

Sec I

Roll No. ....

Total Pages : 3

GSEM-23

1472

NUMBER THEORY AND TRIGONOMETRY  
Paper-BM-121

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is compulsory.

**Compulsory Question**

1. (a) Find  $x$  such that  $x \equiv 7 \pmod{5}$ . 2  
(b) Find  $\phi(n)$  for  $n = 68$ . 2  
(c) If  $a = \cos 2\alpha + i \sin 2\alpha$ , and

$b = \cos 2\beta + i \sin 2\beta$ , show that

$$\sqrt{\frac{a}{b}} + \sqrt{\frac{b}{a}} = 2 \cos(\alpha - \beta).$$

2

- (d) Find general value of  $\text{Log}(-5)$ . 1  
(e) Prove that  $\sin h^{-1} x = -i \sin^{-1}(ix)$ . 1

**SECTION-I**

2. (a) Find g.c.d. of 595 and 252 and express it in the form  $m \cdot 595 + n \cdot 252$ . 4  
(b) Solve the congruence  $222x \equiv 12 \pmod{18}$ . 4  
3. (a) Show that  $n^{16} - a^{16}$  is divisible by 85 if  $n$  and  $a$  are co-prime to 85. 4  
(b) Find the remainder when  $2(26)!$  is divided by 29. 4

1472/4,250/KD/147

[P.T.O.]

26/6

## SECTION-II

4. (a) Find all integers that give the remainder 1, 2, 3 when divided by 3, 4, 5 respectively. 4

- (b) For an odd positive  $m$ , prove that the sum of the integers of any CRS (mod  $m$ ) is congruent to zero modulo  $m$ . 4

5. (a) Prove that  $\sum_{d|n} \log d = \frac{1}{2} d(n) \log n$  for all positive integers  $n$ . 4

- (b) Show that 3 is a quadratic residue of 23. 4

## SECTION-III

6. (a) Show that the roots of  $(1+x)^3 = i(1-x)^3$  are  $x = i \tan \frac{(4r+1)\pi}{12}$ ,  $r = 0, 1, 2$ . 4

- (b) Find an equation whose roots are  $\cos \frac{\pi}{7}, \cos \frac{3\pi}{7}, \cos \frac{5\pi}{7}$  and hence show that  $\cos \frac{\pi}{7}, \cos \frac{3\pi}{7}, \cos \frac{5\pi}{7} = \frac{-1}{8}$ . 4

7. (a) If  $\tan \theta = \tan hx \cdot \cot y$  and  $\tan \phi = \tan hx \cdot \tan y$  prove that

$$\frac{\sin 2\theta}{\sin 2\phi} = \frac{\cosh 2x + \cos 2y}{\cosh 2x - \cos 2y}. \quad 4$$

- (b) If  $\tan (x + iy) = \theta + i\phi$  prove that

$$\theta^2 + \phi^2 = \frac{\cosh^2 y - \cos^2 x}{\cosh^2 y - \sin^2 x}. \quad 4$$

## SECTION-IV

8. (a) If  $u + iv = \log \frac{x+iy+a}{x+iy-a}$ , show that  $x^2 + y^2 - 2ax \cot h u + a^2 = 0$ . 4

- (b) Solve the equation :

$$\tan^{-1} \frac{1}{4} + 2 \tan^{-1} \frac{1}{5} + \tan^{-1} \frac{1}{6} + \tan^{-1} \frac{1}{x} = \frac{\pi}{4}. \quad 4$$

9. (a) Separate  $\cosh^{-1} (x + iy)$  into real and imaginary parts. 4

- (b) Sum to  $n$  terms the series.

$$\cot^{-1} (2.1^2) + \cot^{-1} (2.2^2) + \cot^{-1} (2.3^2) + \dots \quad 4$$

GSE/M-23

1473

## ORDINARY DIFFERENTIAL EQUATIONS

Paper-BM-122

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all, selecting *one* question each from Section-I to Section-IV, while Q. No. 9 (Section-V) is compulsory. All questions carry equal marks.

## SECTION-I

1. (a) Solve  $(x^4 - 2xy^2 + y^2) dx - (2x^2y - 4xy^3 + \sin y) dy = 0$ .  
(b) Solve  $(1 + xy) ydx + (1 - xy)x dy = 0$ .
2. (a) Solve  $x - yp = ap^2$ .  
(b) Find the singular solution of  $y = px - 2p^2$ .

## SECTION-II

3. (a) Find the orthogonal trajectory of the family of curves  $y^2 = 4ax$ .  
(b) Solve  $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 2 \sinh 2x$ .
4. (a) Solve  $\frac{d^2y}{dx^2} - 4y = x \cos 2x$ .  
(b) Solve  $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 20y = (x + 1)^2$ .

1473/4,250/KD/410

[P.T.O.]

28/6

### SECTION-III

5. (a) Solve  $\frac{d^2y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = e^x \sec x$  by removing the first derivative.

(b) Solve  $\frac{d^2y}{dx^2} + \cot x \frac{dy}{dx} + 4y \operatorname{cosec}^2 x = 0$  by changing the independent variable.

6. Solve  $(1 - x^2) \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} - (1 + x^2)y = x$  by the method of variation of parameters.

### SECTION-IV

7. (a) Solve the simultaneous equations  $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$ .

(b) Solve the simultaneous equations  $\frac{dx}{dt} + 7x - y = 0$ ;

$$\frac{dy}{dt} + 2x + 5y = 0.$$

8. (a) Solve the simultaneous equations

$$\frac{dx}{y} = \frac{dy}{-x} = \frac{dz}{2x - 3y}.$$

(b) Solve the total differential equation  $yz \, dx + 2xz \, dy - 3xy \, dz = 0$ .

### SECTION-V (Compulsory Question)

9. (a) Define Clairaut's equation.

(b) Solve  $p = \tan (px - y)$ .

(c) Write the condition for  $x^2$  to be a particular solution of

$$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R.$$

(d) Under what condition  $P \, dx + Q \, dy + R \, dz = 0$  is said to be exact ?

Roll No. ....

Total Pages : 3

GSE/M-23

1474

VECTOR CALCULUS

Paper-BM-123

Time : Three Hours]

[Maxi. Marks :  $\begin{cases} \text{B.Sc. : 40} \\ \text{B.A. : 27} \end{cases}$

**Note :** Attempt *five* questions in all, selecting *one* question from each section. Question No. 1 is compulsory.

### Compulsory Question

1. (a) Show that  $(\vec{a} \times \vec{b}) \times (\vec{b} \times \vec{c}) = [\vec{a}\vec{b}\vec{c}]\vec{b}$   
(b) Prove that  $\text{curl } (\vec{r}) = \vec{0}$  where  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ .  
(c) Let  $u, v, w$  be the orthogonal co-ordinates. Prove that  $\hat{e}_1 = \hat{E}_1, \hat{e}_2 = \hat{E}_2, \hat{e}_3 = \hat{E}_3$ .  
(d) State Green's Theorem. (2×4=8)

### SECTION-I

2. (a) Show that  $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$  iff  $\vec{a}$  and  $\vec{c}$  are collinear.  
(b) If  $\vec{a}, \vec{b}, \vec{c}$  be three unit vectors such that  $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{1}{2} \vec{b}$ ; find the angles which  $\vec{a}$  makes with  $\vec{b}$  and  $\vec{c}$ , where  $\vec{b}$  and  $\vec{c}$  are non-parallel. (4×2=8)

1474//4,250KD/160

[P.T.O.  
30/6

3. (a) The necessary and sufficient condition for the vector function  $\vec{f}$  of a scalar variable  $t$  to have constant direction is  $\vec{f} \times \frac{d\vec{f}}{dt} = \vec{0}$ .

- (b) If  $\vec{r}$  is a unit vector in the direction of  $\vec{r}$ , then prove that  $\hat{r} \times \frac{d\hat{r}}{dt} = \frac{1}{r^2} \vec{r} \times \frac{d\vec{r}}{dt}$ . (4×2=8)

### SECTION-II

4. (a) If  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$  and  $r = |\vec{r}| = \sqrt{x^2 + y^2 + z^2}$  then prove that  $\text{div} \left( \frac{\vec{r}}{r^3} \right) = 0$ .

- (b) If  $\vec{f}$  and  $\vec{g}$  are irrotational, then  $\vec{f} \times \vec{g}$  is solenoidal. (4×2=8)

5. (a) Find the equation of tangent plane and normal to the surface  $x^2 + y^2 + z^2 = 25$  at the point (4, 0, 3).

- (b) What is the greatest rate of increase of  $u = xyz^2$  at the point (1, 0, 3). (4×2=8)

### SECTION-III

6. (a) In orthogonal curvilinear co-ordinate system, find curl of a vector function  $\vec{F}$ .

- (b) If (r,  $\theta$ ,  $\phi$ ) are spherical co-ordinates, show that  $\nabla\phi = \nabla \times (r \text{ cosec } \theta \nabla\theta)$ . (4×2=8)

7. (a) Determine the transformation from cylindrical to rectangular co-ordinates.

- (b) If (r,  $\theta$ ,  $\phi$ ) are spherical co-ordinates, show that  $\nabla \left( \frac{1}{r} \right) = \nabla \times (\cos \theta \nabla\phi)$ . (4×2=8)

### SECTION-IV

8. (a) If  $\vec{f} = 4xz\hat{i} - y^2\hat{j} + yz\hat{k}$ ; Evaluate  $\iint_S \vec{f} \cdot \vec{n} ds$ , where  $S$  is the surface of the cube bounded by  $x = 0$ ,  $x = 1$ ,  $y = 0$ ,  $y = 1$ ,  $z = 0$ ,  $z = 1$ .

- (b) If  $\vec{f} = 2xz\hat{i} - x\hat{j} + y^2\hat{k}$ , then evaluate  $\iiint_V \vec{f} dV$  where  $V$  is the region bounded by the surface  $x = 0$ ,  $y = 0$ ,  $x = 2$ ,  $y = 6$ ,  $z = x^2$ ,  $z = 4$ . (4×2=8)

9. (a) Evaluate by Stoke's theorem  $\oint_C (e^x dx + 2y dy - dz)$ , where  $C$  is the curve  $x^2 + y^2 = 4$ ,  $z = 2$ .

- (b) Evaluate  $\iint_S x \cdot dy \cdot dz + y dz dx + z \cdot dx \cdot dy$ , where  $S$  is the surface of the sphere  $x^2 + y^2 + z^2 = a^2$ . (4×2=8)

Roll No. ....

Total Pages : 3

GSE/M-23

1477

PROPERTIES OF MATTER AND KINETIC

THEORY OF GASES

Paper-I (PH-201)

Time : Three Hours]

[Maximum Marks : 40

**Note :** Question No. 1 is Compulsory. Attempt any *five* questions by selecting *one* question from each unit.

**Compulsory Question**

1. (a) Explain the term center of mass. (2)
- (b) Twisting of a hollow cylinder is more difficult compared to solid cylinder. Why? (2)
- (c) Calculate the ratio of Average speed and root mean square speed at room temperature. (2)
- (d) Discuss the variation of mean free path with temperature. (2)

**UNIT-I**

2. Discuss theory and experiment to determine moment of Inertia of Irregular shaped body. (8)

1477/3150/KD/174

98 [P.T.O.  
5/6

3. Derive an expression for moment of inertia of a hollow sphere and then using results deduce the expression for Moment of Inertia of solid sphere and spherical shell. (8)

#### UNIT-II

4. (a) What do you mean by bending of Beam? Derive expression for depression of beam loaded at the center by ignoring weight of beam. (6)  
 (b) Explain Stress-Strain Diagram. (2)
5. Derive the various relation between Young Modulus (Y) Bulk Modulus (K), Modulus of Rigidity ( $\eta$ ) and Poisson Ratio ( $\sigma$ ). (8)

#### UNIT-III

6. Discuss the assumption of Kinetic theory of gases and derive an expression for pressure exerted by an ideal gas. (8)
7. (a) Define law of Equi-partition of energy and degree of freedom. Find degree of freedom, specific heat at constant Volume and pressure and adiabatic coefficient for mono, di Tri and ploy-atomic gases. (8)

#### UNIT-IV

8. (a) What do you mean by Molecular Diffusion? Derive an expression for diffusion coefficient on the basis of kinetic theory of gases. (6)  
 (b) Determine the diffusion coefficient of hydrogen under STP condition if mean free path of hydrogen molecule is  $1.5 \times 10^{-6}$  m. (2)
9. Derive expression for Maxwell Ian distribution of molecular speed of gases and deduce the expression corresponding to momentum and energy. (8)

Roll No. ....

Total Pages : 3

**GSEM-23**

**1478**

**SEMICONDUCTOR DEVICES**

Paper-II (PH-202)

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* Questions in all. Selecting one question from each unit. Question No. 1 is compulsory.

**Compulsory Question**

1. (a) How does the doping increase the conductivity of semiconductors? (2)  
(b) Why is NPN transistor preferred over PNP transistor? (2)  
(c) In a transistor, base is made thin and doped with little impurity atoms, Why? (2)  
(d) How does intensity control work in a C.R.O.? (2)

**UNIT-I**

2. (a) What is a PN junction diode? Explain its action under forward and reverse biasing. (5)  
(b) Distinguish between intrinsic and extrinsic semiconductors. (3)
3. (a) What is a rectifier? Derive expression for ripple factor and efficiency of full wave rectifier. (5)

1478/3150/KD/180

[P.T.O.  
7/6

- (b) Discuss L-type filter. Find an expression for its ripple filter. (3)

#### UNIT-II

4. (a) Describe with the help of circuit diagram the input, output and transfer characteristics of a NPN transistor in C.B. configuration. (5)  
 (b) In CE configuration of a transistor, current gain is 100. and  $I_{co}$  is 20 nA. Find emitter and collector currents when base current is 20  $\mu$ A. (3)
5. (a) Draw voltage dividing biasing circuit and explain its working also discuss its merits. (5)  
 (b) What are the requirements for the proper biasing of a transistor? (3)

#### UNIT-III

6. (a) What do you mean by coupling of amplifiers? What is its advantage? Name the different methods of coupling. (5)  
 (b) What is meant by distortion in amplifier? What are its different types? (3)
7. (a) What is negative feedback in an amplifier? What are the advantages of negative feedback? Find the expression for voltage gain with negative feedback. (5)  
 (b) The voltage gain of an amplifier is 100 and can have a variation of 20%. How can the variation of gain reduced to 5%. (3)

#### UNIT-IV

8. (a) What is a tank circuit? Which type of oscillations are produced by it? (4)  
 (b) What are sustained oscillations? Explain Barkhausen criterion of sustained oscillations? (4)
9. (a) Draw a circuit for tuned collector oscillator. Explain its working by giving role of each component. (5)  
 (b) What are the uses of Cathode Ray Oscilloscope? (3)

GSE/M-23

1479

## INORGANIC CHEMISTRY

(Theory)

Paper : IV (CH-104)

Time : Three Hours]

[Maximum Marks : 32

**Note :** Attempt *five* questions in all, selecting at least *two* questions from each Section. Question number 1 is compulsory.

**Compulsory Question**

1. (a) Which out of Mg and Ca gives flame coloration and why?
- (b) What do you mean by Cryptates?
- (c) Which is more electropositive: K or Cs?
- (d) Write the formula of Laughing Gas?
- (e) Which compound is also called Inorganic Benzene?
- (f) Which out of the following is more acidic in nature?  
 $\text{BF}_3$  or  $\text{BCl}_3$ .
- (g) Name the alkali metal which is radioactive in nature?
- (h) Write the formula of Marshall's Acid? (1×8=8)

## SECTION-A

2. (a) Explain which has higher boiling point: Ethyl alcohol or dimethyl ether? (2)  
 (b) Why Ice always floats on the surface of water? (2)  
 (c) Discuss n-type and p-type semiconductors with example. (2)
3. (a) Discuss various types of Vander Waals forces. (2)  
 (b) What are the factors responsible for Diagonal Relationship? (2)  
 (c) What is the behavior of sodium metal in liquid Ammonia? (2)
4. (a) Discuss biological importance of Na and K ions. (2)  
 (b) Which alkali metal acts as strongest reducing agent and why? (2)  
 (c) Discuss the structures of  $\text{XeO}_3$  &  $\text{XeF}_4$  molecules. (2)
5. (a) What do you mean by intramolecular Hydrogen Bonding? (2)  
 (b) Discuss Electron Sea Model of bonding in metals? (2)  
 (c) Discuss complexation tendencies of Alkaline earth metals. (2)

1479/2500/KD/661

2

## SECTION-B

6. (a) Compare acidic properties of  $\text{HClO}_3$  and  $\text{HClO}_4$ . (2)  
 (b) Why does iodine dissolve in KI solution? (2)  
 (c) Discuss properties and uses of Fluorocarbons? (2)
7. (a) Discuss structure and bonding in diborane. (2)  
 (b) Explain the concept of back bonding in boron halides. (2)  
 (c) Give method of preparation of Linear Chain Silicone Polymers. (2)
8. (a) Write a short note on Red and White Phosphorus. (2)  
 (b) What do you mean by Interhalogen Compounds? (2)  
 (c) Write about important uses of hydrogen peroxide ( $\text{H}_2\text{O}_2$ ). (2)
9. (a) Arrange the following acids in decreasing order of their acidic strength :  
 $\text{HF}$ ,  $\text{HBr}$ ,  $\text{HCl}$  and  $\text{HI}$ . (2)  
 (b) Discuss the structure of  $\text{ClF}_3$ . (2)  
 (c) Explain Amphoteric nature of  $\text{Al}_2\text{O}_3$ . (2)

1479/2500/KD/661

3

Roll No. ....

Total Pages : 3

GSE/M-23

1480

PHYSICAL CHEMISTRY (Theory)

Paper-V-CH-105

Time : Three Hours]

[Maximum Marks : 32

**Note :** Attempt *five* questions in all. Question No. 1 is compulsory. Select *two* questions from each section.

### Compulsory Question

1. (a) Define rate of reaction. What is the significance of negative sign in rate expression?  
(b) Name the order of reaction whose unit is same as that of rate of reaction.  
(c) Why the rate of reaction is doubled for every 10 degree rise in temperature?  
(d) Define threshold energy.  
(e) What is relaxation effect ?  
(f) Why specific conductance of a solution decreases with the dilution?  
(g) Define buffer solution and buffer action.  
(h) Define transport number. (1×8=8)

### SECTION-A

2. (a) Define order of reaction. Name the methods used for the determination the order of reaction. Explain one method in detail. 4

1480/2,500/KD/409

[P.T.O.

20/6

- (b) A first order reaction is 50% completed in 80 minutes. Calculate time required to complete the reaction 60%. 2
3. (a) Derive an expression for second order kinetics when same reactants are used. 4
- (b) The half-life period of decomposition of a compound is 60 minutes. If the initial concentration is reduced to one half, the half-life period is reduced to 30 minutes. Calculate the order of reaction. 2

4. (a) What is Arrhenius equation? How can you calculate activation energy at different temperatures? 3
- (b) List the differences between molecularity and order of a reaction. 3

5. (a) Write the advantages of transition state theory over collision theory. 3
- (b) Write short note on Lindemann hypothesis of unimolecular reaction. 3

### SECTION-B

6. (a) Define the following terms :  
 (i) pH.  
 (ii) Equivalent conductance.  
 (iii) Buffer solution. 3
- (b) Discuss the effect of dilution of molar conductance of electrolytic solutions with concentration for strong and weak electrolytes. 3

7. (a) Write an expression of Debye-Hückle-Onsager equation. Write the name of the every term involved in it. 3
- (b) Discuss the limitations of Arrhenius theory of ionization. 3
8. (a) Discuss the principle and working of conductometric titration. Discuss the titration curve obtained in the titration of  
 (i) HCl *versus* NaOH.  
 (ii) CH<sub>3</sub>COOH *versus* NaOH. 4
- (b) Define solubility product of a sparingly soluble salt. From conductance measurements, the solubility of AgCl in water is calculated to be  $1.2 \times 10^{-2} \text{ gL}^{-1}$  at 20°C. What is the solubility product of the salt at this temperature? (Mol. mass of AgCl = 143.3) 2
9. (a) State Buffer Capacity. Derive Handerson-Hazel equation for acidic buffer. 3
- (b) State Kohlrausch Law. How can you calculate the molar conductance at infinite dilution of CH<sub>3</sub>COOH with the help of other salts? 3

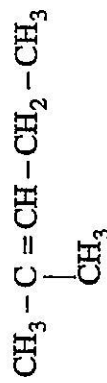
**1481****GSEM-23****ORGANIC CHEMISTRY (THEORY)**  
**Paper-VI (CH-106)**

Time : Three Hours]

[Maximum Marks : 32

**Note :** Attempt *five* questions in all, selecting *two* questions from each Section. Question no. 1 is compulsory.**Compulsory Question**

1. (a) Give IUPAC names of following compounds



- (b) Write the preparation of benzene from acetylene.
- (c) Give *two* examples each of Ring Activating and Deactivating substituents.
- (d) Give the preparation of Ethyl iodide by Finkelstein reaction. (2×4=8)

### SECTION-A

2. (a) Write the reaction and mechanism of addition of HCl to propene.
- (b) Explain in detail the rearrangement process taking place in dehydration of n-Butyl alcohol with conc.  $H_2SO_4$ . (3,3)
3. (a) More substitute alkenes are more stable. Explain by taking suitable example.
- (b) Discuss the reaction and mechanism of Ozonolysis of alkenes. (3,3)
4. (a) Write a note on aromatic, antiaromatic and non-aromatic compounds. Give *one* example each.
- (b) Give the reaction and mechanism of Halogenation of benzene. (3,3)
5. (a) Explain why  $-NO_2$  group is m-directing and deactivating in nature.
- (b) Give the reaction and mechanism of Nitration of benzene. (3,3)

### SECTION-B

6. (a) Explain the reaction and mechanism of Diel's Alder reaction.
- (b) Give *three* methods for the synthesis of alkynes. (3,3)
7. (a) Write the reactions showing oxidation of Ethyne, Propyne and But-2-yne with Hot  $KMnO_4$ .

- (b) How will you convert 2-Butyne into cis- 2-Butene and trans-2-Butene? (3,3)

8. (a) Give Benzene mechanism of Nucleophilic Aromatic Substitution in Aryl halides.
  - (b) Convert  $C_2H_5Cl$  into
    - (i)  $C_2H_5OH$ .
    - (ii)  $C_2H_5NO_2$ .
    - (iii)  $C_2H_5NC$ .
  9. (a) Discuss the mechanism and stereochemistry of  $S_N2$  reactions.
  - (b) Discuss the factors affecting  $S_N1$  reactions. (3,3)
-

GSE/M-23

1482

ENGLISH

Paper-110

(Course-117)

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt all questions as directed.

1. Read the passage given below and answer the questions that follow :

War seems now a video game, where 'victory' produces a good feeling as computer generated destruction is revealed on a video screen. The heroism, the bravery, the risk of combat—all the things which have for so long been a part of military endeavours seem no longer a part of warfare. More ominously, war seems to have become an activity without consequences.

*Questions :*

- (a) Name the chapter and the author.
- (b) How can the war now be fought ?
- (c) What used to be a part and parcel of old time wars ?
- (d) What does the author want to convey through this passage ?

OR

1482/3,700/KD/1052

[P.T.O.]

3/7

For the machines themselves and the power which the machines have given us, are not civilization but aids to civilization. As I said at the beginning, there is nothing particularly civilized in getting into a train. But you will remember that we agreed at the beginning that being civilized meant making and living beautiful things thinking freely, and living rightly and maintaining justice equally between man and man. Man has a better chance today to do things than he ever had before, he has more time, more energy, less to fear and less to fight.

*Questions :*

- (a) Name the chapter and the author.
- (b) How does the author relate machines with civilization ?
- (c) What, according to the author, is meant by being civilized ?
- (d) What should man do with the time and energy machines have saved for him ?

5

2. Explain with reference to the context :

Unfortunately, the sanction behind the caste system is the religious sanction. I say, unfortunately, because anything which has a religious sanction by virtue of it sacred and eternal. To the Hindu, caste is sacred and caste is eternal. If caste cannot vanish, what hope is there for untouchability to disappear ?

OR

1482/3,700/KD/1052

2

Nothing. Whether we operated on one patient or 500 patients, you get the same salary. But what kept me there was the fact that we had excellent research facilities. That was the compensation for the low salary.

3

3. Attempt the following questions in 30 words each :

- (a) What, according to Joad, is meant by being civilized ?

OR

What has made nonsense of national frontiers ?

- (b) What barriers does Ambedkar talk of in the Hindu society ?

OR

Give the effects of unequal ownership of property for women.

- (c) Which innovation did Narlikar introduce for autograph-seekers ?

OR

What have American forces done in Afghanistan ?

- (d) How important are order and safety to our civilization ?

OR

Why did Fred Hoyle want his mother to change his school ?

6

1482/3,700/KD/1052

3

[P.T.O.]

4. What, according to Amartya Sen, are the seven types of gender inequality ? Elaborate.

OR

How does Huck Gutman trace the growth of mechanisation in warfare ?

6

5. Translate the following passage into Hindi :

The greatest need of the whole world, not for our own country alone, is that of peace. Developing countries need it more strongly than the developed ones. They are backward in many fields. They are commonly poor and their production of the necessities of life is low. Literacy in such countries is also limited. War means destruction in a shortest time of the things produced and created during so many years. Developing countries stand to loose the most in case of war. That is why they endeavour for peace.

5

OR

(For Non-Hindi speaking students only)

Read the following passage and answer the questions given at the end :

Many of us act without thinking and when we think it is too late. This habit has ruined many homes. It has injured the feelings of many and has turned many friends into enemies. We repent a lot when we know it. But this repentance is

short-lived. We are again rash and thoughtless on later occasions. Indeed, it is very difficult to act otherwise. It demands enormous self-control and patience. This does not mean that we should develop the habit of thinking too much. In that case, we may not act at all.

Questions :

- (a) What do many of us do ?
- (b) What has ruined many people ?
- (c) Do we repent for our actions ?
- (d) What requires self-control and patience ?
- (e) What will happen if we think too much ?

OR

A strong reason for students becoming unruly is parental neglect. In olden days, children lived in joint families in which many members of the family gave them time and attention. But now in nuclear families the mothers are rushing to full time jobs. They don't have time for their children. In school, the classes are very large with 50 to 70 students. Thus, the attention of the teachers is not directed towards single student.

Questions :

- (a) Why are the students becoming unruly ?
- (b) What happened in olden days ?

- (c) What is the opposite of a 'Joint family' ?
- (d) What problems do students face in school ?
- (e) Make sentences of (i) Nuclear, (ii) Directed.

6. Make a precis of the following passage and assign a suitable heading :

We constantly hear of the evils of wealth and of the sinfulness of loving money, although it is certain that after the love of knowledge there is no one passion which has done so much good to mankind as love of money. It is to the love of money that we owe all trade and commerce : in other words, the possession of every comfort and luxury which our own country is unable to supply. Trade and other ideas have made us familiar with the productions of money, lands, have awakened curiosity, have widened our ideas by bringing us in contact with nations of various manners and thought, have supplied an outlet for energies which would otherwise have remained pent up. It has accustomed men to habits of enterprise, forethought and calculations, it has communicated to us many arts of great utility and have put us in possession of some of the most valuable remedies with which we are acquainted, either to save life or lessen pain. These things we owe to the love of money. If theologians could succeed in their desire to destroy that love, all these things would cease and we should replace into comparative barbarism.

7

7. Write a letter to the S.H.O. Mandi Road, Sonapat, complaining about bad law and order situation in your area.

OR

Write a letter to the Editor of a daily newspaper expressing your views on how the standard of sports can be improved in India.

8

**GSE/M-23**

**1485**

**DIVERSITY OF ARCHEGONIATES**

Paper-I

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all. Select *two* questions from each unit. Question No. 1 is compulsory. Draw neat and well labelled diagrams.

**Compulsory Question**

1. Answer the following :

- (a) Describe the phenomenon of Alternation of Generation?
- (b) What is the characteristic feature of FUNARIA rhizoids?
- (c) Rhynia belongs to which period on geological time scale ?
- (d) Define the term PROTHALLUS.
- (e) Differentiate between Indusium and Pseudindusium.
- (f) What is PROTONEMA ?
- (g) What is the function of Peristome Teeth ?
- (h) Which plant is called 'Spike Moss'? (8x1=8)

**UNIT-I**

2. Describe important characters of Bryophyta. Show its affinities with Pteridophyta. (8)

3. Explain the following :

- (i) Morphology of Marchantia Thallus. (4)
  - (ii) Internal structure of Anthoceros Thallus with suitable diagram. (4)
4. Give the illustrated account of the sporophyte of FUNARIA with suitable diagram. (8)
5. (i) Give a concise account of life history of Anthoceros. (3)
- (ii) Write a short note on Antheridial head in Funaria. (3)
  - (iii) Write a short note on vegetative reproduction in Funaria. (2)

#### **UNIT-II**

6. (i) Describe Alternation of Generation in Pteridophytes. (3)
- (ii) Describe external morphological features of Selaginella. (5)
7. (i) Discuss the structure of sporangium in Rhynia and compare it with that of Pteris (5)
- (ii) Describe the structure of Strobilus of Selaginella. (3)
8. Explain the internal structure of node of Equisetum with well labelled diagram. (8)
9. What is a Strobilus? Give a detailed account of the megasporangium and Female gametophyte in Selaginella. (8)

GSE/M-23  
GENETICS  
Paper-II

**1486**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all. Select *two* questions from each unit. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) What are the functions of enhancers and insulators?  
(b) How do base analogues induce mutations?  
(c) What is the function of satellite DNA?  
(d) How is telomerase used to replicate telomeres? (4×2=8)

**UNIT-I**

2. (a) Explain the importance of DNA-protein interactions giving a suitable example.  
(b) Discuss the mechanism of gene interaction. (2×4=8)
3. (a) Give a brief account of linkage.  
(b) Discuss the characteristics of the genetic code. (2×4=8)
4. (a) Describe the components of prokaryotic DNA replication machinery.

1486/1200/KD/541

**316** [P.T.O.  
28/6

- (b) What are histones? Discuss their assembly into nucleosomes. (2×4=8)

5. Write on the following :

- (a) Unique *vs* repetitive DNA.  
(b) Types and functions of topoisomerases. (2×4=8)

#### UNIT-II

6. (a) How does a gene promoter structure differ in prokaryotes and eukaryotes? .  
(b) Write a note of cpDNA. (2×4=8)

7. (a) Describe the regulation of lac operon by positive control.  
(b) Briefly explain jumping genes in eukaryotes. (2×4=8)

8. (a) Give an account of transcription termination in prokaryotes.  
(b) Explain the steps involved in the initiation of protein translation in eukaryotes. (2×4=8)

9. Describe the regulation of gene expression in prokaryotes. (8)
-

Roll No. ....

Total Pages : 2

**1487**

**GSE/M-23**

**ZOOLOGY**

(Life and Diversity of Annelida to Arthropoda and Genetics-I)  
Paper-I

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all, selecting *two* questions each from Section-A and Section-B. Question No. 1 is compulsory. Illustrate your answer with suitable diagram(s) wherever necessary.

### Compulsory Question

1. Give brief account of the following in about 20 words each :

- (a) Worm castings.
- (b) Spermathecae.
- (c) Trachea.
- (d) Malpighian tubule.
- (e) Sclerites.
- (f) Sex limited genes.
- (g) Test cross.
- (h) Genotype.
- (i) Epistasis.
- (j) Codominance.

10×1=10

1487/1250/KD/947

 [P.T.O.]  
5/6

### SECTION-A

2. Give an account of habitat, habits and external morphology of earthworm. 7.5
3. Give a brief note on the following :
  - (a) Structure of Septal nephridia. 4
  - (b) Metamerism in Annelida. 3.5
4. Write short notes on the following :
  - (a) Ommatidium of Grasshopper. 4
  - (b) General characters of Phylum Arthropoda. 3.5
5. Give an account of the digestive system of Grasshopper. 7.5

### SECTION-B

6. State and explain Mendel's law of Independent assortment with a suitable example. 7.5
7. Discuss the sex linked inheritance by taking the example of haemophilia in man. 7.5
8. Describe the various mechanisms of sex determination in animals. 7.5
9. (a) Mechanism of crossing over. 4  
(b) Chromosomal mapping. 3.5

## GSQ/M-23

LIFE AND DIVERSITY OF MOOLLUSCA  
TO HEMICHORDATA & GENETICS-II  
Paper-II

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all. Q No. 1 is compulsory and Answer to each part should not exceed 20 words. Attempt *two* questions from Section A and *two* questions from Section B. Draw well labelled diagrams wherever they are required.

**Compulsory Question**

1. (a) What is radula?  
(b) What are the organs of Bojanus?  
(c) What is Aristotle's lantern?  
(d) Tornoria larva of *Balanoglossus* resembles which larva of Echinodermata and how?  
(e) What is pentamerous radial symmetry?  
(f) What are the causes of Turner's syndrome?  
(g) What is erythroblastosis foetalis?  
(h) What is the cause of alkaptonuria?  
(i) What are palindromes?  
(j) Name the three stop codons? (1×10=10)

1488/1250/KD/526

197 P.T.O.  
9/6

### SECTION-A

2. Draw a neat and well labelled diagram of :

- (a) Digestive system of *Pila*.
- (b) Water vascular system of *Asterias*. (4+3.5=7.5)

3. (a) Explain the nervous system of *Pila*.

- (b) Explain the adaptations of *Pila* for amphibious mode of life. (4+3.5=7.5)

4. Define the external features of *Balanoglossus* with suitable diagrams. (7.5)

5. Write notes on the following :

- (a) Tube feet.
- (b) Stone canal.
- (c) Regeneration in *Asterias*. (2.5+2.5+2.5=7.5)

### SECTION-B

6. Write notes on the following :

- (a) Eugenics.
- (b) Monozygotic twins.
- (c) Hershey-Chase Experiment. (2.5+2.5+2.5=7.5)

7. Explain the details of human karyotype. (7.5)

8. Write note on the following :

- (a) Down's Syndrome.
- (b) Mitochondrial DNA. (4+3.5=7.5)

9. Define :

- (a) Reverse Transcription.
- (b) Wobble Hypothesis.
- (c) Transcription unit. (2.5+2.5+2.5=7.5)

GSEM-23

1491

ELECTRONIC DEVICES AND CIRCUITS-II (THEORY)  
Paper-I

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all by selecting *one* question from each unit. Question number one is compulsory.

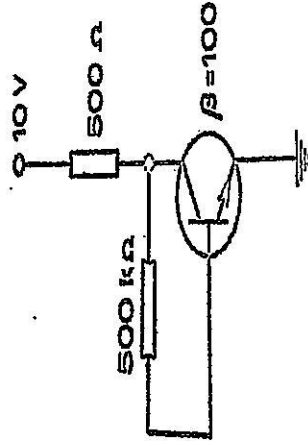
**Compulsory Question**

1. (a) Discuss the need of biasing circuit. (2)
- (b) State the advantages and disadvantages of a transformer coupled amplifier. (2)
- (c) Why one prefer to express gain on logarithmic scale rather than on a linear scale? (2)
- (d) What do you mean by inversion layer in Enhancement type MOSFET? (2)

**UNIT-I**

2. (a) On what factors does the selection of operating point depends. (2)
- (b) What do you understand by transistor biasing? Why it is needed? (2)
- (b) What are the requirements of a biasing circuit? (2)

3. (a) Explain collector to base biasing circuit in detail. Why it is not used. (5)
- (b) Find emitter current and collector voltage in the following circuit. (3)



#### UNIT-II

4. (a) Explain the bias circuit with emitter resistor. Why it is not preferred. (5)
- (b) Explain gain of a multi stage amplifier in detail. (3)
5. (a) Explain voltage divider Biasing circuit. What it is widely used. (6)
- (b) What is the drawback of an emitter feedback bias circuit? (2)

#### UNIT-III

6. (a) Explain the reasons of fall of gain in frequency response curve of R-C coupled amplifier in the low frequency region. (5)
- (b) Explain transformer coupled scheme of coupling. (3)

7. (a) Explain the reasons of fall of gain in frequency response curve of R-C coupled amplifier in the high frequency region. (5)
- (b) Explain direct coupling scheme. What precautions should be exercised in this type of coupling? (3)

#### UNIT-IV

8. (a) Explain the construction and working of JFET. (4)
- (b) Draw and explain CS & CD low frequency model of MOSFET. (4)
9. (a) Explain N-channel MOSFET in depletion mode. (2)
- (b) Draw the circuit of common source (CS) FET amplifier. Derive the expression for the voltage gain. What is the maximum value of  $A_v$ ? (6)

Roll No. ....

Total Pages : 2

GSE/M-23

1494

LOGICAL ORGANIZATION OF COMPUTERS

Paper-II

Time : Three Hours] [Maximum Marks : {B.Sc. 40  
B.A.-25

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. I is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) Evaluate  $(537)_8 = (?)_{16}$ . (2)
- (b) Draw the Venn Diagram for X OR (Y AND Z). (1)
- (c) Define a Half-Adder. (1)
- (d) What do you mean by Sequential Circuit? (1)

**UNIT-I**

2. Using 6-bit notation & 2's complement method perform the following in binary :
  - (a)  $-(25)_{10} + (18)_{10}$ . (2.5)
  - (b)  $-(12)_{10} - (19)_{10}$ . (2.5)
3. Explain Hamming Code for Error Correction. (5)

1494/2000/KD/194

[P.T.O.  
22/6

## UNIT-II

4. Prove the Boolean Algebra Theorem

(a)  $x + (\bar{x} \cdot y) = x + y$ . (3)

(b) What do you mean by the Duality Principle? (2)

5. Convert the following into its equivalent Canonical form :

(a)  $\bar{A} \cdot B + A \cdot \bar{B} \cdot C + B \cdot \bar{C}$  (2.5)

(b)  $(A + \bar{B}) \cdot (\bar{B} + C) \cdot (A + C)$  (2.5)

## UNIT-III

6. Discuss :

(a) NAND Gate. (2.5)

(b) Exclusive OR (XOR) Gate. (2.5)

7. Define & Design a Full Subtractor. (1,4)

## UNIT-IV

8. Explain SR Flip-Flop. (5)

9. Define & Design a MOD-7 counter. (1,4)

---

Roll No. ....

Total Pages : 03

**GSE/M-23 1816**

**HUMAN PHYSIOLOGY**  
**Course-111**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *two* questions from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.  
प्रत्येक इकाई से दो प्रश्न चुनते हुए, कुल पाँच प्रश्नों के उत्तर दीजिए । प्रश्न संख्या 1 अनिवार्य है । सभी प्रश्नों के अंक समान हैं ।

**Compulsory Question (अनिवार्य प्रश्न)**

1. Write short notes on the following : 4×2=8

- (a) Mitochondria
- (b) Joints
- (c) Menstrual cycle
- (d) Role of HCl in digestion.

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

- (अ) माइटोकॉण्ड्रिया
- (ब) सन्धियाँ
- (स) मासिक धर्म चक्र
- (द) पाचन में हाइड्रोक्लोरिक अम्ल की भूमिका ।

(5-29/4) L-1816

P.T.O.

### Unit I (इकाई I)

2. Explain the process of mitosis with the help of suitable diagrams. 8  
समसूत्रण की प्रक्रिया को उपयुक्त चित्रों की सहायता से समझाइए ।
3. What is the role of skeleton system in our body ? Discuss various types of bones. 8  
हमारे शरीर में कंकाल प्रणाली की क्या भूमिका है ? विभिन्न प्रकार की अस्थियों की चर्चा कीजिए ।
4. Discuss the structure of human heart with the help of a suitable diagram. Elaborate the cardiac cycle. 8  
उपयुक्त चित्र की सहायता से मानव हृदय की संरचना की विवेचना कीजिए । हृदय चक्र को विस्तृत कीजिए ।

5. Discuss the following : 2×4=8

- (a) Assimilation in Large Intestine
- (b) Role of Mouth and Buccal Cavity in Digestion.

निम्नलिखित पर चर्चा कीजिए :

- (अ) बड़ी आंत में आत्मसात्करण (एसिमिलेशन)
- (ब) पाचन में मुँह और बुक्कल गुहा की भूमिका ।

### Unit II (इकाई II)

6. Describe the structure and functions of brain. 8  
मस्तिष्क की संरचना एवं कार्यों का वर्णन कीजिए ।

L-1816

2

7. Explain the structure and functioning of kidney with the help of suitable diagram. 8  
उपयुक्त चित्र की सहायता से वृक्क की संरचना एवं कार्यप्रणाली की व्याख्या कीजिए ।
8. Define Respiration. What is the mechanism behind exchange of gases in human body ? Explain with the help of a suitable diagram. 8  
श्वसन को परिभाषित कीजिए । मानव शरीर में गैसों के आदान-प्रदान का तंत्र क्या है ? उपयुक्त आरेख की सहायता से समझाइए ।
9. Write in detail about Internal Reproductive Organs of male. 8  
पुरुष के आन्तरिक जनन अंगों के बारे में विस्तार से लिखिए ।

(5-29/5) L-1816

3

200.

Roll No. ....

Total Pages : 03

GSE/M-23 1817

PRENATAL AND INFANT GROWTH AND  
CARE  
Course-112

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *two* questions from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

प्रत्येक इकाई से दो प्रश्न चुनते हुए, कुल पाँच प्रश्नों के उत्तर दीजिए । प्रश्न संख्या 1 अनिवार्य है । सभी प्रश्नों के अंक समान हैं ।

**Compulsory Question ( अनिवार्य प्रश्न )**

1. Write short notes on the following : 2×4=8

- (a) Bottle Feeding
- (b) Toxemia in Pregnancy
- (c) Conception
- (d) Vaccination Schedule of Infants.

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

(अ) बोतल से दूध पिलाना

(ब) गर्भावस्था में विषाक्तता

(3-52/1) L-1817

P.T.O.

(स) गर्भाधान

(द) शिशुओं की टीकाकरण अनुसूची ।

### Unit I (इकाई I)

2: What is prenatal development ? Elaborate the factors affecting it. 8

प्रसवपूर्व विकास क्या है ? इसे प्रभावित करने वाले कारकों की विवेचना कीजिए ।

3. Give a detailed account of the discomforts and complications associated with pregnancy. 8

गर्भावस्था से जुड़ी असुविधाओं और जटिलताओं का विस्तृत विवरण दीजिए ।

4: Explain the birth process along with detailed comments on various stages of delivery. 8

प्रसव के विभिन्न चरणों पर विस्तृत टिप्पणियों के साथ जन्म प्रक्रिया की व्याख्या कीजिए ।

5. What do you mean by breech position ? Differentiate between normal and C-section birth processes. 8

ब्रीच स्थिति से आप क्या समझते हैं ? सामान्य और सी-सेक्शन जन्म प्रक्रियाओं के बीच अंतर कीजिए ।

### Unit II (इकाई II)

6. Comment on the sensory capacities of a new born. 8  
नवजात शिशु की संवेदी क्षमताओं पर टिप्पणी कीजिए ।

7. Discuss the physical and motor development milestones of infancy. 8

शैशवावस्था के शारीरिक और गत्यात्मक विकास के पड़ावों की चर्चा कीजिए ।

8. Define Weaning. What is its need and discuss the points to ponder upon for weaning ? 8

स्तन्याविमोचन को परिभाषित कीजिए । इसकी क्या जरूरत है और स्तन्याविमोचन के लिए किन बातों पर विचार करना चाहिए ?

9. Give a detailed account of common diseases prevalent among infants. 8

शिशुओं में होने वाले सामान्य रोगों का विस्तृत विवरण दीजिए ।

Roll No. ....

Total Pages : 03

**GSE/M-23**

**1818**

**LAUNDRY SCIENCE AND FINISHING OF  
FABRICS  
Course-113**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *two* questions from each Unit. Q. No. 9 is compulsory. All questions carry equal marks.

प्रत्येक इकाई से दो प्रश्न चुनते हुए, कुल पाँच प्रश्नों के उत्तर दीजिए । प्रश्न संख्या 9 अनिवार्य है । सभी प्रश्नों के अंक समान हैं ।

**Unit I (इकाई I)**

1. Classify the Laundry equipments in detail.  
धुलाई के उपकरणों का विस्तार से वर्गीकरण कीजिए ।
2. Describe the Laundry process in detail.  
कपड़े धोने की प्रक्रिया का विस्तार से वर्णन कीजिए ।
3. What is Detergents ? Describe different Laundry reagents.  
डिटर्जेंट क्या है ? विभिन्न लॉण्डी अभिकर्मकों का वर्णन कीजिए ।

(5-37/5) L-1818

P.T.O.

4. What do you understand by stiffening agents ? Discuss the types of grease absorbents and solvents.  
सख्त करने वाले एजेंटों से आप क्या समझते हैं ? ग्रीस अवशोषक और सॉल्वेंट्स के प्रकारों पर चर्चा कीजिए ।

### Unit II (इकाई II)

5. Classify the different types of stains. How to remove the stains from cotton clothes-Blood, ink, rust, nail polish ?  
विभिन्न प्रकार के दागों का वर्गीकरण कीजिए । सूती कपड़े-रक्त, स्याही, जंग व नेल पॉलिश से दाग कैसे हटाएँ ?
6. Write in detail about the care and storage of cotton clothes.  
सूती वस्त्रों की देखभाल व भंडारण के बारे में विस्तार से बताइए ।
7. What is the importance of finishing process ? Explain mercerizing and calendaring.  
परिष्करण प्रक्रिया का क्या महत्त्व है ? मर्सरीकृत और कैलेण्डरिंग को समझाइए ।
8. What do you understand by special purpose finishes ?  
Explain any two in detail.  
विशेष प्रयोजन परिष्कार से आप क्या समझते हैं ? किन्हीं दो को विस्तार से समझाइए ।

### Compulsory Question ( अनिवार्य प्रश्न )

9. Write short notes on the following :  
(i) Bleaching  
(ii) Cold method of soap manufacturing

- (iii) Tentering  
(iv) Waterproof Finish.  
निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :  
(i) ब्लीचिंग  
(ii) साबुन बनाने की ठंडी विधि  
(iii) टेंटरिंग  
(iv) वाटर प्रूफ फिनिश ।

Roll No. ....

Total Pages : 03

**GSE/M-23 1819**

**INTRODUCTORY HOME MANAGEMENT**  
**Course 114**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *two* questions from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

प्रत्येक इकाई से दो प्रश्न चुनते हुए, कुल पाँच प्रश्नों के उत्तर दीजिए । प्रश्न संख्या 1 अनिवार्य है । सभी प्रश्नों के अंक समान हैं ।

**Compulsory Question ( अनिवार्य प्रश्न )**

1. Write short notes on the following : 2×4=8

- (a) Standards
- (b) Types of Goals
- (c) Evaluation
- (d) Managerial Skills

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

- (अ) मानकों
- (ब) लक्ष्यों के प्रकार
- (स) मूल्यांकन
- (द) प्रबंधकीय कौशल ।

(2-34/12)L-1819

P.T.O.

## Unit I (इकाई I)

2. Define home management. What are its objectives and significance in daily life ? 8  
गृह प्रबंधन को परिभाषित कीजिए । दैनिक जीवन में इसके उद्देश्यों और महत्व क्या हैं ?
3. Write a detailed account of the various steps involved in the process of management. 8  
प्रबंधन की प्रक्रिया में शामिल विभिन्न चरणों का विस्तृत विवरण लिखिए ।
4. What are the responsibilities of a good home-maker ? 8  
एक अच्छी गृहिणी के क्या उत्तरदायित्व हैं ?
5. What do you mean by family life cycle ? Write down its different stages. 8  
पारिवारिक जीवन-चक्र से आप क्या समझते हैं ? इसके विभिन्न चरणों को लिखिए ।

## Unit II (इकाई II)

6. What do you mean by decision-making ? Explain its process. Write down different types of decisions. 8  
निर्णय लेने से आपका क्या तात्पर्य है ? इसकी प्रक्रिया को समझाइए । निर्णय के विभिन्न प्रकार लिखिए ।

7. Define Values. Explain their classification and significance in life. 8  
मूल्यों को परिभाषित कीजिए । उनके वर्गीकरण और जीवन में महत्व की व्याख्या कीजिए ।
8. What are different types of goals and their characteristics ? 8  
विभिन्न प्रकार के लक्ष्य और उनकी विशेषताएँ क्या हैं ?
9. Define Resources. Classify them and explain their common characteristics. 8  
संसाधनों को परिभाषित कीजिए । उनका वर्गीकरण कीजिए और उनके सामान्य लक्षणों की व्याख्या कीजिए ।

Roll No. ....

Total Pages : 02

**GSE/M-23      1820**

**BASIC NUTRITION**  
**Course-115**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *two* questions from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

1. Answer the following in 2-3 lines :      1×8=8

- (a) Role of fibre in constipation
- (b) Blanching
- (c) Balanced Diet
- (d) Name of Water-soluble Vitamins
- (e) Full form of RDA
- (f) Undernutrition
- (g) Vitamin.....is responsible in coagulation of blood.
- (h) Supplementation.

**Unit I**

- 2. Describe the types, functions and sources of fibre.      8
- 3. Give a detailed description on 'Importance of Water from Nutritional point of view'.      8

4. Explain importance of protein with its functions and sources. 8
5. Discuss various functions of Fat. What are the effects of its deficiency and excess in human body ? 8

### Unit II

6. Give a detailed description on the following : 4×2=8  
 (a) Folic Acid  
 (b) Vitamin C.
7. Explain functions of Calcium with its sources, effects of deficiency and excess in children. 8
8. Why is sodium essential for human body ? Discuss in detail. 8
9. Discuss any *two* Micro Minerals in brief. 8

Roll No. ....

Total Pages : 03

GSE/M-23

1821

## NUTRITIONAL BIOCHEMISTRY

Course-116

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all. Question No. 1 is compulsory. Attempt any *two* questions from each Unit.

All questions carry equal marks.

1. (a) Define and differentiate between macro- and micronutrients.
- (b) Explain the biological role of Vitamin D.
- (c) Discuss the importance of potassium in human nutrition.
- (d) Define "cofactor" and "coenzyme" in the context of enzyme activity. 2×4=8

### Unit I

2. (a) Describe the classification and general properties of carbohydrates. 4
- (b) Discuss the process of digestion and absorption, of lipids. 4

(3-65/5) L-1821

P.T.O.

3. Draw the structures of the following : 2×4=8
- (a) Galactose
  - (b) Sucrose
  - (c) Starch
  - (d) Lactose.
4. (a) Define and explain significance of iodine number and saponification value of fats. 4
- (b) Discuss the factors affecting the bioavailability and utilization of proteins. 4
5. (a) What are essential amino acids ? Give examples. 4
- (b) Differentiate between reducing and non-reducing sugars. Give examples. 4

## Unit II

6. (a) Describe the structure and physiological importance of Vitamin A, and their impact on human health. 4
- (b) Explain the biological roles of Vitamins B1, and its significance in human nutrition. 4
7. Discuss the physiological importance and biochemical functions of iron and phosphorus. 8

8. (a) Classify enzymes based on the reactions catalysed by the enzymes. 4
- (b) Write a note on the chemical nature and and importance of enzymes in biological systems. 4
9. Describe the factors affecting enzyme activity. Explain the effect of changing substrate concentration and temperature on enzyme activity. 8

#### UNIT-IV

8. Define a combinational circuit. What is a Full Adder? Make its truth table and implement the full adder circuit using NAND gates only. (8)

9. Define a digital comparator. Make the truth table for a 2-bit digital comparator and implement its circuit using logical gates. (8)

Roll No. ....

Total Pages : 4

1492

GSE/M-23

DIGITAL ELECTRONICS-I (THEORY)

Paper-II

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *five* questions in all, selecting *one* question from each unit. Question No. 1 is compulsory. All questions carry equal 8 marks.

#### Compulsory Question

1. (a) Represent 7 and  $-7$  in binary number system.
- (b) What is an Exclusive-OR gate? Make its truth table.
- (c) Why CMOS family is preferred over TTL logic family?
- (d) Implement full adder circuit using half adder.

(2×4=8)

#### UNIT-I

2. (a) Determine the values of P, Q, R and S :

(i)  $(110101)_2 = (P)_{10}$

(ii)  $(1010.101)_2 = (Q)_{10}$

(iii)  $(255)_{10} = (R)_2$

(iv)  $(26.25)_{10} = (S)_2$

(4)

- (b) Convert the following decimal numbers into OCTAL system numbers and then from OCTAL system number into binary system numbers :

- (i) 375.  
(ii) 249. (4)

3. (a) Convert the following binary numbers into OCTAL system numbers and then from OCTAL system number into decimal system numbers :

- (i) 11011100.  
(ii) 01010011.010101. (4)

- (b) Convert the following decimal numbers into BCD codes :

- (i) 76.  
(ii) 327.67. (2)

- (c) What do you understand by weighted and non-weighted codes? Give *one* example of each. (2)

### UNIT-II

4. (a) Design a 2-input AND gate using PN-Diodes. Make its equivalent symbol and explain its working with the help of its truth table. (4)

- (b) Prove the following Boolean Identities :

- (i)  $A + BC = (A + B)(A + C)$ .  
(ii)  $AB + A'C + BC = AB + A'C$ .

Note : A' represents complement of A. (4)

5. (a) What is a K-Map? Minimize the given Boolean expression using K-Map and implement the minimized function using NAND gates only.

$$F(A, B, C, D) = \Sigma(0, 1, 3, 5, 8, 12) + \phi(2, 11).$$

- (b) NAND gate is known as universal gate. Why? (2)  
(6)

### UNIT-III

6. (a) What is a TTL logic? Explain the working of TTL logic with the help of circuit diagram. What are its merits and de-merits? (5)

- (b) Define  $V_{OL}$  and  $V_{OH}$  with the help of voltage level diagram for a logic family. (3)

7. (a) Define the following terms for a logic family :

(i) Fan-in.

(ii) Fan-out.

(iii) Figure of Merit.

(iv) Power Dissipation.

(v) Propagation Delay. (5)

- (b) What are Saturated and Non-Saturated logic families? Explain in brief detail with examples and their respective advantage and disadvantages. (3)

**GSE/M-23**  
**PROGRAMMING IN C**  
Paper-I

**1493**

Time : Three Hours]

[Maximum Marks : B.Sc. : 40  
B.A. : 25

**Note :** Attempt *five* questions in all selecting *one* question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) Differentiate between Break and Continue statement.  
(b) Define string. Explain its syntax and use by giving example.  
(c) Define Recursion by giving suitable example.  
(d) Explain Switch statement by giving example.

**UNIT-I**

2. (a) What is variable? How variables are declared? Also describe lifetime and scope of a variable.  
(b) Define Conditional operator with example.
3. What is data type? Explain various data types in C and also give memory requirement of each.

## **UNIT-II**

4. Explain the use of Bitwise and Unary operators by giving suitable examples.
5. (a) Explain ELSE-IF ladder by giving example.  
(b) Write a Program in C to find largest among four numbers.

## **UNIT-III**

6. What is a Function Prototype? Explain how parameters are passed between functions.
7. (a) Differentiate between while and do-while loop?  
(b) Write a Program in C to find HCF and LCM of two numbers.

## **UNIT-IV**

8. What is an array? Explain various types of arrays with example.
  9. (a) What is Register Variable? What is the scope of a register variable?  
(b) Differentiate between Structure and Union.
-

GSE/M-23

1494

## LOGICAL ORGANIZATION OF COMPUTERS

Paper-II

Time : Three Hours] [Maximum Marks :  $\begin{cases} \text{B.Sc. 40} \\ \text{B.A.-25} \end{cases}$

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. I is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) Evaluate  $(537)_8 = (?)_{16}$ . (2)
- (b) Draw the Venn Diagram for X OR (Y AND Z). (1)
- (c) Define a Half-Adder. (1)
- (d) What do you mean by Sequential Circuit? (1)

**UNIT-I**

2. Using 6-bit notation & 2's complement method perform the following in binary :
  - (a)  $-(25)_{10} + (18)_{10}$ . (2.5)
  - (b)  $-(12)_{10} - (19)_{10}$ . (2.5)
3. Explain Hamming Code for Error Correction. (5)

## UNIT-II

4. Prove the Boolean Algebra Theorem  
(a)  $x + (\bar{x} \cdot y) = x + y$ . (3)  
(b) What do you mean by the Duality Principle? (2)
5. Convert the following into its equivalent Canonical form :  
(a)  $\bar{A} \cdot B + A \cdot \bar{B} \cdot C + B \cdot \bar{C}$  (2.5)  
(b)  $(A + \bar{B}) \cdot (\bar{B} + C) \cdot (A + C)$  (2.5)

## UNIT-III

6. Discuss :  
(a) NAND Gate. (2.5)  
(b) Exclusive OR (XOR) Gate. (2.5)
7. Define & Design a Full Subtractor. (1,4)

## UNIT-IV

8. Explain SR Flip-Flop. (5)
  9. Define & Design a MOD-7 counter. (1,4)
-

# Unit IV

8. (a) Given :

|        |   |   |    |    |     |     |     |     |
|--------|---|---|----|----|-----|-----|-----|-----|
| $x$    | 1 | 2 | 3  | 4  | 5   | 6   | 7   | 8   |
| $f(x)$ | 1 | 8 | 27 | 64 | 125 | 216 | 343 | 512 |

Find the value of  $f(7.5)$  using interpolation method.

4

(b) Find  $f(x)$  as a polynomial in powers of  $(x - 5)$ , provided :

|        |   |    |    |     |     |     |
|--------|---|----|----|-----|-----|-----|
| $x$    | 0 | 2  | 3  | 4   | 7   | 9   |
| $f(x)$ | 4 | 26 | 58 | 112 | 466 | 922 |

9. (a) Apply Lagrange's formula to find  $u_5$  and  $u_6$  given that  $u_1 = 2$ ,  $u_2 = 4$ ,  $u_3 = 8$ ,  $u_4 = 16$ , and  $u_7 = 128$ .

4

(b) (i) Prove that  $y_4 = y_3 + \Delta y_2 + \Delta^2 y_1 + \Delta^3 y_1$ .

2

(ii) Evaluate  $\left(\frac{\Delta^2}{E}\right)x^3$ , interval of differencing being unity.

2

L-26504

4

150

Roll No. ....

Total Pages : 04

BSIT/M-23

26504

## MATHEMATICAL FOUNDATION OF INFORMATION TECHNOLOGY-II

BSIT-202

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt Five questions in all, selecting one question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

### (Compulsory Question)

1. (a) Can a system  $AX = B$ , where  $B$  is a zero matrix, of linear equations be inconsistent ? Justify. 2
- (b) Show that equation  $x^3 - 7x + 30 = 0$  has at least one negative root and find the interval in which it lies. 2
- (c) State Newton-Gregory formula for backward interpolation. 2
- (d) Apply Euler's method to solve  $\frac{dy}{dx} = x + y$ ,  $y(0) = 0$ , choosing the step length  $= 0.2$ , find  $y(0.4)$ . 2

(5-37/3) L-26504

P.T.O.

### Unit I

2. (a) Find a real positive root of the equation  $x^3 - x - 1 = 0$  by bisection method correct up to three places of decimal. 4
- (b) Show that the iterative formula for finding the reciprocal of  $m$  is  $x_{i+1} = x_i(2 - mx_i)$  and hence find the value of  $\frac{1}{31}$ . 4
3. (a) Define order of convergence of an iterative method. 2
- (b) Find order of convergence of Regula-Falsi method. 6

### Unit II

4. (a) Solve the following equations by Gauss-Jordan method :
 

$4x + y + 3z = 11,$   
 $3x + 4y + 2z = 11,$   
 $2x + 3y + 2z = 7.$

 4
- (b) Solve the following equations by Gauss elimination method :
 

$2x + y + 4z = 12,$   
 $4x + 11y - z = 33,$   
 $8x - 3y + 2z = 20.$

 4

5. Using triangularization method, solve the equations :

$$x_1 + x_2 + 2x_3 = 1,$$

$$2x_1 + x_2 + 3x_3 = 1,$$

$$3x_1 - 2x_2 + 4x_3 = -1.$$

8

### Unit III

6. (a) Using Euler's method, solve for  $y$  at  $x = 0.1$  from  $\frac{dy}{dx} = x + y + xy$ ,  $y(0) = 1$ , taking step size  $h = 0.025$ . 4
- (b) Solve the following equations by Gauss-Seidel method :
 

$10x + y + z = 6,$   
 $x + 10y + z = 6,$   
 $x + y + 10z = 6.$

 4
7. (a) Solve  $y = y^2 + x$ ,  $y(0) = 1$  using Taylor series method and compute  $y(0.1)$  and  $y(0.2)$ . 4
- (b) Given :

$$\frac{dy}{dx} = 1 + y^2,$$

where  $y(0) = 0$ ,  $y(0.2) = 0.2027$ ,

$$y(0.4) = 0.4228$$

and  $y(0.6) = 0.6841$ .

Using Milne-Simpson's method compute  $y(0.8)$ . 4

Roll No. ....

Total Pages : 03

**BSIT/M-23 26505**

**APPLICATIONS OF EM WAVE**

**BSIT-203**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. (a) Prove that the characteristic impedance of electromagnetic wave in free space is 377 ohm. 2  
(b) Explain the meaning of the term resonant antenna. 2  
(c) What is dipole array ? 2  
(d) What is elevation angle for a satellite ? 2

**Unit I**

2. (a) How the propagation of electromagnetic wave is affected by environment ? 4  
(b) Discuss refraction of electromagnetic waves and derive Snell's law. 4

(5-35/10)L-26505

P.T.O.

3. (a) Describe ground-wave propagation. What is the angle of tilt ? How does it affect field strength at a distance from the transmitter ? 6
- (b) What is Tropospheric Scatter Propagation ? 2

## Unit II

4. (a) Define the radiation resistance of an antenna. What is the significance of this quantity ? 4
- (b) Discuss bandwidth, as applied to the *two* major parameters of an antenna. 4
5. Draw the circuits of two typical antenna couplers and briefly explain their operation. What extra requirements are there when coupling to parallel-wire transmission lines ? 8

## Unit III

6. (a) What are the general considerations for network coupling of antenna ? 4
- (b) Discuss in details voltage and current feed and feed point impedance. 4
7. What is Antenna Coupler ? Discuss direct coupler and  $\pi$ -coupler with neat and clean diagram. 8

L-26505

2

(5-35/11)L-26505

3

150

## Unit IV

8. Explain Kepler's law of planetary motion in detail. 8
9. What do you mean by remote sensing through satellite ? Discuss its applications. 8

Roll No. ....

Total Pages : 03

**BSIT/M-23**

**26507**

**ELECTRONIC COMMUNICATION-II**

**BSIT-205**

Time : Three Hours]

[Maximum Marks : 40

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

**Compulsory Question**

1. (a) Define FSK and draw its conceptual view. 2  
(b) What is forward acting error correction method ? 2  
(c) Define Binary Cyclic codes. 2  
(d) What do you mean by discrete message ? 2

**Unit I**

2. (a) Describe the generation of ASK signal. How is the ASK signal detected ? 6  
(b) What are the differences between analog and digital modulation techniques ? 2
3. Explain the phase shift keying (PSK) and differential phase shift keying (DPSK) in detail. What are the differences between them ? 8

(2-05/12)L-26507

P.T.O.

## Unit II

4. (a) What are the error control strategies in a communication system ? Explain. 4
- (b) What are the transmission errors in a digital communication system ? 4

5. (a) Consider a (7, 4) Linear code whose generation matrix is :

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & : & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & : & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & : & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & : & 0 & 1 & 1 \end{bmatrix}$$

Find :

- (i) The code word that begin with (1110),
- (ii) Parity check matrix for this code.
- (iii) Minimum weight of this code. 6
- (b) Define Hamming weight and distance of a code vector. 2

## Unit III

6. (a) Explain the Algebraic structure of cyclic codes in detail. 4
- (b) The generator polynomial of a (7, 4) cyclic code is  $g(x) = 1 + x + x^3$ . Find the code word of the 1010 by using the systematic form. 4

7. (a) Design an encoder for the (7, 4) binary cyclic code generated by  $1 + x + x^3$  and verify its operation using the message vector (0101). 4
- (b) Explain and draw the  $(n-k)$  syndrome calculation for the  $(n, k)$  cyclic code. 4

## Unit IV

8. Discuss the Shanon-fano coding and apply it with the following messages ensemble : 8

$$[X] = [X_1 \ X_2 \ X_3 \ X_4 \ X_5 \ X_6 \ X_7 \ X_8]$$

$$[P] = [1/4 \ 1/8 \ 1/16 \ 1/16 \ 1/16 \ 1/4 \ 1/16 \ 1/8]$$

Take  $M = 2$ .

9. (a) Derive the relation between different Entropies. 4
- (b) Define the terms channel capacity and information rate. 4