the heat multiplication factor of this method. Determine this multiplication factor if $T_1$=473K, $T_2$=293k and $T_3$=273K.

**(20)**
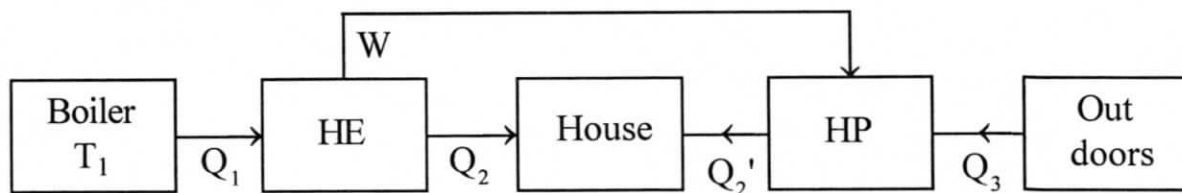


b)   In an air nozzle normal shock occurs at M=1.8. The stagnation conditions are $5×10^5$N/m$^2$ and 60°C. Determine the conditions after the shock, k=1.4.   **(15)**

c)   In a gas turbine plant, air enters the L.P. compressor having a pressure ratio of 3.5 and efficiency 0.85 at 1 bar and 300 K. If then enters the inter cooler where it is cooled down to 310 K. The cooled air is further compressed in the H.P. compressor also having a pressure ratio of 3.5 and an efficiency of 0.85. It enters the regenerator having an effectiveness of 0.8. The gases coming out of the combustion chamber enter the H.P turbine of efficiency 0.88 at 1100 K. The H.P. turbine drives the compressor and there is a reheater between the two turbines. The gases enter the L.P. turbine at 1050 K and the exhaust gases coming out of L.P. turbine of 0.88 efficiency are used to heat the air in the regenerator before leaving to the atmosphere. Determine:   **(15)**

i)   The power output

ii)   The over all efficiency of the plant. Take Cp for air as 1.005 and for gases as 1.15 kJ/kgK and $\gamma$ for air as 1.4 and for gases as 1.33.
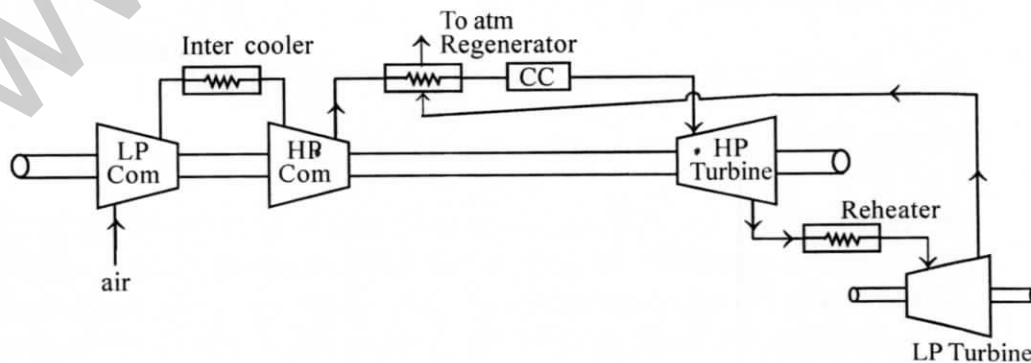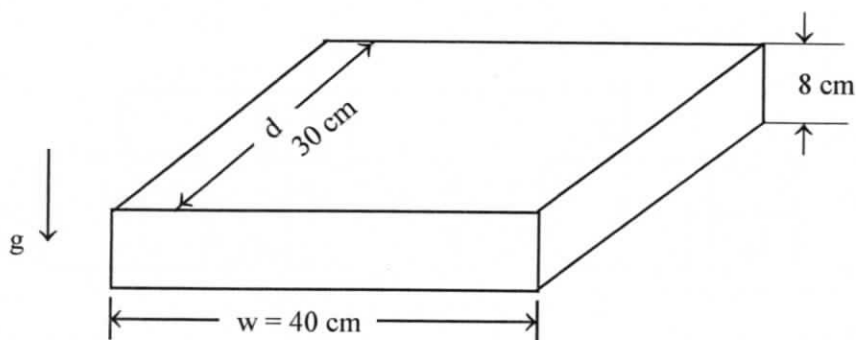
3. a) The case of an electronic device is 40-cm wide, 30 cm deep, and 8 cm high as shown in Figure. **(20)**



The top surface of the case has to dissipate 25W to the surrounding air, which is at 20°C. The emissivity of the surface is 0.6. Determine the temperature of the top surface, Given $\beta=3.411\times10^{-3}$/K.

| T°C | P (kg/m³) | Cp (J/Kg°C) | K (w/m°C) | $\mu\times10^7$ Ns/m² | $P_r$ |
|-----|-----------|-------------|-----------|------------------------|-------|
| 30  | 1.1645    | 1005        | 0.02588   | 187.20                 | 0.7268 |
| 40  | 1.1273    | 1005        | 0.02662   | 191.81                 | 0.7244 |
| 50  | 1.0924    | 1006        | 0.02735   | 196.35                 | 0.7221 |

b) Hot air at a temperature of 60°C in flowing through a steel pipe of 10 cm diameter. The pipe is covered with two layers of different insulating materials of thickness 5 cm and 3 cm and their corresponding thermal conductivities are 0.23 and 0.37 W/mK. The inside and outside heat transfer coefficient are 58 and 12 W/m²K. The atmosphere is at 25°C. Find the rate of heat loss from a 50m length of pipe. Neglect the resistance of the steel pipe. **(15)**

c) A gray, diffuse, opaque surface ($\alpha=0.8$) is at 100°C with an Iradication of 1000 w/m². If the area of the surface is 0.1m², compute **(15)**

   i) The radiosity of the surface

   ii) The net radiative heat transfer rate from the surface

   Stefan - Boltzmann constant $\sigma = 5.67\times10^{-8}$w/m²K⁴.

4. a) A four - cylinder two stroke cycle petrol engine develops 30 kW at 2500 rpm. The mean effective pressure of each is 800 kN/m² and mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder if the stoke-to-bore ratio is 1.5. Also calculate the brake specific fuel consumption of the engine, if brake thermal efficiency is 28%. The heating value of petrol is 44MJ/kg. **(20)**

**(40)** **(4)** **[Turn Over**

b) Explain the phenomenon of Knock in CI engines and compare it with SI engine Knock.

**(15)**

c)  i)  What are the various desired properties of a lubricant and explain how additives help to achieve the desired properties.

  ii)  Explain the following

-  Thermo syphon cooling system

-  Forced circulation cooling system

-  Evaporative cooling system

-  Pressure cooling system

**(15)**

## SECTION - B

5. a)  i)  What is the stefan Boltzmann Law? Explain its importance with neat diagram and example .

  ii)  What is the view factor? Why it is Significant in radiant heat Exchange between two bodies.                                                                                                    **(10)**

b)  Classify the heat Exchangers into five categories and name them accordingly with brief explanation .                                                                                        **(10)**

c)  In an engine working on Diesel cycle inlet pressure and temperature are 1 bar and 17°C respectively. Pressure at the end of adiabatic compression is 35 bar. The ratio of expansion i.e. after constant pressure heat addition is 5. Calculate the heat addition, heat rejection and the efficiency of the cycle. Assume $\gamma = 1.4$, Cp= 1.004 kJ/kg K and Cv = 0.717 kJ/Kg K.                                                                                    **(10)**

d)  i)  What is Reynolds number? What is its critical value when the flow through a tube becomes turbulent?

  ii)  What are Prand+1 number and Nusselt number? For fully developed laminar flow in a tube, what are the values of Nusselt number for constant wall temperature and for constant wall heat flux?                                                                           **(10)**

e)  The room air leaves an air - conditioned space at 25°C, 50% relative humidity. The by pass factor of the cooling coil is 0.15. The out door air is at 45°C, 30% relative humidity. Room sensible heat (RSH) and Room Latent Heat (RLH) are 160 kW and 35 kW respectively. The outdoor mass flow rate is 20% of the supply air. Find the supply air state, total outside air load and total cooling load.                                    **(10)**

**(40)**                                        **(5)**                                        **[Turn Over**

**6.** **a)** A test on a single - cylinder, four stroke oil engine having a bore of 15 cm and stroke 30 cm gave the following results : speed 300 rpm, brake torque 200 Nm; Indicated mean effective pressure 7 bar; fuel consumption 2.4 Kg/h; cooling water flow 5 Kg/min; Cooling water temperature rise 35°C; air fuel ratio 22; exhaust gas temperature 410°C; barometer pressure 1 bar; room temperature 20°C. The fuel has a Calorific value of 42 MJ/kg and contains 15% by weight of hydrogen. Take latent heat of vapourisation as 2250 kJ/Kg. Determine

　　i)　　The indicated thermal efficiency.

　　ii)　　The volumetric efficiency based on atmosphere conditions.

Draw up a heat balance in terms of kJ/min. Take Cp for dry exhaust gas = 1 kJ/kgK and super heated steam Cp=2.1 kJ/Kg K, R=0.287 kJ/Kg K.　　**(20)**

**b)** A cyclic steam power plant is to be designed for a steam temperature at turbine inlet of 360°C and an exhaust pressure of 0.08 bar. After isentropic expansion of steam in the turbine, the moisture content at the turbine exhaust is not to exceed 15%. Determine the greatest allowable steam pressure at the turbine inlet, and calculate the Rankine cycle efficiency for these steam conditions. Estimate also the mean temperature of heat addition.　　**(15)**

**c)** What are the differences between Impulse and reaction turbines? Enumerate them with neat diagrams.　　**(15)**

**7.** **a)** Steam initially at 12 bar and 250°C is expanded in a nozzle to 2 bar. The condensation does not take place while the steam is in the nozzle due to super saturation phenomenon. Find the throat area, degree of undercooling, degree of super saturation, exit area, actual heat drop and the Isentropic heat drop. The mass flow rate is 1 Kg/s. Super heated steam index n = 1.3.　　**(20)**

**b)** A steam power plant equipped with regenerative as well as reheat arrangement is supplied with steam to the H.P. Turbine at 80 bar and 470°C. For feed heating, a part of steam is extracted at 7 bar and remainder of steam is reheated to 350°C in a reheater and then expanded in LP turbine down to 0.035 bar. Determine

　　**(15)**

　　i)　　Amount of steam bled off for feed heating

　　ii)　　Amount of steam on LP turbine

　　iii)　　Heat supplied in the boiler and reheater

　　iv)　　Cycle efficiency

　　v)　　Output of turbine.

The steam supplied by the boiler is 50 Kg/Sec.

c)  i)  What are the different methods used for reheating the steam? Discuss the merits and demerits of different systems.

ii)  State briefly the advantages of a regenerative feed heating in steam power cycle.

iii)  Why super heating of the steam is essential in power plants? What different types of super heaters are used in modern power plants?          (15)

8.  a)  A vapour compression plant uses R-134 a as refrigerant. The evaporator temperature is − 10°C. The condenser pressure is 7.675 bar and there is no subcooling of the condensate. The flash chamber pressure is 4.139 bar and the dry saturated Vapour bled off from the flash chamber is mixed with refrigerant from the LP compressor before entering the HP compressor. The liquid from the flash chamber is throttled before entering the evaporator. Assuming isentropic compression, determine

i)  The cop of the plant

ii)  The mass flow rate of refrigerant in the evaporator when the power input to the compressor is 100 kW.

(20)

b)  i)  Explain the difference between flooded type shell-and-tube-evaporator and dry type shell-and-tube evaporator.

ii)  Describe the relative advantages and disadvantages of air-cooled, water cooled and evaporative condensers.          (15)

c)  An air conditioned space is maintained at 27°C DBT and 50% RH. The ambient conditions are 40°C DBT and 27°C WBT. The space has a sensible heat gain of 14 kW. Air is supplied to the space at 7°C saturated.          (15)

Calculate :

i)  Mass of moist air supplied to the space in Kg/h.

ii)  Latent heat gain of space in kW.

iii)  Cooling load of the air washer in kW if 30% of the air supplied to the space is fresh, the remainder being recirculated.

—————————

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

## CC(M)
## MEDICAL SCIENCE
## (OPTIONAL)
## PAPER - II
## [42]

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

### INSTRUCTIONS

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## SECTION - A

1. a) Enumerate the common organisms causing Pneumonia in children under 5 years of age. Write the approach to management of Pneumonia in children. **(5+15)**

   b) Enlist the available vaccines and schedule to prevent rotavirus diarrheal disease. **(10)**

   c) Classify dehydration into mild, moderate and severe. Outline the management plan of a 10 kg child with moderate dehydration. **(8+12)**

2. a) Write a short note on: **(4×5)**

   i)   Tension Pneumothorax

   ii)  Surgical site infection

   iii) ERAS

   iv)  Primary Survey in Trauma

   b) Write short notes on: **(4×5)**

   i)   Multi drug resistant Tuberculosis.

   ii)  Vaccines for cancers

   iii) Estimating "Strength of association" for establishing causal relationship.

   iv)  Standardized death rate – the rationale and methodology

   c) Discuss the various components of Community Based Rehabilitation (CBR) in Leprosy. **(10)**

3. a) Discuss clinical symptoms, signs and management of acute severe Asthma. **(5+5+15)**

   b) Discuss pathogenesis and management of microvascular and macrovascular complications of Diabetis mellitus. **(5+5+5)**

   c) Write about the complications of Malaria. **(10)**

4. a) Write short notes on: **(4×5)**

   i)   Universal immunisation

   ii)  Management of Ulcerative colitis

   iii) Electro convulsive therapy.

   iv)  Management of third stage of labor

   b) Describe the pathogenesis, types and complications of Gall stones **(5+5+10)**

   c) What are the clinical features raising the suspicion of Enteric fever? What is the Clinical utility of Typhidot test? **(5+5)**

(42)                                   (2)

## SECTION - B

5.  a)  A 30 year old female presented with a swelling in the anterior aspect of the neck which moves with deglutition.                                    (3+6+3+3)

    i)    What are the differential diagnosis.

    ii)   Write the diagnostic Approach to STN.

    iii)  What are the USG features suggestive of malignancy of Thyroid.

    iv)   Write briefly about the Bethesda classification of Thyroid.

    b)  i)    What are the supports of Uterus.                                   (7+3+10)

        ii)   What are the factors predisposing to Prolapse

        iii)  Outline the surgical and non-surgical management of Uterine Prolapse.

    c)  A 60 years old diabetic has presented to emergency department with high grade fever and chills for three days. Microscopic examination of urine revealed full field of pus cells. Discuss your approach for immediate, short term and long term management.                                    (5+5+5)

6.  a)  Classify the cyanotic heart disease as per pulmonary blood flow. Discuss the management of cyanotic spell.                                    (10+10)

    b)  What is the role of NAFLD in the development of Cirrhosis of Liver? Discuss the complications of Cirrhosis of Liver and the management?    (10+10+10)

7.  a)  A 30 year old female presented with a lump in the right breast for 3 months. The lump is mobile and not fixed the chest wall or skin.    (3+3+4)

    i)    What are the differential diagnosis.

    ii)   What are the risk factors for carcinoma Breast

    iii)  Write a short note on ANDI.

    b)  i)    Enumerate the common causes of infertility.                       (5)

        ii)   Evaluate and investigate a infertile couple of 3 years. Write the management of tubal factors of infertility.                                    (10+5)

    c)  Write Short Note on:                                              (4×5)

    i)    Cardiac Tamponade

    ii)   Anxiety attack

    iii)  Glassgow coma Scale score

    iv)   Enumerate causes of Pleural effusion

8.  a)  Write Short note on:                                                      (4×5)

       i)    Critical Limb Ischemia

       ii)   Management of Varicose Veins

       iii)  Management of Allergic Dermatitis

       iv)  Management of post menopausal syndrome

   b)  A 70 year old female presented with post-menopausal bleeding.    (5+5+10)

       i)    Enumerate the causes of Post Menopausal Bleeding

       ii)   Diagnostic approach to Post Menopausal Bleeding

       iii)  Classify the various types of Hysterectomy with their indications

   c)  Write a short note on Fluid management in Burns. And explain the various methods to calculate the body surface area in burns.        (5+5)

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

CC(M)

PHILOSOPHY

(OPTIONAL)

PAPER - II

[44]

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

## INSTRUCTIONS

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

## SECTION - A

1. a) Discuss the importance of land and property rights for the empowerment of women in India. **(10)**

   b) Discuss the questions that are raised against Sen's notion of equality of functioning capability. **(10)**

   c) Discuss the importance of the liberal-democratic ethos for democracy in India. **(10)**

   d) Discuss Bodin's concept of sovereignty. **(10)**

   e) Analyse arguments in favour of and against a Uniform Civil Code in India. **(10)**

2. a) Discuss the conceptions of 'Justice as Difference' vis-à-vis 'Justice as Harmony', 'Justice as Equality' and 'Justice as Equity'? Discuss with examples from Indian context. **(20)**

   b) How does the protection of secularism and multi-culturalism ensure humanism in India? **(15)**

   c) How have Marxism & Socialism contributed to Indian Democracy? **(15)**

3. a) Discuss the Gandhi-Ambedkar debate in reference to the method of upliftment of the lower castes in India. **(20)**

   b) 'Giving Capital Punishment to rapists is an effective way to stop crimes against women' - Give arguments for as well as against this statement. **(15)**

   c) Critically analyse the law that makes performing abortions at any stage of pregnancy a felony with almost no exceptions. **(15)**

4. a) Discuss the following principles that might be thought to justify state policies that limit individual liberty: The Harm Principle, Legal Moralism, The Collective Benefits Principle, The Justice Principle, and The Need Principle. Give examples to explain them clearly. **(20)**

   b) Discuss the role of media in protection of rights and in ensuring accountability of a democratic State, such as India. **(15)**

   c) Apart from measuring GDP, discuss three alternative ways to assess development and progress of a Nation. **(15)**

(44)                                      (2)

## SECTION - B

5.  a) Discuss the postmodernist critique of religious truth. (10)

    b) Elaborate on the following statement: 'The world's religions have not been kind to women'. (10)

    c) Discuss the logical positivist critique of religious propositions such as 'God is all-powerful', 'God is just', 'God is merciful'. (10)

    d) How does Kierkegaard make space for faith in his philosophy? (10)

    e) Compare any two versions of ontological arguments for the existence of God. (10)

6.  a) Discuss 'verification' and 'falsification' principles in the context of religious language. (20)

    b) Explain at least three types of religious experiences with examples. (15)

    c) Discuss Necessity, Omniscience, Omnipotence, Eternity, and Immutability attributes of God. (15)

7.  a) What is technology? Discuss the possible attitude of Hindu, Buddhist, & Christian believers towards technology? (20)

    b) Discuss Augustine's free will theodicy, Hick's Irenaean or soul-making theodicy, and Whitehead's process theodicy in the context of the problem of evil. (15)

    c) Give three arguments against the 'Design Argument' as proof of God. (15)

8.  a) Discuss the following approaches to religious diversity: Religious relativism, Religious pluralism, Religious inclusivism, Religious exclusivism. Present at least two issues each that one might face while believing in these approaches. (20)

    b) Discuss the need, relevance, and importance of Dalit Theology. (15)

    c) Discuss three approaches to ethics that are not rooted in religion. (15)

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

**CC(M)**

**PHYSICS**

**(OPTIONAL)**

**PAPER-II**

**[46]**

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

**INSTRUCTIONS**

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## SECTION-A

1. a) The de-Broglie's wave length of an electron is 0.24Å what voltage applied between two grids will bring to rest. **(10)**

   b) Derive time independent form of a Schrodinger equation. **(10)**

   c) Write down the matrix representation of the three Pauli matrices $\sigma_x, \sigma_y, \sigma_z$ and show that $\left[\sigma_x, \sigma_y\right] = 2i\sigma_z$ and $\left[\sigma^2, \sigma_x\right] = 0$. **(10)**

   d) Find the Lande's 'g' factor of $3S^2_{1/2}$ and $3P^2_{3/2}$ energy levels. **(10)**

   e) Explain the elementary theory of NMR and explain its applications. **(10)**

2. a) Discuss the linear Harmonic oscillator with help of Schrödinger equation. **(20)**

   b) Apply the Schrödinger equation to get different quantum numbers of Hydrogen atom. **(20)**

   c) Calculate the de-Broglie's wave length of an Alpha particle which is accelerated in 25,000 Volts. **(10)**

3. a) What mean by fine structure? Explain the fine structure of $H_\alpha, H_\beta$ spectral lines. Explain L-S and J-J coupling Schemes. **(20)**

   b) Explain the Vibrating spectra of a diatomic molecule and calculate first two quantized energies of HCl molecule of force constant 516N/m. **(20)**

   c) Explain the basic principle of ESR Spectroscopy. **(10)**

4. a) Define Bohr Magnetron and derive an equation for it. Find the total orbital and spin magnetic moments of electron which is present in $3P^2_{3/2}$ energy level. **(20)**

   b) Explain the Quantum theory of Raman Effect, and Raman Spectrometer. Discuss the difference between Raman and Infrared Spectroscopy. **(20)**

   c) Find the most probable position of particle which is kept in a box of length $l$. **(10)**

(46)                                        (2)

## SECTION - B

5.  a) Discuss about Pair Production and Annihilation. **(10)**

    b) Explain about $\beta$-Decay. **(10)**

    c) Derive equations to Drift current density and diffusion current density in Intrinsic semiconductors. **(10)**

    d) Explain about Meissner effect and prove that a superconductor is diamagnetic materials. Discuss about BCS theory of superconductors. **(10)**

    e) What are Universal logic gates? Give logic diagrams, Boolen Expression and truth tables of these gates. **(10)**

6.  a) Explain salient features of Nuclear forces and discuss about nuclear shell model. **(20)**

    b) Derive an equation for Q-Value of Nuclear reaction, Find the energy released in Proton-Proton cycle at the sun. **(20)**

    c) What are Elementary particles discuss about their classification. **(10)**

7.  a) Explain the X-ray powder diffraction method to find the crystal structure, and also explain construction and working principle of Scanning electron microscope. **(20)**

    b) Explain the basic properties of an operational amplifiers, show that it can be used as adder, integrator and differentiator. **(20)**

    c) What are High. $T_c$ superconductors discuss about them. **(10)**

8.  a) Discuss about conservation laws in Elementary particles, and Quark model of Hadrons. **(20)**

    b) Explain about Debye's theory of specific heat in a solid material, outline its drawbacks. **(20)**

    c) Draw the logic diagram of a full adder and write its truth table. **(10)**

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

## CC(M)

## POLITICAL SCIENCE AND INTERNATIONAL RELATIONS

### (OPTIONAL)

### PAPER - II

### [48]

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

## INSTRUCTIONS

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## SECTION - A

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

    a)  State the limitations of comparative method.                     **(10)**

    b)  Describe the functionalist view of the state.                     **(10)**

    c)  Examine the nature of state in post colonial societies.                     **(10)**

    d)  Explain the reasons for emergence of new social movements in developing societies.                     **(10)**

    e)  'Globalisation has become irresistible to developing societies'. Elaborate.**(10)**

2.  a)  Identify the main elements of American hegemonic architecture in world politics.                     **(20)**

    b)  Discuss the limitations of functionalist approach.                     **(15)**

    c)  'Regionalism has various dimensions and takes different forms across the world'. Comment.                     **(15)**

3.  a)  Assess the contribution of UNO to the social development of the world. **(20)**

    b)  Globalisation facilitated crony capitalism. Examine.                     **(15)**

    c)  Analyse the nature of Iranian nuclear politics.                     **(15)**

4.  a)  Is global environmental justice a possibility ?                     **(20)**

    b)  'Super power structure of post war politics provided stability in the world'. Comment.                     **(15)**

    c)  'R2P' is a ploy for global interventionist politics'. Examine.                     **(15)**

## SECTION- B

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

    a)  Analyse the role of national security council in the making of India's foreign policy.                     **(10)**

    b)  'NAM represented India's pacifist traditions'. Examine.                     **(10)**

    c)  Account for India's increasing acceptability in global nuclear regimes.                     **(10)**

    d)  Assess the potential of India as a soft power.                     **(10)**

    e)  Is there a space for paradiplomacy in India's foreign policy?                     **(10)**

(48)                                         (2)

**6.** a) Present the main elements of India's Indo-Pacific strategy. **(20)**

     b) Guage the depth of strategic partnership between Russia and India. **(15)**

     c) Identify the challenges to success of regional cooperation in South Asia. **(15)**

**7.** a) Account for the emerging strategic synergy in India-America defence cooperation. **(20)**

     b) 'India relegated Latin America to the backwater of diplomacy'. Discuss. **(15)**

     c) Analyse the main content of India's engagement with Africa. **(15)**

**8.** a) How does India better the world as and when it becomes permanent member of security council? Present your views. **(20)**

     b) Draw a balance sheet of 'Neighbourhood' first policy of 2014. **(15)**

     c) Identify the advantages of India's Look west policy. **(15)**

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

# CC(M)
# PSYCHOLOGY
# (OPTIONAL)
# PAPER-II
## [50]

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

## INSTRUCTIONS

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

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

ii)     Your answer should be precise and coherent.

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

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

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

vi)     No blank page be left in between answer to various questions

## SECTION-A

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

   a) Discuss critically the ethical issues involved in using psychological tests for psychological counseling.      (10)

   b) Discuss the role of psychologists in the rehabilitation programs of intellectually disabled children.      (10)

   c) Explain the motivation theories or models relating to distance learning through information technology.      (10)

   d) What are the psychological consequences of population explosion? Explain with examples.      (10)

   e) Why do we need psychologists in the field of information technology and mass media?      (10)

2. a) According to McClelland any country that wished to accelerate economic progress should be interested in raising the levels of need for achievement. Critically examine the statement.      (20)

   b) Are leaders born or made? What is your view? Also explain Fiedler's contingency theory of leadership.      (15)

   c) Schizophrenia: Describe the prevalence explain the causes with empirical support and discuss critically the psychosocial interventions.      (15)

3. a) According to WHO, mental health promotion and prevention are key to helping adolescents thrive. Comment on the statement and suggest suitable measures for promoting adolescent mental health in India.      (20)

   b) Examine the factors that we need to consider when we are planning for a social change. Suggest suitable strategies for a planned social change.      (15)

   c) People perform better when they are in jobs best suited to their abilities and interests. Comment on the statement in the context of career counselling. Also explain the stages involved in career planning.      (15)

4. a) Critically examine the influence of media on aggression and ante-social behaviour. Explain studies conducted by Albert Bandura.      (20)

   b) What methods can you use to reduce prejudice? Discuss and also differentiate between prejudice and discrimination.      (15)

   c) Discuss critically the negative effects of crowding on performance, social behaviour, health of individuals and also the behaviour of inmates of prisons.      (15)

(50)             (2)

## SECTION-B

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

5. a) What the test developer has to do to ensure the reliability of a test? Explain the types of reliability. **(10)**

    b) Explain the concepts of glass ceiling and glass escalator Analyse the reasons for glass ceiling. Give examples and studies. **(10)**

    c) Examine critically the factors affecting academic performance of disadvantaged students. **(10)**

    d) What are the different types of learning styles? Suggest appropriate teaching learning techniques for each type of learners. **(10)**

    e) One of the goals of community psychology is the empowerment of individuals and communities that have been marginalized by society. Critically examine the goal and also the role of community psychologist. **(10)**

6. a) People say entrepreneurship is an essential element in economic development. Comment on the statement. Also explain the traits of a successful entrepreneur. Cite research studies. **(20)**

    b) How to enhance the performance of sports persons? Suggest suitable psychological interventions. **(15)**

    c) What are the causes and consequences of occupational stress? Explain Evaluate biofeedback as a technique of stress reduction. **(15)**

7. a) Explain cognitive distortions, cognitive restructuring and ABC model of cognitive therapy (Ellis). Illustrate with examples. **(20)**

    b) Explain the psychological principles involved in effective teaching-learning process? Give examples relating to teachers and students. **(15)**

    c) Analyze the causes of stressors in military life. Discuss the role of psychologists in military organizations. **(15)**

8. a) Distinguish between content and process theories of motivation. Explain equity theory of Adams in relation to soft ware organizations. **(20)**

    b) In what ways the manifestation prejudice occur towards an out group? Discuss the causes of prejudice. Give examples. **(15)**

    c) Demonstrate how systematic desensitization and flooding therapies can be used for treating phobic disorders. Comment on ethical issues of flooding. **(15)**

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(50)                    (3)

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

**CC(M)**

**PUBLIC ADMINISTRATION**

**(OPTIONAL)**

**PAPER - II**

**[52]**

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

## INSTRUCTIONS

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

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

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

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

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

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

vi)    *No blank page be left in between answer to various questions*

(52)/2019                               (1)                               [Turn Over

## SECTION - A

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

   a) What are the elements of Kautilya's Saptanga theory of State? Discuss its relevance to the contemporary State.     **(10)**

   b) Examine the need and relevance of reforms in Higher Civil Services in the context of globalised economy.     **(10)**

   c) What is judicial activism? Explain how far it has been successful in exercising control over administration.     **(10)**

   d) 'Despite the constitutional status the District Planning Committee remained a non-entity in preparing and implementation of decentralized planning' - Comment.     **(10)**

   e) Discuss the objectives of 'Smart City Mission' in India and examine its impact on the infrastructure development in urban areas.     **(10)**

2. a) Examine the future trajectory of Public Sector Undertakings in the context of new economic reforms.     **(20)**

   b) Explain the pros and cons of establishment of the institution of Lokpal in ensuring transparency and accountability in Indian Administration.     **(15)**

   c) 'Higher Civil Service training in India is too pedagogic, too casual and too generalistic. Suggest suitable measures to make it professionally relevant and result oriented'- Discuss.     **(15)**

3. a) The question of Federal character of Indian State has come once again under political scanner during 2019 elections. Explain central-state relations in its historical trajectory.     **(20)**

   b) 'The efficiency of Cabinet depends mostly on the role played by Cabinet Secretariat'- Elaborate.     **(15)**

   c) 'Rural development programmers in India to a large extent suffer from lack of political will and coordination among field functionaries'- Comment.     **(15)**

4. a) 'The substantive decentralization efforts in India have been driven much more by constitutional amendment and central government schemes than the efforts of state governments'- Comment.     **(20)**

   b) National Human Rights Commission is apex statutory watchdog of human rights in the country. Critically examine its role in protection of the rights related to life, liberty, equality and dignity of the individuals.     **(15)**

   c) 'E-governance has no distinct boundaries'. Explain its application in delivery of services to the citizens.     **(15)**

(52)                 (2)

## SECTION- B

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

a)  'NITI Aayog (National Institution for Transforming India) has become a 'super-cabinet' in formulating the development agenda of the country'- Comment.        (10)

b)  "The police force in India is far from efficient, it is defective in training and organization; and it has failed to secure the confidence and cordial cooperation of the people"-Comment.        (10)

c)  'Institution of District Collector is a British legacy and it is constrained to cope with the changing demands of people'- suggest reforms for improving the district administration.        (10)

d)  'Bureaucracy with its status-quoism and value-neutrality cannot be expected to play the role of a change agent'- Examine the statement.        (10)

e)  'Parliamentary democracy stands for a form of government in which people rule through their representatives in the Parliament' – Examine the statement in the light of the scenario prevailing in parliament.        (10)

6.  a)  'Grievance redressal system is the weakest link in India's civil service management'. Explain the issues and challenges in addressing the grievance of citizens.        (20)

b)  'The financial suitability of the urban local bodies can become a reality only when the urban local bodies receive their due share of public finances'- explain the financial sources of urban local bodies in India.        (15)

c)  Explain the role of Reserve Bank of India in formulation of monetary policy, with reference to the recent demonetization.        (15)

7.  a)  Maintenance of law and order is a de-facto concurrent subject. In this context, examine the role of Centre and States in maintenance of law order.        (20)

b)  Explain the salient features of Mughal Administration and their relevance to the present administration.        (15)

c)  'Election Commission of India as a statutory body ensures free, fair and impartial elections'. Critically examine the statement in the light of General elections, 2019.        (15)

8.  a)  Examine the linkages between Union Public Service Commission and State public Service Commissions for evolving a uniform policy of human resource management. **(20)**

    b)  Examine the role of district administration in disaster preparedness and management. **(15)**

    c)  Critically examine the functioning of Adalat Panchayat in controlling criminal and civil disputes in the State. **(15)**

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

CC(M)

SOCIOLOGY

(OPTIONAL)

PAPER-II

[54]

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

## INSTRUCTIONS

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

vi)  No blank page be left in between answer to various questions

## SECTION-A

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

   a) Discuss AR Desai's Marxist analysis of Indian Society. (10)

   b) Analyse the features of the caste system described by Ghurye. (10)

   c) Explain Andre Beteille's class structure in Sripuram village of Tanjoore District. (10)

   d) Examine how Indian Society can be understood from an ideological perspective. (10)

   e) Explain the causes for untouchability in India. (10)

2. a) Explain structural functionalism of MN Srinivas in understanding Social change in India. (20)

   b) Discuss Yogendra Singh's analysis of modernisation of Indian tradition. (20)

   c) Explain the changes in the kinship relations in India. (10)

3. a) Examine the problems of displacement among the tribal communities in India. (20)

   b) Analyse the causes for anti-brahmin movement in India. (20)

   c) Explain the changes taking place in the middle class in India due to Globalization. (10)

4. a) Bring out the changes in the sexual division of labour in Urban areas. (20)

   b) Examine the barriers to rural development programmes in India. (20)

   c) Critically examine the concept of homo hierarchicus. (10)

## SECTION-B

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

   a) Examine Oscar Lewis's concept of culture of poverty. (10)

   b) Explain the Marxist's perspective on the capitalist state. (10)

   c) Analyse the causes for the imbalance in the sex ratio in India. (10)

   d) "Poverty survives in part because it is useful to a number of groups in society". Explain. (10)

   e) Examine the reasons why women tolerate domestic violence. (10)

(54) (2)

6. a) Explain the conflict between law and social customs in India. (20)

   b) Examine the subaltern perspectives of B R Ambedkar. (20)

   c) Explain the relation between Over population and Environment. (10)

7. a) Explain the intermediate variables affecting fertility. (20)

   b) Examine the causes for caste conflicts in rural India. (20)

   c) Discuss the reasons why Indian population is young. (10)

8. a) Examine the causes for peasant movements in India after Independence. (20)

   b) Analyse the relationship between Regionalism and Globalization. (20)

   c) Discuss gender as a social construct. (10)

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Roll No. _____                    Total No. of Printed Pages-7

# CC(M)

# URDU

## (OPTIONAL)

## (LITERATURE)

## PAPER - II

### [56]

*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 پڑھیے)

اس پرچے میں آٹھ سوالات ہیں جو دو حصوں (سیکشن) پر مشتمل ہیں۔

امیدوار کو کل پانچ سوالوں کے جواب دینے ہیں۔

سوال نمبر 1 اور 5 لازمی ہیں۔ باقی سوالات میں سے صرف تین سوالوں کے جواب دینے ہیں ہر سیکشن سے کم از کم

ایک سوال کا انتخاب ضروری ہے۔

ہر سوال یا سوال کے حصے کے نمبر اس کے سامنے درج کر دیے گئے ہیں۔

جوابات اردو میں ہی مطلوب ہیں۔

سوالات کے جوابات کے لیے الفاظ کی جو تعداد مقرر کی گئی ہے اس کی پابندی لازمی ہے۔

سوالات کے جوابات کو ترتیب وار اہمیت دی جائے گی۔ جب تک کوئی جواب یا اس کا حصہ کاٹ کر مسترد نہ دیا گیا ہو سوال

کا جواب تصور کیا جائے گا گرچہ جواب جزوی طور پر ہی حل کرنے کی کوشش کی گئی ہو۔ کوئی صفحہ یا صفحہ کا کوئی حصہ اگر چھوڑا

جائے تو اس کو کاٹنا ضروری ہے۔

## SECTION - A

<div dir="rtl">

1. مندرجہ ذیل اقتباسات کی تشریح سیاق و سباق کے حوالے سے تقریباً ایک سو پچاس (150) الفاظ میں کیجیے اور ان کے ادبی

و فنی محاسن پر روشنی ڈالیے:                                                (5 × 10 = 50)

a- ''اس میں بھی شک نہیں کہ امید دھوکے بہت دیتی ہے اور ان باتوں کی توقع پیدا کرتی ہے، جو انسان کو حاصل نہیں ہو

سکتیں، مگر وہ دھوکے کی اصل نعمتوں سے سوا مزہ دیتے ہیں اور موہوم وعدے قسمت کی لکھی ہوئی دولتوں سے گراں

بہا اور خوش نما معلوم ہوتے ہیں۔ اگر کسی معاملے میں نا کام بھی کرتی ہے تو اسے نا کامی نہیں بلکہ قسمت کی دیر کہہ

کر ایک اس سے بھی اعلیٰ بھی یقین سامنے حاضر کر دیتی ہے۔''

b- ''کائنات ساکن نہیں ہے، متحرک ہے؛ اور ایک خاص رُخ پر بنتی اور سنورتی ہوئی بڑھی چلی جا رہی ہے۔ اس کا

اندرونی تقاضا ہر گوشے میں تعمیر و تکمیل ہے۔ اگر کائنات کی اس عالم گیر ارتقائی رفتار کی کوئی مادی توضیح ہمیں نہیں

ملتی تو ہم غلطی پر نہیں ہو سکتے، اگر اس معمے کا حل روحانی حقائق میں ڈھونڈنا چاہتے ہیں۔ اس موقعے پر یہ حقیقت

بھی پیشِ نظر رکھنی چاہیے کہ مادّہ کی نوعیت کے بارے میں اٹھارہویں اور انیسویں صدی نے جو عقائد پیدا کیے تھے،

وہ اس صدی کے شروع ہوتے ہی بلنا شروع ہو گئے اور اب یکسر منہدم ہو چکے ہیں۔ اب ٹھوس مادہ کی جگہ مجرد قوت

نے لے لی ہے۔''

c- ''کیوں کر تجھ کو لکھوں کہ تیرا باپ مر گیا اور اگر لکھوں تو پھر آ گے کیا لکھوں کہ اب کیا کرو مگر صبر کرو؟ یہ ایک شیوۂ فر

سودہ اپنے روز گار ہے۔ تعزیت یوں ہی کیا کرتے ہیں کہ صبر کرو۔ ہائے ایک کا کلیجہ کٹ گیا ہے اور لوگ اسے

کہتے ہیں کہ تو نہ تڑپ۔ بھلا کیوں کر نہ تڑپے۔ صلاح اس امر میں نہیں بتائی جاتی۔ دعا کو دخل نہیں۔ دوا کا لگاؤ

نہیں۔ پہلے بیٹا مرا، پھر باپ مرا۔ مجھ سے اگر کوئی پوچھے کہ بے سر و پا کس کو کہتے ہیں تو میں کہوں گا یوسف مرزا کو۔

d- ''نوفل نے، اس لکڑہارے بوڑھے کو پاس بلا کر پوچھا 'سچ کہہ' اصل کیا ہے؟ حاتم کو کون پکڑ لایا؟ اُس بے چارے

نے، سر سے پاؤں تک جو گزر رہا تھا، راست کہہ سنایا اور کہا کہ حاتم میری خاطر آپ چلا آیا ہے۔ نوفل، یہ ہمت حاتم کی

سن کر، متعجب ہوا کہ بل بے تیری سخاوت! اپنی جان کا بھی خطرہ نہ کیا؟ جتنے، جھوٹ دعوے، حاتم کے پکڑ لانے

کے کرتے تھے، حکم کیا کہ اُن کی ٹنڈیاں کس کر، پان سو اشرفی کے بدلے، پان سو جوتیاں اُن کے سر پر لگاؤ کہ ان کی

بھی جان نکل پڑے۔ دو نہیں تڑ تڑ پیزاریں پڑنے لگیں کہ ایک دم میں، سر اُن کے گنجے ہو گئے۔''

</div>

(56)                                        ( 2 )

-e ''بنوارا ہوا اور بے شمار زخمی لوگوں نے اپنے بدن پر سے خون پونچھ ڈالا اور سب مل کر اُن کی طرف متوجہ ہو
گئے۔ کئی بدن صحیح و سالم تھے، لیکن دل زخمی تھے۔ گلی گلی، محلّے محلّے میں ''پھر بساؤ'' کمیٹیاں بن گئی تھیں اور شروع شروع
میں بڑی تندہی کے ساتھ'' کاروبار میں بساؤ'' ''زمین پر بساؤ'' اور گھروں میں بساؤ'' پروگرام شروع کردیا گیا تھا
لیکن ایک پروگرام ایسا تھا جس کی طرف کسی نے توجہ نہ دی تھی۔ وہ پروگرام مغویہ عورتوں کے سلسلے میں تھا جس کا سلو
گن تھا''دل میں بساؤ'' اور اس پروگرام کی نرائن باوا کے مندر اور اس کے آس پاس بسنے والے قدامت پسند طبقے کی
طرف سے بڑی مخالفت ہوئی تھی۔''

2. حسب ذیل سوالوں کے جوابات تین سو (300) الفاظ میں دیجیے:

(20) ‎-a خطوطِ غالب کی ادبی اہمیت

(15) ‎-b نیرنگ خیال کی ادبی اہمیت

(15) ‎-c پریم چند کی ناول نگاری

3. حسب ذیل سوالوں کے جوابات تین سو (300) الفاظ میں لکھیے:

(20) ‎-a گؤدان کی ادبی اہمیت

(15) ‎-b راجندر سنگھ بیدی کی افسانہ نگاری

(15) ‎-c ابوالکلام آزاد کا اسلوب نثر

4. حسب ذیل سوالوں کے جوابات تین سو (300) الفاظ میں دیجیے:

(20) ‎-a افسانہ ''اپنے دکھ مجھے دے دو'' کا تنقیدی تجزیہ

(15) ‎-b محمد حسن آزاد کا اسلوب نگارش

(15) ‎-c ''باغ و بہار'' کی ادبی قدر و قیمت

## SECTION - B

5. مندرجہ ذیل شعری اقتباسات کی تشریح ساق و سباق کے حوالے سے تقریباً ایک سو پچاس (150) الفاظ میں اس طرح کیجیے
جس سے ان اشعار کا ادبی اور فنی حسن واضح ہو جائے۔

(5 × 10 = 50)

(56)　　　　　　　( 3 )　　　　　　　[Turn over

A

حسب معمول سنبھالے ہوئے خانہ داری

منجھلی آپا کبھی آتی تھیں ، کبھی جاتی تھیں

ہم سے دور ابا اسی کمرے کے اک کونے میں

کاغذات اپنے اراضی کے لیے بیٹھے تھے

یک بیک شور ہوا، ملک نیا ملک بنا

اور اک آن میں محفل ہوئی درہم برہم

آنکھ جو کھولی تو دیکھا کہ زمیں لال ہے سب

تقویت ذہن نے دی ، ٹھیرو، نہیں خون نہیں

پان کی پیک ہے، یہ اماں نے تھوکی ہوگی!

B

کچھ لوگ ہیں جو اس دولت پر

پردے لٹکاتے پھرتے ہیں

ہر پربت کو، ہر ساگر کو

نیلام چڑھاتے پھرتے ہیں


کچھ وہ بھی ہیں جو لڑ بھڑ کر

یہ پردے نوچ گراتے ہیں

ہستی کے اٹھائی گیروں کی

ہر چال الجھائے جاتے ہیں

ان دونوں میں رن پڑتا ہے

نت بستی بستی، نگر نگر

ہر بستے گھر کے سینے میں

ہر چلتی راہ کے ماتھے پر

یہ کالک بھرتے پھرتے ہیں

وہ جوت جگاتے رہتے ہیں

یہ آگ لگاتے پھرتے ہیں

وہ آگ بجھاتے رہتے ہیں

سب ساغر، شیشے، لعل و گہر

اس بازی میں بد جاتے ہیں

اُٹھو، سب خالی ہاتھوں کو

اس رن سے بُلاوے آتے ہیں

C

باتیں ہماری یاد رہیں پھر باتیں ایسی نہ سنیے گا

پڑھتے کسو کو سنیے گا تو دیر تلک سر دھنیے گا

سعی و تلاشی بہت سی رہے گی اس انداز کے کہنے کی

صحبت میں علما فضلا کی جاکر پڑھیے گنیے گا

دل کی تسلی جب کہ ہوگی گفت و شنود سے لوگوں کی

(56)                    ( 5 )                    [Turn over

آگ بھڑکے گی غم کی دن میں اس میں جلیے بھنیے گا

گرم اشعار میرے درد نہ داغوں سے یہ بھر دیں گے

زرد روش ہر میں پھریے گا، گلیوں میں گل چنیے گا

## D

کعبہ ارباب فن! سطوتِ دینِ مبین

تجھ سے حرم مرتبت اندلسیوں کی زمیں

ہے تہ گردوں اگر حسن میں تیری نظیر

قلبِ مسلماں میں ہے اور نہیں ہے کہیں!

آہ وہ مردانِ حق! وہ عربی شہسوار

حاملِ ''خلقِ عظیم''، صاحبِ صدق و یقیں

جن کی حکومت سے ہے فاش یہ رمزِ غریب

سلطنتِ اہلِ دل فقر ہے، شاہی نہیں!

جن کی نگاہوں نے کی تربیت شرق و غرب

ظلمتِ یورپ میں تھی جن کی خرد راہ بیں

جن کے لہو کے طفیل آج بھی ہیں اندلسی

خوش دل و گرم اختلاط، سادہ و روشن جبیں

آج بھی اس دیس میں عام ہے چشمِ غزال

اور نگاہوں کے تیر آج بھی ہیں دل نشیں

بوئے یمن آج بھی اس کی ہواؤں میں ہے!

رنگِ حجاز آج بھی اس کی نواؤں میں ہے!

(56)        ( 6 )

E

رہیے اب ایسی جگہ چل کر جہاں کوئی نہ ہو

ہم سخن کوئی نہ ہو اور ہم زباں کوئی نہ ہو

بے در و دیوار سا اک گھر بنایا چاہیے

کوئی ہم سایہ نہ ہو اور پاسباں کوئی نہ ہو

پڑیے گر بیمار تو کوئی نہ ہو بیمار دار

اور اگر مر جایے تو نوحہ خواں کوئی نہ ہو

6. مندرجہ ذیل سوالوں کے جوابات تین سو (300) الفاظ میں دیجیے:

(20) a- خدائے سخن سے کیا مراد ہے؟ میر کو خدائے سخن کہنا کس حد تک مناسب ہے؟

(15) b- کیا 'بالِ جبریل' میں فلسفہ اور شعر کا حسین امتزاج ملتا ہے؟

(15) c- 'فیض: رومان اور حقیقت کا سنگم' عنوان سے ایک مضمون لکھیے۔

7. مندرجہ ذیل سوالوں کے جوابات تین سو (300) الفاظ میں دیجیے:

(20) a- مثنوی 'سحر البیان' میں لکھنوی تہذیب کی عکاسی

(15) b- اختر الایمان کی نظم نگار کی حیثیت سے انفرادیت واضح کیجیے۔

(15) c- فراق کی شاعرانہ اہمیت واضح کیجیے۔

8. مندرجہ ذیل سوالوں کے جوابات تین سو (300) الفاظ میں دیجیے:

(20) a- گنجینۂ معنی کا طلسم اس کو سمجھیے؛ غالب کی شاعری کے حوالے سے بحث کیجیے۔

(15) b- اقبال کی نظم 'مسجد قرطبہ' کا تنقیدی تجزیہ پیش کیجیے۔

(15) c- مثنوی 'سحر البیان' کے ادبی اور فنی محاسن واضح کیجیے۔

Total No. of Printed Pages-**2**                          **Roll No.** _____

## CC(M)

## ZOOLOGY

## (OPTIONAL)

## PAPER-II

## [58]

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

### INSTRUCTIONS

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

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

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

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

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

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

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

## SECTION-A

1.  a)  Explain the structure and function of mitotic spindle.                    (10)
    b)  Elaborate the role of continental drift in distribution of animals.       (10)
    c)  Explain how molecular taxonomy is helpful in biodiversity.                (10)
    d)  Describe polytene chromosome and its significance.                        (10)
    e)  Describe steps involved in production of recombinant DNA.                 (10)

2.  a)  Substantiate how fluid mosaic model in plasma membrane explain its structure and function                                                              (20)
    b)  Explain key steps of regulation of cell cycle                            (15)
    c)  Write a comparative account of DNA replication and transcription.        (15)

3.  a)  Explain sex determination in drosophila with illustration.               (20)
    b)  Elaborate the steps involved in whole animal cloning and its significance.(15)
    c)  Explain the application of RFLP in DNA finger printing and its relevance. (15)

4.  a)  Explain the role of reproductive isolation mechanisms in speciation.     (15)
    b)  Describe Hardy-Weinberg law and write a comment on its utility in explanation of evolution                                                              (15)
    c)  Explain evolution of man using contemporary fossil data.                 (20)

## SECTION-B

5.  a)  Describe the structure of cholesterol and its role in metabolism.        (10)
    b)  Explain mechanism of enzyme action and factors affecting it.             (10)
    c)  Describe the mechanism of coagulation of blood and give names of two anticoagulants.                                                                  (10)
    d)  Explain how light is converted as a biological signal in rods during vision. (10)
    e)  Compare and contrast paedogenesis and neoteny with examples              (10)

6.  a)  What is oxidative phosphorylation? Explain how ATP is produced in Mitochondria.                                                                     (20)
    b)  Give the structure of ATP, AMP, cyclic AMP, steps of their formation and their biological role                                                       (15)
    c)  Describe the structure of antibody, types of antibodies and their role in Immunity.                                                                   (15)

7.  Describe structure of skeletal muscle along with muscle proteins. Explain the excitation – coupling mechanism and physiological steps of skeletal muscle contraction. Describe the effects of exercise on structure, metabolism and function of skeletal muscle                                                       (20+15+15 = 50)

8.  a)  Explain the process of formation of gastrula of chick and fate map of chick.                                                                        (20)
    b)  Describe in vitro fertilization and embryo transfer techniques with their application.                                                                (15)
    c)  Describe sources, types and uses of stem cells in human welfare.         (15)

_____

(58)                              (2)

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