

Roll No.

Total Pages : 03

NGSE/D-25 101

ANIMAL DIVERSITY OF NON-CHORDATES
B-23-ZOO-101

Time : Three Hours]

[Maximum Marks : 50

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

1. Define the following : 10×1=10

- (i) Gamogony
- (ii) Metamerism
- (iii) Incubation period
- (iv) Parts of leg of Periplaneta
- (v) Statocyst
- (vi) Pedicellareae
- (vii) Laurer's canal
- (viii) Ospiridium
- (ix) Setae
- (x) Madreporite.

Unit IV

- | | | | |
|----|-----|---|---|
| 8. | (a) | Explain digestive system of <i>Pila</i> . | 6 |
| | (b) | Draw Pallial complex of <i>Pila</i> . | 4 |
| 9. | (a) | Explain Water vascular system in <i>Asterias</i> . | 6 |
| | (b) | Draw Haemal and perihæmal system in <i>Asterias</i> . | 4 |



Unit I

- | | | | |
|----|-----|--|---|
| 2. | (a) | Explain life-cycle of <i>Plasmodium</i> . | 7 |
| | (b) | Explain formation of Spicules in <i>Scypha</i> . | 3 |
| 3. | (a) | Explain Canal system in <i>Scypha</i> . | 6 |
| | (b) | Give characteristics of three classes of Porifera. | 4 |

Unit II

- | | | | |
|----|-----|---|---|
| 4. | (a) | Explain reproductive system of <i>Fasciola</i> . | 6 |
| | (b) | Explain Cnidoblast cell in <i>Obelia</i> . | 4 |
| 5. | (a) | Explain Polymorphism in <i>Obelia</i> . | 8 |
| | (b) | Give various larval forms in <i>Fasciola hepatica</i> . | 2 |

Unit III

- | | | | |
|----|-----|--|---|
| 6. | (a) | Explain Digestive system of <i>Periplaneta</i> . | 5 |
| | (b) | Explain structure of Tracheal system in <i>Periplaneta</i> . | 5 |
| 7. | (a) | Explain Reproductive System in <i>Pheretima</i> . | 5 |
| | (b) | Give Classification upto orders of Phylum Annelida. | 5 |

- (b) Define coefficient of viscosity and write its mathematical expression. 3
- (c) Discuss the various types of van der Waals forces with examples. 3
9. (a) Give the derivation of Bragg's equation. 4
- (b) What are Miller indices ? How are they determined ? 3
- (c) Define the terms : centre of symmetry and plane of symmetry. 3



Roll No.

Total Pages : 04

NGSE/D-25 107

CHEMISTRY-I

B-23-CHE-101

Time : Three Hours] [Maximum Marks : 50

Note : Attempt *Five* questions in all, selecting *one* question from each Section. Q. No. 1 is compulsory. All questions carry equal marks. Log Table and Non-programmable calculator is allowed.

(Compulsory Question)

1. (a) Write the electronic configurations of Cr and Cu^{2+} ions. 2
- (b) Define isoelectronic ions. Give one example. 2
- (c) What is the effect of temperature on molecular distribution of velocities ? 2
- (d) Compare the structures of carbocation and carbanion. 2
- (e) Why amorphous solids are isotropic and crystalline solids are anisotropic in nature ? 2

Section I

2. (a) What do you mean by Quantum Numbers ? Give the significance of all Quantum numbers. 4
- (b) Define Heisenberg's uncertainty principle with its mathematical expression. 3
- (c) Calculate effective nuclear charge for a $3p$ electron of chlorine atom. 3
3. (a) The internuclear distance for KCl is $3.14 \text{ \AA}$. Calculate the ionic radii of K^+ and Cl^- ions using the Pauling method. 4
- (b) Discuss the various factors on which ionization energy depend. 3
- (c) Discuss Pauling Scale's electronegativity and give its disadvantages. 3

Section II

4. (a) Calculate the root mean square velocity, average velocity and most probable velocity of methane molecules at $27^\circ C$. 4
- (b) What is the excluded volume or Co-volume of the gas ? 3
- (c) What are the differences between Ideal and Non-ideal gases ? 3

L-107

2

5. (a) What is the difference between collision number and collision frequency ? 4
- (b) Discuss main postulates of the kinetic theory of gases. 3
- (c) Define Boyle's temperature. How is it related to van der Waal's constants ' a ' and ' b ' ? 3

Section III

6. (a) Using the concept of inductive effect, compare the acidities of acetic acid and chloroacetic acid. 4
- (b) Define substitution and elimination reactions with examples. 3
- (c) Discuss Homolytic and Heterolytic cleavages in the molecules. 3
7. (a) Compare the stabilities of different types of free radicals. 4
- (b) Define Electrophile and Nucleophile with examples. 3
- (c) Discuss the various types of additional reactions. 3

Section IV

8. (a) Define surface tension. How will you determine it by using Drop Number method ? 4

(5-07/8) L-107

3

P.T.O.

Roll No.

Total Pages : 03

NGSE/D-25

109

MINOR CHEMISTRY-I

B23-CHE-103

Time : Three Hours]

[Maximum Marks : 20

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

1. (a) Name hybridisation in PCl_5 molecule
- (b) What is order of a reaction ?
- (c) What is an Isomer ?
- (d) Give range of conductivity for semi-conductor. $4 \times 1 = 4$

Section A

2. (a) Explain shape of NIH_2 molecule using Valence Shell Electron Pair Repulsion (VSEPR) theory. 2
- (b) Explain hybridisation and structure of SF_6 molecule. 2

(3-12/17)L-109

P.T.O.

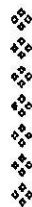
3. (a) Explain hybridisation and structure of trigonal planar molecule. 2
 (b) Give order of electron pairs repulsions in VSEPR theory. 2
- Section B**
4. (a) What is effect of catalyst and sunlight on rate of a reaction ? 2
 (b) What is significance of positive (+) and negative (–) sign in a reaction rate expression ? 2
5. (a) Derive rate expression for first order reaction. 3
 (b) What is Rate Law ? 1

Section C

6. (a) Give two reactions for preparation of alkanes from alkyl halides. 2
 (b) Give two reaction for preparation of alkanes from carboxylic acids. 2
7. (a) What is Isomerism ? Give two examples. 2
 (b) Explain primary, secondary, tertiary carbon atoms in alkanes. 2

Section D

8. (a) What is effect of temperature on conductance of a conductor and semi-conductor ? 3
 (b) What is range of conductivity for conductor ? 1
9. (a) Differentiate between insulator and semi-conductor on the basis of band theory of metals. 3
 (b) Give two examples of semi-conductors. 1



Roll No. Total Pages : 03

NGSE/D-25 111

BASIC DIGITAL ELECTRONICS

B23-ELE-103

Time : Three Hours] [Maximum Marks : 20

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) How many bits are there in one byte ? 1
 - (b) Prove the following $a + a = a$. 1
 - (c) Make the truth table of 3-input NAND gate. 1
 - (d) Simplify the following by using K-map. 1
- $Z(A, B) = \Sigma(0, 1, 2, 3)$

Unit I

2. (a) Convert $(425.25)_{10} = O_8$. 2
- (b) Write a short note on Self Complementing Code. 2

3. (a) Explain Gray Code. 2
- (b) Perform $(29)_{10} - (18)_{10}$ in 1's complement. 2

Unit II

4. Discuss the postulates of Boolean algebra. 4
5. (a) Prove that Demorgans law for three variables. 2
- (b) Using the theorems of Boolean algebra, prove the following Boolean identity. 2

$$(A + B\bar{C} + C)\bar{C} = AB\bar{C} + A\bar{B}\bar{C}$$

Unit III

6. (a) Why NOR Gate is called Universal Gate ? 2
- (b) Draw the circuit diagram for following Boolean expression by using only NAND gates. 2

$$F = (\bar{X} + \bar{Y})(Z + W)(\bar{U} + V)$$

7. (a) Draw a AND-OR logic circuit for the following Boolean expression: 2

$$A = \bar{X}.\bar{Y}.Z + \bar{X}.Y.Z + X.\bar{Y}.\bar{Z}$$

- (b) What do you mean by positive logic & negative logic ? 2

Unit IV

8. (a) Convert the following Boolean function in canonical form : 2

$$F = (\bar{X} + Y)(X + Z)(Y + Z)$$

- (b) Simplify the following Boolean function by using K-map.. 2

$$F(A, B, C) = \Sigma(0, 1, 2, 3, 4, 5, 7)$$

9. Minimize the following Boolean function by using K-map and realize it with NOR gates only. 4

$$F(A, B, C, D) = \Pi(2, 3, 4, 5, 6, 7, 11, 14, 15)$$



- (b) The acceleration due to gravity at the surface of moon is 1.67 ms^{-2} . If the radius of the moon is $1.84 \times 10^6 \text{ m}$, calculate the mass of the moon. 2
9. (a) What is a compound pendulum ? Obtain equation of motion for a compound pendulum and solve it. 5
- (b) Discuss the motion of reduced mass under a central force. 5



Roll No.

Total Pages : 04

NGSE/D-25 112

MECHANICS

B23-PHY-101

Time : Three Hours] [Maximum Marks : 50

Note : Attempt Five questions in all. Question No. 1 is compulsory. Attempt four more questions selecting one question from each Unit. The symbols have their usual meaning.

(Compulsory Question)

1. (a) Why are fly-wheels not provided in moving engines ? 2
- (b) Why are the steel girders manufactured in the form of I section ? 2
- (c) What is frame of reference ? Can earth be taken as an inertial frame of reference ? 2
- (d) How does the mass of a particle change when its velocity increases ? Explain. 2
- (e) What is Gravitational field and Gravitational potential ? How are they related ? 2

Unit I

2. (a) Derive an expression for the moment of inertia of a circular disc about an axis passing through its centre and perpendicular to its plane. 5
- (b) A solid cylinder of radius 4 cm and mass 0.25 kg rolls down an inclined plane 1 m in 10. Find acceleration and the total energy of the cylinder after 5 seconds. 5
3. (a) State and prove the theorem of perpendicular axes. 5
- (b) Describe moment of inertia of an irregular body using Torsion pendulum. 5

Unit II

4. (a) Define Poisson's ratio σ , modulus of rigidity η , the Young's modulus Y and show that they are connected by the relations, $\eta = \frac{Y}{2(1+\sigma)}$ where σ is the Poisson's ratio. 5
- (b) What couple must be applied to a wire 1 meter long and 2 mm in diameter to twist one of its end through 45° , when other end remain fixed ? The modulus of rigidity is $5 \times 10^{10} \text{ Nm}^{-2}$. 5

5. (a) Explain the term bending moment. Derive an expression for the bending of a rectangular bar supported at the two ends and loaded in the middle. 5
- (b) Differentiate between angle of twist and angle of shear. 3
- (c) Show that value of Poisson's ratio always lies between 0.5 and 1. 2

Unit III

6. (a) Describe Michelson-Morley Experiment. What important conclusion are drawn from it ? 8
- (b) The kinetic energy of a body is twice rest mass-energy ? Find out its velocity. 2
7. (a) What is Lorentz Fitzgerald contraction ? Derive its formula. 5
- (b) Explain Length contraction. Derive the relation : 5

$$l = l_0 \sqrt{1 - v^2/c^2}$$

Unit IV

8. (a) Derive expression for the Gravitational Potential due to a solid sphere at any point (i) inside (ii) on the surface, and (iii) outside the sphere. 8

Roll No.

Total Pages : 03

NGSE/D-25
ELEMENTARY MECHANICS

114

Time : Three Hours]

[Maximum Marks : 20

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks. Use of Scientific calculator (non-programmable) is allowed.

Compulsory Question

1. (a) Define radius of gyration. 1
- (b) Can Poisson's ratio of a material be negative ?
Give reason. 1
- (c) Show that a particle with zero rest mass always moves with the speed of light in free space. 1
- (d) Find a relation between g and G . 1
2. (a) What is the moment of inertia of a body ? Give Its physical significance. 2
- (b) Calculate of moment of inertia of a uniform circular disc of mass 0.5 kg and radius 10 cm about the diameter of the disc. 2

(9-26/1) L-114

P.T.O.

3. State and prove (i) theorem of perpendicular axes (ii) theorem of parallel axes. 4

Unit II

4. (a) Define Poisson's ratio and show that its value lies between - 1 and 0.5. Find its maximum and minimum value. 2
 (b) Define the terms: stress and strain 2
5. Define the terms : elasticity, Young's modulus, bulk modulus of rigidity and Poisson's ratio of elasticity. 4

Unit III

6. Describe the principle, experimental arrangement and working of Michelson- Morley experiment. From this experiment what inference was derived regarding the existence of ether and how does it lead to the concept of special theory of relativity. 4
7. What is Lorentz transformation ? Derive Lorentz transformation for momentum and energy. 4

Unit IV

8. What is spherical shell ? Find gravitational potential and gravitational field at points outside (ii) on the surface (iii) inside the spherical shell. Express them graphically also. 4
9. What are the normal coordinates and normal modes of vibration of coupled system ? What are the properties of a normal mode ? What is the significance of a normal mode ? 4



Roll No.

Total Pages : 03

NGSE/D-25

117

DIVERSITY OF MICROBES, ALGAE,
FUNGI AND ARCHEGONIATES

B23-BOT-101

Time : Three Hours]

[Maximum Marks : 50

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

1. Write brief answers for the following parts : $5 \times 2 = 10$
 - (a) What is a bacteriophage ? Describe the structure of a typical bacteriophage.
 - (b) Comment on the nutritional types of bacteria.
 - (c) Describe the types of lichens.
 - (d) What is heterospory ? Comment on its significance.
 - (e) Define the term fossil and name different types of fossils.

Unit I

2. (a) Describe the salient features of algae and discuss its economic importance. 5

(3-18/3) L-117

P.T.O.

- (b) Classify the Genus *Vaucheria*. Explain its life-cycle. 5
3. (a) Write a note on the general characters and classification of fungi. 5
- (b) Discuss the life history of the Genus *Puccinia*. 5

Unit II

4. What are bryophytes ? Explain the classification and ecological and economic importance of bryophytes. 10
5. (a) Describe the morphology and anatomy of gametophyte of *Marchantia*. 5
- (b) Explain the structure and dehiscence of sporophyte of *Funaria*. 5

Unit III

6. (a) Define the term Stele. Discuss the evolution of stelar system in pteridophytes. 7
- (b) Describe the structure of cone in *Equisetum*. 3
7. (a) Write a detailed note on reproduction in *Selaginella*. 5
- (b) Explain the morphology and anatomy of stem and leaf in Pteris. 5

L-117

2

(3-18/4) L-117

3

2,400

Unit IV

8. (a) Write an explanatory note on the distribution of conifers. 5
- (b) Elaborate the economic importance of gymnosperms. 5
9. (a) Explain the anatomical details of wood and needle of *Pinus*. 5
- (b) Describe the structure of male and female cone of *Ephedra*. 5



- (b) Find the volume of the solid formed by the revolution of one arch of the curve :

$$x = a(\theta - \sin \theta), y = a(1 - \cos \theta) \text{ about its base.}$$

9. (a) Find the area of the polar curve $r = a \sin 3\theta$.

- (b) Find the area common to the circle $r = a$ and the cardioid $r = a(1 + \cos \theta)$.



Roll No.

Total Pages : 04

NGSE/D-25

120

CALCULUS

B23-MAT-101

Time : Three Hours]

[Maximum Marks : 50

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) Give an example of function which is continuous but not differentiable.
- (b) The parabola $y^2 = 4ax$ has no oblique asymptotes, prove it.
- (c) Define multiple points of the curve and briefly describe double points and its types.
- (d) Find the area of the parabola $y^2 = 4ax$ bounded by its latus rectum.
- (e) State only five basic properties of limits.

Unit I

2. (a) Using the E-8 definition of limit to show that

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = 2.$$

- (b) Evaluate :

$$\lim_{x \rightarrow 0} \frac{\tan x - x}{x^2 \tan x}$$

3. (a) If $y = e^{a \sin^{-1} x}$ then show that $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2 + a^2)y_n = 0$ by

using Leibnitz's theorem where $y_n = \frac{d^n y}{dx^n}$.

- (b) Expand $\cos x$ in power of x and hence $\cos 18^\circ$ upto four decimal places.

Unit II

4. (a) Find all the asymptotes of the curve $x(x^2 + y^2) = a(x^2 - y^2)$.

- (b) Find the asymptotes of the polar curve

$$r = \frac{2a}{1 + 2 \cos \theta}.$$

5. (a) Show that the radius of curvature at any point of the curve $x = a \cos^3 \theta, y = a \sin^3 \theta$ is equal to three times the length of the perpendicular from the origin to the tangent.

- (b) Find the circle of curvature at $\left(\frac{a}{4}, \frac{a}{4}\right)$ on the curve

$$\sqrt{x} + \sqrt{y} = \sqrt{a}$$

Unit III

6. (a) Find the position and the nature of the double points on the curve :

$$y^2 = (x-2)^2(x-1)$$

- (b) Form an reduction formula for $\int \cos^n x dx$.

7. (a) Trace the curve $y^2(2a-x) = x^3$.

- (b) Find the range of values of x for which the curve $y = (x^2 + 4x + 5)e^{-x}$ is concave upwards or down wards. Find also the points of inflexion in each case.

Unit IV

8. (a) Find the length of the arc of the hyperbolic spiral $r\theta = a$ taken from the point $r = a$ to $r = 2a$.

Roll No.

Total Pages : 03

NGSE/D-25

140

PROBLEM SOLVING THROUGH C

Time : Three Hours]

[Maximum Marks : 50

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

1. Answer the following questions in brief : $4 \times 2.5 = 10$
 - (a) Write the structure of 'C' program.
 - (b) What is implicit and explicit casting ?
 - (c) How can we pass arguments to function ?
 - (d) What is the difference between structure and union ?

Unit I

2. Explain the various formatted Input and Output functions in 'C' with example. 10
3. Discuss the following : 10
 - (a) Keywords
 - (b) Identifiers

(8-26/1) L-140

P.T.O.

(c) Constants

(d) Variables and rules for naming the variables.

Unit II

4. What is an operator ? Discuss the different types of operators available in 'C' along with their hierarchy and associativity. 10

5. (a) What is switch case statement in C ? Explain its usage with example. 5

(b) Write a program to print the table of any number. 5

Unit III

6. Define an array and its types. How are one-dimensional and two-dimensional arrays declared, initialized and represented in memory ? 10

7. What is Function ? Differentiate the following with example : 10

(a) Actual and Formal Parameters

(b) Local and Global variables.

L-140

2

(8-26/2) L-140

3

2,250

Unit IV

8. Define Pointer. How can we declare and initialize pointers ? Discuss the relation between pointer and array with example. 10

9. What is Structure ? Explain, how to declare the structure variables, initialize and access its members ? Write its advantages also. 10



Roll No.

Total Pages : 03

GSE/D-25 1207

CLASSICAL MECHANICS AND THEORY
OF RELATIVITY

Paper : I

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) What are conservative and non-conservative forces ? 2
- (b) How are the generalized coordinates related to degree of freedom ? 2
- (c) What are the postulates of special theory of relativity ? 2
- (d) What is the physical significance of mass energy relationship ? 2

Unit I

2. State and prove the law of conservation of energy for system of particles. 8

(5-24/3) L-1207

P.T.O.

3. (a) What are holonomic and non-holonomic constraints ? Explain with examples. 4
- (b) State and prove the conservation theorem for angular momentum of a particle. 4

Unit II

4. What is Hamilton's principle ? Using this principle, derive Lagrange's equation of motion. 8
5. (a) Using Hamilton's principle, find the equation of motion for linear harmonic oscillator. 4
- (b) What are generalised coordinates ? Obtain expression for generalized force. 4

Unit III

6. Describe the principle and working of Michelson-Morley experiment. What conclusion can be drawn from this experiment ? 8
7. (a) What are Coriolis and centrifugal forces ? When do they come into picture ? 6
- (b) Calculate the fictitious acceleration of the sun in a frame fixed with the earth and rotating about its axis. Given that distance of sun from the earth is $R = 1.5 \times 10^8$ km. 2

Unit IV

8. On the basis of Lorentz transformations, discuss the following : 8
 - (i) Length contraction
 - (ii) Time dilation.
9. (a) Deduce Einstein's mass energy equivalence relationship. Discuss some of its important examples. 5
- (b) Find the velocity at which the mass of a body becomes 10 times its rest mass. 3



Roll No.

Total Pages : 03

GSE/D-25

1208

**ELECTRICITY, MAGNETISM AND
ELECTROMAGNETIC THEORY**

Paper : II

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. Use of Scientific (Non-programmable) calculator is allowed.

- | | | | |
|----|-----|---|---|
| 1. | (a) | Prove that $\text{curl grad} \phi = 0$. | 2 |
| | (b) | Explain the terms Magnetic susceptibility and Magnetic permeability. | 2 |
| | (c) | Explain the concept of Poynting Vector. | 2 |
| | (d) | What is the physical significance of Quality factor of an LCR circuit ? | 2 |

Unit I

- | | | | |
|----|-----|---|---|
| 2. | (a) | State and prove Stoke's theorem. Give its practical applications. | 5 |
|----|-----|---|---|

(S-24/17)L-1208

P.T.O.

- (b) If velocity of any body is given by $\vec{V} = 2x\hat{i} + 2y\hat{j}$, show that the motion is irrotational. 3
3. Derive an expression for force per unit area acting normally outwards on the surface of a charged conductor. Hence calculate the energy per unit volume of an electrostatic field. 8

Unit II

4. (a) Explain the domain theory of Ferromagnetism. 6
 (b) What do you mean by Hysteresis ? 2
5. (a) Prove that $\nabla \cdot \vec{B} = 0$. 4
 (b) Show that the energy loss per unit volume per cycle of magnetization is equal to the area of B-H loop. 4

Unit III

6. Explain the boundary conditions for $\vec{E}$ and $\vec{H}$ at the interface of two media. 8
7. (a) Prove that $\nabla \cdot \vec{D} = \rho$. 4
 (b) Prove that $\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$. 4

Unit IV

8. Using J-operator method, explain parallel resonant circuit. Why it is called rejector circuit ? 8
9. (a) The current through a 07 henry inductor varies sinusoidally with amplitude of 1A and a frequency of 50 cycles per second. Calculate the potential difference across the terminals of inductor. 4
 (b) Explain the sharpness of resonance in LCR circuit. 4



Roll No.

Total Pages : 03

GSE/D-25 1209

CHEMISTRY

Paper : I

CH-101

Inorganic Chemistry

Time : Three Hours] [Maximum Marks : 32

Note : Attempt *Five* questions in all. Question No. 1 is compulsory. Attempt *four* more questions selecting *two* questions from each Section. Question No. 1 carries 8 marks and all questions in Section A and B carry 6 marks each.

(Compulsory Question)

1. (a) Calculate screening constant for elements with atomic number 11 and 17. 2
- (b) Why the size of cation is smaller, as compared to that of atom ? 2
- (c) What do you mean by Odd-electron molecules ? Explain by giving one example. 2
- (d) State Fajans' rule of covalency. 2

(5-01/2) L-1209

P.T.O.

Section A

2. (a) What is effective nuclear charge ? How is it related with shielding phenomenon ? 3
- (b) Discuss radial probability distribution curve for $1s$ and $2s$ orbitals. 3
3. (a) State and discuss Pauli's exclusion principle. 3
- (b) Write a note on physical significance of ψ and ψ^2 . 3
4. (a) Classify the elements in terms of their electronic configuration. 3
- (b) Discuss the periodic trend of electron affinity in the elements. 3
5. (a) Write a note on the Mulliken's method of determination of electronegativity. 3
- (b) Give some applications of the concept of electronegativity in different field of Chemistry. 3

Section B

6. (a) What is valence bond theory ? Give its limitations. 3
- (b) Discuss the factors that influence the shape of a molecule according to VSEPR theory. 3

7. (a) By applying concept of hybridization, explain the geometries of ClO_4^{-1} and NO_3^{-1} . 3
- (b) Discuss any *one* method for determination of dipole moment. 3
8. What do you understand by Stoichiometric and non-stoichiometric defects ? Discuss their types by citing suitable examples. 6
9. (a) Discuss the structure of CaF_2 . 3
- (b) Write a note on Born-Haber Cycle. 3



- (b) What is Kolbe's Electrolytic process for formation of Alkanes ? 2
- (c) What is the effect of branching on melting point of Alkanes ? 2
9. (a) What is theory of Strainless Rings ? 2
- (b) Write *two* methods of preparation of Cycloalkanes. 2
- (c) What is Baeyer's Strain theory ? 2



(Compulsory Question)

1. (a). Define Electromeric Effect.
- (b) What is Chirality ?
- (c) Give *two* examples of Nucleophiles.
- (d) What is Homolytic Bond Fission ?
- (e) Name the hybridization at Carbon in Carbocation.
- (f) Define Metamerism.
- (g) Which is most stable Conformation of n-Butane ?
- (h) Define Addition Reactions. 8×1=8

Roll No.

Total Pages : 04

GSE/D-25 1211

CHEMISTRY

Paper III

Organic Chemistry

Time : Three Hours]

[Maximum Marks : 32

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

Section A

2. (a) What is Inductive Effect ? Write its types. 2
- (b) What is Hyperconjugation ? Explain with a suitable example. 2
- (c) What is Resonance ? Write its two conditions. 2
3. (a) What is Chain Isomerism ? Write two examples. 2
- (b) What are Diastereomers ? Write their properties. 2
- (c) What is Molecular Chirality ? Give example. 2
4. (a) What is the difference between Configuration and Conformation ? Give examples. 2
- (b) Write names of different conformations of Cyclohexane. 2
- (c) Define E and Z system of Isomerism. Explain with examples. 2
5. (a) What is Racemic Mixture ? Give two methods of resolution. 2
- (b) Explain Absolute and Relative Configuration. 2

L-1211

2

- (c) Write different Conformations of Ethane. Draw its Energy Level Diagram. 2

Section B

6. (a) What is Heterolytic Bond Cleavage ? Give example. 2
- (b) What are Electrophiles ? Write *two* examples. 2
- (c) What are Substitution Reactions ? Write an example. 2
7. (a) What are Free Radicals ? Write the structure of Methyl Free Radical. 2
- (b) Write *two* methods of preparation of Carbocations. 2
- (c) What are Carbenes ? Write their types and stability order. 2
8. (a) What are Primary, Secondary and Tertiary Carbons ? Explain with a suitable example. 2

(3-02/4) L-1211

3

P.T.O.

Roll No.

Total Pages : 07

GSE/D-25

1212

ENGLISH

Course No. 105

Paper V

Time : 3 Hours]

[Maximum Marks : 40

Note : Attempt all questions.

1. Read the passage given below and answer the questions that follow : 5

Death Not be proud, though some have called thee
Mighty and Dreadful, for thou art not so,
For those whom thou think'st thou dost overthrow,
Die not, poor death, not yet Canst thou kill me.

Questions :

- (i) What do people think about death ?
- (ii) Does the poet agree with them ? Why ?
- (iii) What happens to those whom death thinks to have killed ?
- (iv) What is the poet's challenge to death ?
- (v) Why does the poet call death 'poor death' ?

(3-01/1) L-1212

P.T.O.

Or

Three years she grew in sun and shower;
Then nature said, 'A lovelier flower
On earth was never sown;
This child I to myself will take;
She shall be mine, and I will make
A lady of my own.

Questions :

- (i) Name the poem and the poet.
- (ii) Who is the subject of this poem ?
- (iii) Where did Lucy grow up ?
- (iv) What did Lucy experiment ?
- (v) What did nature decide to do ?

2. Explain with reference to the context : 3

O, no! it is an ever-fixed mark,
That looks on tempests and is never shaken;
It is the star to every wand' ring bark,
Whose worth's unknown, although his height be taken.

L-1212

2

Or

Religion christless, Godless — a book sealed;
A senate, — Time's worst statute unrepealeds
Are graves, from which a glorious Phantom may
Burst, to illumine our tempestuous day.

3. Answer the following questions in about 30 words each : 6

- (a) Whom does Flucknoe choose a his successor and why ?

Or

- Why should death be not proud of its power ?
- (b) Explain "created half to rise and half to fall".

Or

- Why is the king George III despised ?
- (c) Briefly write the central idea of the poem 'The Little Black Body'.

Or

Why does the poet, John Donne, compare death to rest and sleep ?

(3-01/2) L-1212

3

P.T.O.

- (d) What kind of farewell does the poet wish for in 'Crossing the Bar' ?

Or

What is the mark of true love ?

4. Consider 'Shadwell' as a satire.

6

Or

Attempt a critical appreciation of the poem 'The Little Black Boy'.

5. Translate the following passage into English :

4

पुस्तकें भी एक विचित्र वरदान हैं । जब दुःख और कष्ट के बादल हमारे जीवन को अन्धकारमय बना देते हैं तो ये एक सच्चे मित्र के समान मधुर वाणी से हमें ढाढ़स बँधाती हैं । जब हमारे मित्र और सम्बन्धी हमारे दुर्भाग्य के कारण हमसे मुख मोड़ लेते हैं तो ये हमारा साथ देती हैं । साहस और दृढ़ता से कठिनाइयों पर काबू पाने की शिक्षा देती हैं । यह मनुष्य की बुद्धिमत्ता एवं अनुभव का निचोड़ हैं । परन्तु सब पुस्तकें अच्छी नहीं होती हैं । इसलिए पुस्तकों को चुनने में बुद्धिमत्ता और सोच-विचार से काम लेना चाहिए ।

L-1212

4

Or

(For Non-Hind/Foreign Candidates Only)

Read the following passage and answer the questions that follow :

In cases of national or ideological conflicts, we should seek not a precarious military solution but a permanent human one. We cannot divide the people of the world into blacks and whites. These sharp distinctions which develop feelings of hatred for large sections of humanity are not adequate to human relations. The common people in every country are like ourselves, ordinary human beings, who wish to go about their daily work, do their best for their children, cultivate their own garden and live at peace with their neighbours. If some of them are willing tools of their governments, many are unwilling victims. Instead of threatening those who are opposed to us with frightful disaster, we should appeal to their high nature. We may not love each other or like each other; we may at least talk to each other, try to understand each other. We must be learn to put ourselves in the place of other people and realize how they feel.

(3-01/3) L-1212

5

P.T.O.

Questions :

- (i) What advice does the author give to resolve national or ideological conflicts ?
- (ii) Why should not we divide the people of the world into blacks and whites ?
- (iii) What sort of life do the ordinary people wish to lead ?
- (iv) Use in your own sentences : Disaster; Ideological.

6. Write a paragraph of about **250** words on any *one* of the following : 6

- (a) Science and Technology
- (b) Value of Discipline
- (c) Pollution
- (d) A Bank Robbery
- (e) Fashions Today.

7. (a) Use the following phrasal verbs in your own sentences : 10

- (i) Take down
- (ii) Write off
- (iii) Give up.

(b) Fill in the blanks with appropriate prepositions :

- (i) I am not interested.....your story.
- (ii) The father was angry.....his son.
- (iii) My cousin came.....Agra.

(c) Correct the following sentences :

- (i) Your shoes is not good.
- (ii) She is the girl which has won the prize.
- (iii) I met the eldest person in the village.
- (iv) One of my friends are a doctor.



Roll No.

Total Pages : 03

GSE/D-25

1215

DIVERSITY OF MICROBES

Paper : I

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. Draw well labelled diagrams where they are necessary.

(Compulsory Question)

1. (a) Eyespot
(b) Coenocytic algae
(c) Zoospores
(d) Heterotrichous algae
(e) Transduction
(f) Dikaryon
(g) Coenocytic are characteristic feature of which algae ?
(h) Crustose Lichen. 8

(5-24/17)L-1215

P.T.O.

Unit I

- | | | | |
|--|-------|---|---|
| 2. Explain important, characteristics and features of Cyanobacteria and highlight its importance. | 8 | 8. Describe Bacteriophages and explain lytic and lysogenic life-cycles. | 8 |
| 3. Write notes on the following :
(a) Structure of volvox colony
(b) Alteration of generation in polysiphonia. | 2×4=8 | 9. Write a note on classification of Lichen, with well labelled diagram and suitable example. | 8 |



Unit II

- | | |
|---|---|
| 6. Give an illustrated account of life-cycle of Puccinia, highlight various stages of it in primary and alternate host. | 8 |
| 7. Write a short note on economic importance of fungi and mention its advantages and harmful effects. | 8 |

Roll No.

Total Pages : 03

GSE/D-25

1216

CELL BIOLOGY

Paper : II

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. Explain the following :

8×1=8

(i) Glycoproteins

(ii) Plasmodesmata

(iii) Heterochromatin

(iv) Suicidal bags of cell

(v) Name the stage where crossing over occurs in meiosis.

(vi) Telomere

(5-24/9) L-1216

P.T.O.

(vii) Nullisomics

(viii) Sex chromosomes.

Unit I

2. Write down the structure and functions of cell wall. 8
3. Give an ultrastructure of endoplasmic reticulum and also differentiate between SER and RER. 8

Unit II

4. Write short notes on the following : 2×4=8
 - (i) Lysosomes
 - (ii) Nucleolus.
5. Discuss the autonomous nature of chloroplast and mitochondria. 8

Unit III

6. List the differences between mitosis and meiosis. 8
7. Discuss various types of sex chromosomes. 8

L-1216

2

(5-24/10)L-1216

3

150

Unit IV

8. Write short notes on the following : 2×4=8
 - (a) Karyotype and idiogram
 - (b) Cell cycle.
9. What do you mean by translocation ? Explain its cytological effects and significance. 8



Roll No.

Total Pages : 03

GSE/D-25 1217

ZOOLOGY

Paper : I

Life and Diversity from Protozoa to Porifera
and Cell Biology-I

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt *Five* questions in all. Question No.1 is compulsory. Attempt any *two* questions from Section A and any *two* questions from Section B. Draw well labelled diagrams wherever they are required.

1. (a) What are Red Tides ?
- (b) Name *two* Protozoans which help the insects to digest the wooden structures.
- (c) Define Exflagellation.
- (d) Name polymorphic forms of *Trypanosoma*.
- (e) What is Olynthus stage ?
- (f) What do you mean by Diplodal Canal System ?
- (g) What is Emeiocyctosis ?

(h) Golgi body is considered as Traffic Police of the cell. Why ?

(i) What type of DNA is found in mitochondria ?

(j) Name the four types of Lysosomes. 10×1=10

Section A

2. Give an account of mode of infection, life-cycle and pathogenicity of *Trypanosoma gambiense*. 7½

3. Explain in detail the life cycle of Malarial Parasite (Plasmodium) in Humans. 7½

4. Define Canal System. Explain syconoid canal system of Scypha. 7½

5. What are skeletal elements in sponges ? Explain the various types of skeletal elements found in the sponges. 7½

Section B

6. Define active transport. Explain *two* types of active transport with one example of each type. Also give the significance of each type. 7½

7. Describe the structure and functions of Endoplasmic Reticulum in animal cells. 7½

8. Write notes on the following : 2½+2½+2½

(a) Role of Golgi Complex in acrosome formation

(b) Biogenesis of Ribosomes in Eukaryotes

(c) Mitochondrial DNA.

9. Write notes on the following : 2½+2½+2½

(a) Amoeboid or Pseudopodial movement

(b) T.S. of Centriole

(c) Difference between cilia and flagella.



Roll No. Total Pages : 03

GSE/D-25 **1218**
ZOOLOGY
Paper-II

Time : Three Hours] [Maximum Marks : 40

Note : Attempt *Five* questions in all. Q. No. 1 is compulsory.
Select at least *two* questions each from Section A
and B. Draw well labelled diagrams wherever necessary.

Compulsory Question

1. Short answer type questions (in about 20-30 words) :
10×1=10

- (i) What is Digenetic Life-Cycle ?
- (ii) What are Balbiani Rings ?
- (iii) What is Wurburg effect ?
- (iv) Fringing Reef.
- (v) What is Laurer's Canal ?
- (vi) Ancylostomiasis
- (vii) What do you mean by Idiograms ?
- (viii) Define Nuclear-pore complex.
- (ix) What are B-Chromosomes ?
- (x) Define Chemotherapy.

(7-07/19)L-1218

P.T.O.

Section A

2. (a) Draw a neat and labelled diagram of life-history of Obelia. 5
- (b) Describe the functions of Statocyst of Medusa. 2½
3. (a) Describe Excretory system in Liver fluke. 5
- (b) Write a note on structure of Cercaria larva. 2½
4. (a) With the help of well labelled diagram explain the structure and functions of body wall of Liver fluke. 6
- (b) What do you mean by atoll ? 1½
5. Describe the life-history, mode of infection and pathogenicity of *Wuchereria bancrofti* and *Oxyuris*. 7½

Section B

6. (a) What are histones and non-histone proteins ? Name the major histones found in the nucleus and enumerate their functions. 5
- (b) What is Master and Slave Hypothesis ? 2½

7. Describe the structure and functions of Salivary gland chromosomes. 7½
8. (a) Differentiate between Proto-oncogenes and Oncogenes. Discuss modes of activation of Proto-oncogenes. 5
- (b) List the functions of Nucleolus. 2½
9. (a) With the help of well labelled diagram explain Cell Cycle and its regulation. 5
- (b) Describe Antibody Mediated Immune System. 2½



Roll No.

Total Pages : 03

GSE/D-25

1221

ELECTRONIC DEVICES AND CIRCUITS-I

Paper I

Time : Three Hours]

[Maximum Marks : 40

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

1. (a) Write difference between Intrinsic and Extrinsic semiconductors. 2
- (b) Write the advantages and disadvantages of full wave rectifier. 2
- (c) Define the transistor current gain alpha and beta. Derive the relation between them. 2
- (d) Why common emitter amplifier is preferred ? 2

Unit I

2. (a) Draw the circuit diagram and discuss the working of Zener diode as voltage regulator. 4
- (b) Discuss the forward and reverse bias characteristics of PN junction diode using circuit diagram. 4

(3-14/2) L-1221

P.T.O.

3. (a) What do you understand by clamper ? Explain any one clamper circuit with suitable circuit diagram. 4
- (b) Define drift and diffusion currents in semiconductors. 2
- (c) What do you mean by N-type and P-type semiconductors ? Explain each on the bases of energy band diagram. 2

Unit II

4. (a) Discuss the circuit of full wave rectifier and explain its working. Also calculate the ripple factor. 4
- (b) Draw the circuit diagram of half wave voltage doubler and explain its working. 4
5. (a) Draw the circuit of half wave rectifier with shunt capacitor filter and explain its working. Also calculate the ripple factor. 4
- (b) Draw the circuit diagram of full wave voltage doubler and discuss its working. 4

Unit III

6. (a) With the help of circuit diagram discuss the input/output characteristics of transistor in CE configuration. 6

- (b) Discuss the Early Effect with its three consequences. 2

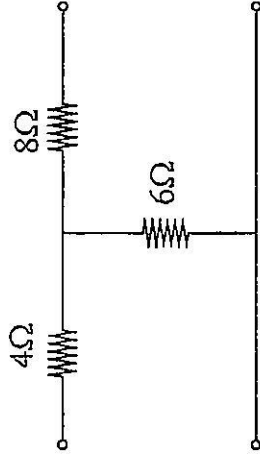
7. For a PNP transistor biased in the active region, plot the variations in potential and minority carrier concentration in each emitter, base and collector region. Explain the shapes of these plots. 8

Unit IV

8. (a) Draw the Ebers-Moll model of a transistor. Explain a transistor can not be represented by two diodes connected back to back. 4
- (b) State and prove Miller's theorem. 4
9. (a) Draw the circuit of transistor in common emitter configuration and give its h -parameter model. 5
- (b) Prove that the transistor can be used as an amplifier. 3



7. (a) Find the h-parameters for the given circuit. 4



- (b) Derive relationship between y-parameters h-parameters. 4

Unit IV

8. (a) Show, how 2- two port networks are connected in parallel manner and calculate the y-parameters of the overall parallel connected network. 4
- (b) Derive an expression for input impedance of a two port network in terms of h-parameters. 4
9. (a) Show, how 2- two port networks are connected in series-parallel manner and calculate the h-parameters of the overall series-parallel connected network. 4
- (b) Derive an expression for output impedance of a two port network in terms of z-parameters. 4



Roll No.

Total Pages : 04

GSE/D-25

1222

NETWORK ANALYSIS

Paper : II

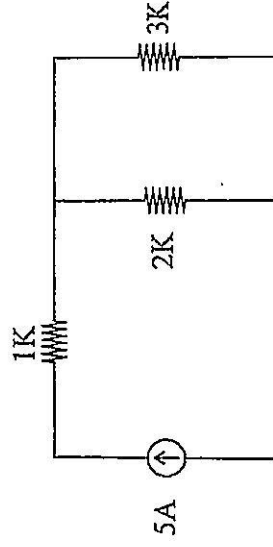
Time : Three Hours]

[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) Compare an ideal and practical voltage source.
- (b) Find the current in 3 kΩ resistor.

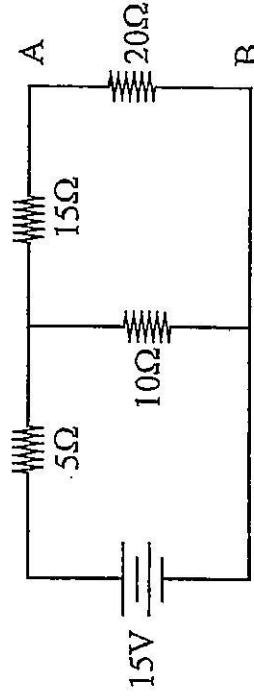


- (c) h-parameters are known as hybrid parameters. Why ?
- (d) Define the condition for symmetry in a two port network. 4×2=8

Unit I

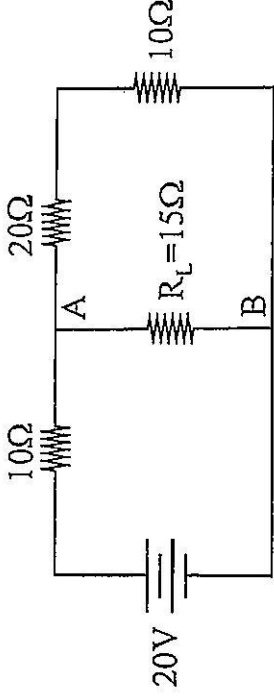
2. (a) Discuss Node Analysis method for network analysis with a suitable example. 4
- (b) What is Star-Delta transformation ? Derive expression for equations to convert a star representation into equivalent delta representation. 4

3. What is Thevenin's Theorem ? Using Thevenin theorem, find the power consumed across 20Ω resistor connected across terminals AB in the given circuit. 8



Unit II

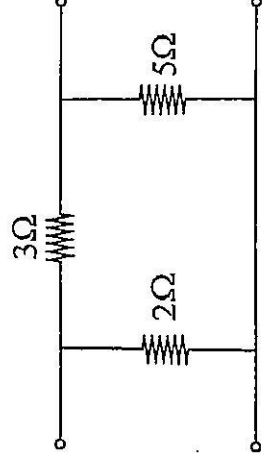
4. What is Norton's Theorem ? Find the power consumed across 15Ω resistor across AB terminal in the given circuit. 8



5. What is maximum power transfer theorem ? Derive the condition for maximum power transfer by taking a suitable circuit example. 8

Unit III

6. (a) Find the Z-parameters for the given circuit. 4



- (b) Derive relationship between Z-parameters and ABCD-parameters. 4

Roll No.

Total Pages : 03

GSE/D-25

1249

FOOD SCIENCE

Course No. 104

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) Roasting
- (b) Wheat Bran
- (c) Caramelisation
- (d) Mutual supplementation.

(5-13/6) L-1249

P.T.O.

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

- (अ) भूतना
- (ब) गेहूँ का चोकर
- (स) कार्मेलीकरण
- (द) पारस्परिक पूरकता ।

Unit I (इकाई I)

2. Explain physiological, social and psychological functions of food. 8

भोजन के शारीरिक, सामाजिक और मनोवैज्ञानिक कार्यों की व्याख्या कीजिए ।

3. What is the nutritional contribution of spices and condiments in our diet ? 8

हमारे आहार में मसालों और मसालों का पोषण संबंधी योगदान क्या है ?

4. Discuss the following : 2×4=8

- (a) Nutritive Value of Egg
- (b) Anti-nutritional Substances present in pulses.

निम्नलिखित पर चर्चा कीजिए :

- (अ) अंडे का पोषक मान
- (ब) दालों में मौजूद पोषण-विरोधी पदार्थ ।

5. Describe the nutritional contribution of milk and milk products. 8

दूध और दूध उत्पादों के पोषण संबंधी योगदान का वर्णन कीजिए ।

Unit II (इकाई II)

6. Give an account of the principles of cooking food. 8

भोजन पकाने के सिद्धांतों का विवरण दीजिए ।

7. Describe microwave cooking along with its advantages and disadvantages. 8

माइक्रोवेव में खाना पकाने के लाभ और हानियों का वर्णन कीजिए ।

8. Discuss the process of food fermentation along with its pros and cons. 8

भोजन के किण्वन की प्रक्रिया और उसके लाभ और हानियों पर चर्चा कीजिए ।

9. Explain moist heat cooking methods of cooking. 8

नम ताप पर खाना पकाने की विधियों की व्याख्या कीजिए ।



GSE/D-25

1250

INTRODUCTORY CHEMISTRY

Course No.-105

Time : Three Hours]

[Maximum Marks : 40

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

प्रत्येक खण्ड 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. (a) Write the symbols of the following elements :

Sodium, Potassium, Helium and Carbon. 2

निम्नलिखित तत्वों के प्रतीक लिखिए :

सोडियम, पोटेशियम, हीलियम और कार्बन ।

(b) Classify the given substances into elements, compound and mixtures :

Air, milk, iron and distilled water. 2

दिए गए पदार्थों को तत्व, यौगिक और मिश्रण में वर्गीकृत कीजिए :

वायु, दूध, लोहा और आसुत जल ।

- (c) Write the monomers of PVC and Teflon. 2
PVC और टेफ्लॉन के मोनोमर्स लिखिए ।
- (d) Write the general formula of alkane and carboxylic acid. 2
एल्केन और कार्बोक्सिलिक एसिड का सामान्य सूत्र लिखिए ।

Section I (खण्ड I)

2. (a) Calculate the number of electrons, protons and neutrons of the following elements :
 $^{23}_{11}\text{Na}$ and $^{19}_9\text{F}$. 3
निम्नलिखित तत्वों के इलेक्ट्रॉनों, प्रोटॉन और न्यूट्रॉन की संख्या की गणना कीजिए :



- (b) Define the following terms :
Molarity and Normality. 3
निम्नलिखित शब्दों को परिभाषित कीजिए :
मोलैरिटी और नॉर्मलिटी ।

- (c) Calculate the number of moles in 36 gram of water. 2
36 ग्राम पानी में मोल्स की संख्या की गणना कीजिए ।

3. (a) Write the electronic configuration of Sodium and fluorine. 4
सोडियम और फ्लोरिन का इलेक्ट्रॉनिक विन्यास लिखिए ।

- (b) What are the differences between homogenous and heterogeneous mixtures ? 4
सजातीय और विषमंगी मिश्रण के बीच क्या अंतर है ?
4. (a) Explain coordinate bond and hydrogen bond with example. 4
समन्वय बंधन और हाइड्रोजन बंधन को उदाहरण सहित समझाइए ।

- (b) Define Ionization Energy. Explain the factors on which ionization energy depends. 4
आयनीकरण ऊर्जा को परिभाषित कीजिए । उन कारकों की व्याख्या कीजिए जिन पर आयनीकरण ऊर्जा निर्भर करती है ।

5. (a) What do you mean by buffer solution ? What are the various types of buffer solution ? Give one example of each type of buffer solution. 4
बफर समाधान से आप क्या समझते हैं ? बफर समाधान के विभिन्न प्रकार क्या हैं ? प्रत्येक प्रकार के बफर समाधान का एक उदाहरण दीजिए ।

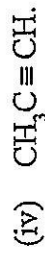
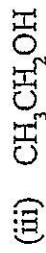
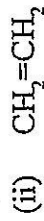
- (b) What do you understand by pH scale ? Calculate the pH of 0.001M HCl. 4
पीएच स्केल से आप क्या समझते हैं ? 0.001M HCl के pH की गणना कीजिए ।

Section II (खण्ड II)

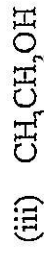
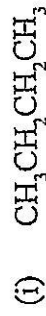
6. (a) "Carbon is tetravalent." Justify the statement. 4

"कार्बन टेट्रावैलेंट है।" कथन का औचित्य सिद्ध कीजिए।

(b) Write the IUPAC name of the following : 4



निम्नलिखित का IUPAC नाम लिखिए :



7. (a) What is difference between Soap and synthetic detergent ? What are the advantages of soap and detergents ? 6

साबुन और सिंथेटिक डिटरजेंट के बीच क्या अंतर है ? साबुन और डिटरजेंट के क्या लाभ हैं ?

(b) Why carbon has tendency to form multiple bonds ? 2

कार्बन में एकाधिक बंधन बनाने की प्रवृत्ति क्यों होती है ?

8. (a) Write the monomer, properties and uses of PAN (Polyacrylonitrile). 4

पैन (पॉलीएक्रिलोनिट्राइल) के मोनोमर, गुण और उपयोग लिखिए।

(b) Write the monomer, properties and uses of Nylon-6, 6. 4

Nylon-6, 6 के मोनोमर, गुण और उपयोग लिखिए।

9. (a) Write the chemical composition of the following : 6

(i) Talcum powder

(ii) Lipsticks

(iii) Shampoo.

निम्नलिखित की रासायनिक संरचना लिखिए :

(i) टैल्कम पाउडर

(ii) लिपस्टिक

(iii) शैम्पू।

(b) What is the composition and uses of Paint ? 2

पेंट की संरचना और उपयोग क्या है ?



Roll No.

Total Pages : 03

NGSE/D-25 37005

HOME AND INTERIOR DECOR

B23-HSC-101

Time : Three Hours]

[Maximum Marks : 50

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

प्रत्येक इकाई से एक 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. Define the following Terms : 5×2=10

(a) Interior decoration

(b) Colour

(c) Buffet style

(d) Soft furnishing.

निम्नलिखित शब्दों को परिभाषित कीजिए :

(अ) आंतरिक सज्जा

(ब) रंग

(3-03/15)L-37005

P.T.O.

(स) बुफे शैली

(द) सॉफ्ट फर्निशिंग ।

Unit I (इकाई I)

2. Differentiate between structural and decorative design with their application in interior decoration. 10

आंतरिक सजावट में उनके अनुप्रयोग सहित संचनात्मक और सजावटी डिजाइन के बीच अंतर कीजिए ।

3. Discuss the application of elements of arts in interior decoration. 10

आंतरिक सजा में कला के तत्वों के अनुप्रयोग पर चर्चा कीजिए ।

Unit II (इकाई II)

4. Describe the application of principles of design in interior decoration. 10

आंतरिक सजा में डिजाइन के सिद्धांतों के अनुप्रयोग का वर्णन कीजिए ।

5. Write an elaborate note on types of lighting and light fixture used in home settings. 10

घरेलू साज-सजा में प्रयुक्त प्रकाश व्यवस्था और प्रकाश जुड़नार के प्रकारों पर एक विस्तृत टिप्पणी लिखिए ।

Unit III (इकाई III)

6. Describe formal and informal table setting with appropriate examples in detail. 10

उपयुक्त उदाहरणों सहित औपचारिक और अनौपचारिक टेबल सेटिंग का विस्तार से वर्णन कीजिए ।

7. Write a detailed note on furniture arrangement for bedroom, drawing room and dining room with layouts. 10

शयनकक्ष, बैठक और भोजन कक्ष के लिए फर्नीचर व्यवस्था पर लेआउट सहित एक विस्तृत टिप्पणी लिखिए ।

Unit IV (इकाई IV)

8. What are different types of flower arrangement ? Discuss flower arrangement for different occasions. 10

पुष्प सजा के विभिन्न प्रकार क्या हैं ? विभिन्न अवसरों के लिए पुष्प सजा पर चर्चा कीजिए ।

9. Write a detailed note on wall treatment and its types. 10

दीवार सजावट और उसके प्रकारों पर एक विस्तृत टिप्पणी लिखिए ।



9. Explain the following :

(i) Basic principles of Yarn Making

5

(ii) Novelty and Complex Yarn.

5

निम्नलिखित को स्पष्ट कीजिए :

(i) यार्न बनाने के मूल सिद्धांत

(ii) नवीन और जटिल यार्न ।



Roll No.

Total Pages : 04

NGSE/D-25

37006

FUNDAMENTAL OF CLOTHING AND
TEXTILE

B23-HSC-102

Time : Three Hours]

[Maximum Marks : 50

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

प्रत्येक इकाई से एक 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 : $5 \times 2 = 10$

(i) Dart

(ii) Placket

(iii) Nylon

(iv) Filament

(v) Cotton

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

- (i) डार्ट
- (ii) प्लैकेट
- (iii) नायलॉन
- (iv) फिलामेंट
- (v) कपास ।

and homemade garments. 10

दर्जी द्वारा बनाए गये, रेडीमेड और घर पर बने कपड़ों की तुलना के बारे में विस्तार से बताइए ।

Unit III (इकाई III)

6. Define fiber and explain its classification. 10

फाइबर को परिभाषित कीजिए और इसके वर्गीकरण की व्याख्या कीजिए ।

7. Write in detail about manufacturing and properties of Silk. 10

रेशम के निर्माण एवं गुणों के बारे में विस्तार से लिखिए ।

Unit IV (इकाई IV)

8. Write notes on the following :

- (i) Process of Yarn Making 5
- (ii) Properties of Yarn. 5

निम्नलिखित पर टिप्पणियाँ लिखिए :

- (i) यार्न बनाने की प्रक्रिया
- (ii) यार्न के गुण

Unit I (इकाई I)

2. Write the types of sewing machine with their uses in garment industry. 10

सिलाई मशीन के प्रकार और परिधान उद्योग में उनके उपयोग लिखिए ।

3. Explain the importance and scope of clothing and textile. 10

क्लोथिंग एंड टेक्स्टाइल के महत्व एवं दायरे को समझाइए ।

Unit II (इकाई II)

4. Explain the factors affecting selection of clothing. 10

कपड़ों के चयन को प्रभावित करने वाले कारकों की व्याख्या कीजिए ।

8. Define Learning. Explain affecting learning types and factors. 10

अधिगम (सीखने) की परिभाषा दीजिए। इसके प्रकार तथा अधिगम को प्रभावित करने वाले कारक बताइए।

9. Define Intelligence. Explain different methods of measurement of intelligence in detail. 10

बुद्धि की परिभाषा दीजिए। बुद्धि मापन की विभिन्न विधियाँ विस्तार से बताइए।



Roll No. Total Pages : 06

NGSE/D-25 37007

INTRODUCTION TO HUMAN

DEVELOPMENT

B23-HSC-103

Time : Three Hours] [Maximum Marks : 50

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

प्रत्येक इकाई से एक 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. Multiple choice questions :

बहुविकल्पीय प्रश्न :

- (i) Growth refers to : 1
- (a) Increase in size
(b) Change in behaviour
(c) Emotional maturity
(d) None of the above

वृद्धि का संबंध है :

- (अ) आकार में वृद्धि से
- (ब) व्यवहार परिवर्तन से
- (स) भावनात्मक परिपक्वता से
- (द) उपर्युक्त में से कोई नहीं

(ii) Piaget proposed how many cognitive states ? 1

- (a) 2
- (b) 3
- (c) 4
- (d) 5

पियाजे वे संज्ञानात्मक विकास के कितने चरण बताए ?

- (अ) 2
- (ब) 3
- (स) 4
- (द) 5

(iii) Case study means :

- (a) Large sample
 - (b) In-depth study of one case
 - (c) Only observation
 - (d) None of the above
- केस स्टडी का अर्थ है :

- (अ) बड़ा नमूना
- (ब) एक मामले का गहन अध्ययन
- (स) केवल अवलोकन
- (द) उपर्युक्त में से कोई नहीं

(iv) I.Q. stands for :

- (a) Intelligent Quantity
- (b) Intelligence Quotient
- (c) Inner Quality
- (d) None of the above

आई.क्यू. क्या है :

- (अ) बुद्धिमान मात्रा
- (ब) बौद्धिक लब्धि/बुद्धि लब्धि
- (स) आंतरिक गुणवत्ता
- (द) उपर्युक्त में से कोई नहीं

(v) Freud's theory is :

- (a) Behavioural
- (b) Psychoanalytic
- (c) Humanistic
- (d) None of the above

फ्रायड का सिद्धांत है :

- (अ) व्यवहारवादी
- (ब) मनोविश्लेषण
- (स) मानवतावादी
- (द) उपर्युक्त में से कोई नहीं

(vi) Name one test to measure I. Q.

आई.क्यू. मापने का एक टेस्ट बताइए !

(vii) Family environment plays a major role in all round development of child. (True/False) 1

घर का वातावरण बच्चे के सर्वांगीण विकास में अहम भूमिका निभाता है । (सत्य/असत्य)

(viii) Infant is 2nd stage of life. (True/False) 1

शैशवास्था जीवन की दूसरी अवस्था है । (सत्य/असत्य)

(ix) Sigmund-Freud was founder of Psychoanalysis. (True/False) 2

सिगमंड-फ्रायड मनोविश्लेषण के संस्थापक थे । (सत्य/असत्य)

Unit I (इकाई I)

2. Define Human Development. Explain importance scope and multidisciplinary nature. 10

मानव विकास की परिभाषा दीजिए । इसका महत्व क्षेत्र तथा बहुविषयक प्रकृति स्पष्ट कीजिए ।

3. Explain the meaning and concept of growth and development. Differentiate between them. 10

वृद्धि और विकास का अर्थ व अवधारणा को समझाइए । दोनों में अन्तर बताइए ।

Unit II (इकाई II)

L-37007

4

4. Describe Freud's Psychoanalytic theory with example in detail. 10

फ्रायड के मनोविश्लेषण सिद्धांत को उदाहरण सहित विस्तार से समझाइए ।

5. Explain Piaget's cognitive theory with example in detail. 10

पियाजे के संज्ञानात्मक सिद्धांत को उदाहरण सहित समझाइए ।

Unit III (इकाई III)

6. Describe developmental tasks during the life span in physical, emotional and cognitive areas. 10

जीवन-चक्र में शारीरिक, भावनात्मक व संज्ञानात्मक विकासार्त्मक कार्यों का वर्णन कीजिए ।

7. Explain method of child study-observation and case study in detail. 10

बाल अध्ययन की विधियाँ-अवलोकन और केस स्टडी विस्तार से समझाइए ।

Unit IV (इकाई IV)

(5-12/20)L-37007

5

P.T.O.

- (स) उपभोक्ता की कोई दो जिम्मेदारियाँ बताइए ।
 (द) उपभोक्ता शिक्षा से आपका क्या तात्पर्य है ?
 (इ) उपभोक्ता शिकायत क्या है ?
 (फ) दोषपूर्ण वस्तुओं से संबंधित एक समस्या का उदाहरण सहित उल्लेख कीजिए ।
 (ग) विश्व स्तर पर मान्यता प्राप्त किन्हीं दो उपभोक्ता संरक्षण एजेंसियों के नाम बताइए ।
 (ह) सी.जी.एस.आई. का फोकस क्या है ?



Roll No.

Total Pages : 04

NGSE/D-25 37008

CONSUMER EDUCATION

B23-HSC-104

Time : Three Hours]

[Maximum Marks : 20

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 9 (Unit V) is compulsory. All questions carry equal marks.
 प्रत्येक इकाई से एक प्रश्न चुनते हुए कुल पाँच प्रश्नों के उत्तर दीजिए । प्रश्न संख्या 9 (इकाई V) अनिवार्य है । सभी प्रश्नों के अंक समान हैं ।

Unit I (इकाई I)

1. Describe the safety precautions that must be followed when using major electrical appliances such as mixers, heaters, irons and washing machines.
 मिक्सर, हीटर, इस्त्री और वाशिंग मशीन जैसे प्रमुख विद्युत उपकरणों का उपयोग करते समय अपनाई जाने वाली सुरक्षा सावधानियों का वर्णन कीजिए ।
2. Discuss the role of family size, income, occupation and lifestyle in selecting household electrical equipments.
 घरेलू विद्युत उपकरणों के चयन में परिवार के आकार, आय, व्यवसाय और जीवनशैली की भूमिका पर चर्चा कीजिए ।

Unit II (इकाई II)

3. Who is a consumer ? Explain the role of a consumer in the market economy.

उपभोक्ता कौन है ? बाजार अर्थव्यवस्था में उपभोक्ता की भूमिका समझाइए ।

4. Explain various consumer rights and their significance in detail.

विभिन्न उपभोक्ता अधिकारों और उनके महत्व को विस्तार से समझाइए ।

Unit III (इकाई III)

5. Describe the Consumer Protection Act. How it protects the consumers' interests ?

उपभोक्ता संरक्षण अधिनियम का वर्णन कीजिए । यह उपभोक्ताओं के हितों की किस प्रकार रक्षा करता है ?

6. Discuss various common problems which are faced by a consumer in the market.

बाजार में उपभोक्ता के सामने आने वाली विभिन्न सामान्य समस्याओं पर चर्चा कीजिए ।

Unit IV (इकाई IV)

7. Describe how Citizen Consumer and Civic Action Group (CAG) works for consumer welfare.

नागरिक उपभोक्ता एवं नागरिक कार्रवाई समूह (सी.ए.जी.) उपभोक्ता कल्याण के लिए किस प्रकार कार्य करता है ?

8. Explain the structure and functions of the Consumer Education and Research Centre (CERC).

उपभोक्ता शिक्षा एवं अनुसंधान केंद्र (सी.ई.आर.सी.) की संरचना एवं कार्यों की व्याख्या कीजिए ।

Unit V (इकाई V)

Compulsory Question (अनिवार्य प्रश्न)

9. Write short answers (3-4 lines) of the following :

- (a) Mention two precautions while using an electric heater.
 - (b) How does availability of spare affect equipment selection ?
 - (c) Name any *two* responsibilities of a consumer.
 - (d) What do you mean by consumer education ?
 - (e) What is a consumer grievance ?
 - (f) Mention one problem related to defective goods with example.
 - (g) Name any *two* globally recognised Consumer Protection agencies.
 - (h) What is the focus of CGSI ?
- निम्नलिखित के संक्षिप्त उत्तर (3-4 पंक्तियों) लिखिए :
- (अ) विद्युत हीटर का उपयोग करते समय दो सावधानियाँ बताइए ।
 - (ब) स्थान की उपलब्धता उपकरण चयन को किस प्रकार प्रभावित करती है ?

26678

BSIT/D-25
FUNDAMENTAL OF EM WAVES
Paper : BSIT-103

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) Explain the concept of electric flux. (2)
(b) Define skin depth. (2)
(c) Write down the uses of series and parallel resonant circuits. (2)
(d) Discuss reflection and refraction of electromagnetic waves. (2)

UNIT-I

2. (a) State and prove Gauss's divergence theorem.
Discuss its practical applications. (5)
(b) Prove that $\nabla \cdot (\phi \vec{A}) = (\nabla \phi) \cdot \vec{A} + \phi (\nabla \cdot \vec{A})$. (3)

3. (a) Prove that the electric field is negative gradient of electric potential. (3)
- (b) Explain the concept of displacement current. (3)
- (c) Prove that $\nabla \cdot (\nabla \times \vec{A}) = 0$. (2)

UNIT-II

4. (a) Derive in detail the propagation of plane waves in the conducting and non-conducting media. (5)
- (b) Write four Maxwell's equations and discuss their physical significance. (3)
5. (a) State and prove Poynting theorem. (5)
- (b) Prove that electromagnetic waves are transverse in nature. (3)

UNIT-III

6. (a) Derive an expression for impedance of a parallel LCR circuit and find the resonance frequency. Discuss the condition of sharpness of resonance. (6)
- (b) Calculate the resonant frequency and quality factor of a series LCR circuit with $L = 3$ henry, $C = 27 \mu F$ and $R = 7 \Omega$. (2)

7. Derive expression for the relation between the e.m.f. and current in a circuit consisting of (i) resistance only, (ii) inductance only and (iii) capacitance only. (8)

UNIT-IV

8. (a) What do you mean by Transmission line? Write its equivalent circuit and define characteristics impedance. Write the losses of transmission line. (6)
- (b) An ideal lossless transmission line of $Z_0 = 60 \Omega$ is connected to unknown load impedance Z_L . If standing wave ratio = 4, calculate Z_L and reflection coefficient. (2)
9. (a) Explain the input impedance of open circuit and short circuit lines. Discuss how half wavelength and quarter wavelength lines act as circuit element? (5)
- (b) Explain the reactance properties of transmission lines. (3)

26679

BSIT/D-25

ELECTRONIC DEVICES AND CIRCUITS

Paper : BSIT-104

Time : Three Hours] [Maximum Marks : 40

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

Compulsory Question

1. (a) Write a short note on transition capacitance. (2)
- (b) What will be the voltage at the output of half wave voltage doubler, if the voltage at the secondary of the transformer is 40 volts? What will be the PIV of the diodes used? (2)
- (c) Why base in a BJT is very thin? Justify your answer. (2)
- (d) What are the advantages of the FET over BJT? (2)

UNIT-I

2. (a) Explain the Avalanche and Zener breakdown in a diode. (4)

- (b) What is a semiconductor? Distinguish between intrinsic and extrinsic semiconductor. (4)
3. (a) Explain the formation of a depletion layer in a PN junction diode. (4)
- (b) Draw the circuit diagram of zener diode as voltage regulator. Explain its working. (4)

UNIT-II

4. (a) Discuss the positive and negative unbiased shunt clipper with the help of suitable circuit diagrams. (4)
- (b) Explain the working of full wave rectifier. Derive the expression of ripple factor for full wave rectifier? (4)

5. (a) What do you mean by voltage multiplier circuit? Draw and explain half wave voltage doubler and half wave voltage multiplier circuit. (4)
- (b) Explain the working of half wave rectifier with suitable diagram. Derive the expression of rectifier efficiency and ripple factor for half wave rectifier. (4)

UNIT-III

6. (a) Discuss how the transistor can work as an amplifier. (4)
- (b) Discuss the early effect with its three consequences. (4)

7. (a) What is a junction transistor? Draw and explain the plot of potential under unbiased condition and when the transistor is biased in active region. (4)
- (b) Discuss various current components in a transistor under the normal biasing. (4)

UNIT-IV

8. (a) Draw and explain common drain low frequency model. (4)
- (b) Sketch the basic structure of N-channel Junction Field Effect transistor and explain its working. Also draw its circuit symbol. (4)
9. (a) Give the cross-section of N-channel depletion MOSFET and explain its working. (6)
- (b) Discuss the small signal model of field effect transistor. (2)

Roll No.

Total Pages : 3

26680

BSIT/D-25
ELECTRONIC COMMUNICATION-I

Paper : BSIT-105

Time : Three Hours] [Maximum Marks : 40

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

Compulsory Question

1. (a) List any two advantages of PAM.
(b) What is companding and why is it required?
(c) Define Shanon Hartely Theorem .
(d) Enlist the reason which makes digital communication system more popular. (2×4=8)

UNIT-I

2. (a) Derive the mathematical expression for Phase Modulation signal and draw its frequency spectrum. (4)
(b) What is demodulation? What are essentials in Demodulation? Draw the diode linear detector circuit and explain its working. (4)

26680/50/KD/447

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3. (a) In an FM system, when the AF is 500 Hz and AF voltage is 2.4 V the deviation is 4.8 kHz. If the AF voltage is now increased to 7.2 V. What is the new deviation? If the AF voltage is raised to 10 V, while the AF is dropped to 200 Hz, what are the deviations? Find the modulation index in each case. (4)
- (b) Draw the relation between Phase and frequency modulation. (4)

UNIT-II

4. (a) What do you understand by Aliasing? What are the steps involved in order to avoid Aliasing? (4)
- (b) What do you mean by natural sampling? Explain the concept of natural sampling in detail. (4)
5. (a) Explain the channel bandwidth requirement for a PAM Signal. (5)
- (b) For a low pass signal with $f_m = 30$ kHz, what should be minimum sampling frequency? (3)

UNIT-III

6. (a) Discuss the Noise considerations in PCM systems. (4)
- (b) What is Delta Modulation? Explain Delta Modulation with help of its transmitter and waveforms. (4)

7. (a) What is Companding? Why is it used in PCM? Make a PCM Transmitter block diagram showing where companding is used. (4)
- (b) What are advantages and disadvantages of Delta Modulation over PCM? (4)

UNIT-IV

8. (a) Write a short note on bandwidth requirements in digital communication system. (4)
- (b) What do you mean by echo suppressor? How is it different from echo cancellor? (4)
9. (a) An analog signal carries eight bits in each signal element. If 4000 elements are sent per second. Find bit rate and baud rate. (4)
- (b) Discuss different elements of digital communication systems. (4)

Roll No.

Total Pages : 3

301

NGSM/D-25

ZOOLOGY/FORENSIC SCIENCE
(Cell Biology and Animal Genetics)

Paper : B23-ZOO-301

(5-Year Integrated)

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt *five* questions in all, selecting *one* question from each unit. Question No. 1 is compulsory. Support your answer with neat and labelled diagram(s) wherever necessary.

Compulsory Question

1. Answer the following in brief :

- (a) Synapsis.
- (b) Heterochromatin.
- (c) Endocytosis.
- (d) Diffusion.
- (e) Nucleosome.
- (f) Phenotype.
- (g) Monozygotic twin.

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196 [P.T.O.
10/1

(h) Suicidal bags.

(i) Cell cycle.

(j) Protein factories of cell. (10×1=10)

UNIT-I

2. What is active transport? Describe the mechanism of active transport. (10)

3. Describe the structure of the Endoplasmic Reticulum (ER). How is rough ER different from smooth ER. (10)

UNIT-II

4. Describe the ultrastructure of nucleus with a well-labelled diagram. (10)

5. (a) Differentiate between cilia and flagella. (5)

(b) What are the functions of lysosomes? (5)

UNIT-III

6. What is heredity? Explain Mendel's Law of Independent Assortment with a suitable example. (10)

7. What is sex-linked inheritance? Discuss in detail the inheritance of a recessive sex-linked trait in humans with a suitable example. (10)

UNIT-IV

8. Explain briefly the following :

(a) Phenylketonuria. (5)

(b) Transgenic animals. (5)

9. Describe chromosomal abnormalities involving autosomes and sex chromosomes in humans. (10)

Roll No.

Total Pages : 3

309

NGSM/D-25

PHYSICS

(Thermodynamics and Statistical Physics)

Paper : B23-PHY-301

(CC-3/MCC-4)

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt *five* questions in all. Question No. 1 is compulsory. Select *one* question from each unit. All questions carry equal marks. Use of scientific (non-programmable) calculator is allowed.

1. (a) What is third law of thermodynamics? Write its mathematical form also.
- (b) Draw the P-T phase diagram of CO₂.
- (c) If the r.m.s. speed of hydrogen at N.T.P. is 1840 m/s, calculate the speed of oxygen molecule at N.T.P. Molecular weight of hydrogen and oxygen are 2 gm and 32 gm respectively.
- (d) What is a degenerate gas? (2.5×4=10)

309/3200/KD/49

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20/2

UNIT-I

2. (a) State and prove Carnot's theorem. (3)
(b) What is Joule-Thomson porous plug experiment? Explain its theory with diagram. (7)
3. (a) Define Kelvin absolute scale of temperature. Show that this scale agrees with the ideal gas scale. (4)
(b) Define entropy. Discuss its physical significance. Derive an expression for the change in entropy in terms of temperature and pressure. (6)

UNIT-II

4. (a) Drive the Clausius-Clapeyron heat equation
$$dP/dT = L/T(V_2 - V_1),$$
 where letters have their usual meanings. Also discuss the significance of equation. (6)
(b) Define and explain the thermodynamic functions, (i) Enthalpy and (ii) Helmholtz free energy. (4)
5. (a) Using Maxwell's thermodynamic relations derive relationship between two molar specific heats for a perfect gas. (5)
(b) Derive Stefan-Boltzmann Law using Maxwell's relations. Also explain the law. (5)

UNIT-III

6. (a) Show that entropy of a system is proportional to logarithm of probability of that system. (5)
(b) For a distribution of n distinguishable particles in two compartments of equal size, derive the expression for the probability for maximum and minimum probable macrostates. (5)
7. (a) Discuss the basic assumptions of statistical mechanics. (2)
(b) Show that probability distribution function of gas molecules in the speed range v to $v + dv$ is given by
$$P(v)dv = 4\pi(m/2\pi KT)^{3/2} v^2 \exp(-mv^2/2KT)dv.$$
 Also discuss the significance of function. (8)

UNIT-IV

8. (a) Derive Planck's law for black body radiation using Bose-Einstein distribution law. (5)
(b) What is Fermi gas? Derive an expression for the energy of a Fermi gas at absolute zero. (5)
9. (a) Derive Bose-Einstein's distribution formula and explain the phenomenon of Bose-Einstein condensation. (8)
(b) Explain the concept of zero point energy. (2)

NGSM/D-25

BOTANY

(Plant Physiology)

Paper : B23-BOT-301

(CC-3/MCC-4)

Scheme-A, B & C

Time : Three Hours]

[Maximum Marks : 50

Note : *Five* questions to be attempted in all, selecting *one* question from each unit. Question No. 1 will be compulsory.

Compulsory Question

1. Explain the following :

- (a) Define DPD?
- (b) Define critical concentration.
- (c) What is floating respiration
- (d) What is Hill reaction?
- (e) Why is abscisic acid (ABA) termed a "stress hormone"?
- (f) Name the two forms of auxin found in plants and state their biological activity.

(g) Why can't plants directly use atmospheric nitrogen (N_2), and what forms of nitrogen do they absorb from the soil?

(h) Name the two interconvertible forms of phytochrome.

(i) What is vivipary?

(j) What is scarification? (1×10=10)

UNIT-I

2. Discuss Cohesion-tension theory of ascent of sap in detail. (10)

3. Write short note on :

(a) Calvin cycle.

(b) Electron transport chain. (5×2=10)

UNIT-II

4. Write short notes on the following :

(a) Physiological role of Auxin.

(b) Role of abscisic acid (ABA) in stomatal regulation and drought response. (5×2=10)

5. Discuss the different pathways of oxidation of fatty acids. (10)

313/1350/KD/51

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313/1350/KD/51

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UNIT-III

6. What is phytochrome? Discuss its structure and physiological roles in detail. (10)

7. Describe the process of vernalization. How does cold treatment influence flowering in winter annuals and biennials? Discuss the hormonal and genetic mechanisms involved.

UNIT-IV

8. Describe the three phases of plant growth and their significance. (10)

9. What is senescence? Discuss physiological and biochemical changes that occur during leaf senescence. (10)

- (b) Show that the equations $xp - yq = x$, $x^2p + q = xz$ are compatible and find their solution. (5)

9. (a) Find the complete integral of the following equation using Charpit's method
 $2(z + xp + yq) = yp^2$. (5)

- (b) Solve :
 $(D^2 - DD' - 2D)z = \sin(3x + 4y)$. (5)

Roll No.

Total Pages : 4

315

NGSM/D-25
 MATHEMATICS
 (Differential Equations-I)
 Paper : B23-MAT-301
 (CC-3/MCC-4)
 Scheme-A, B & C

Time : Three Hours]

[Maximum Marks : 50

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) Determine the order and degree of following differential equations :

(i) $y = \frac{dy}{dx} + \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$.

(ii) $\left(\frac{d^2y}{dx^2}\right)^2 + \sin\left(\frac{dy}{dx}\right) = 0$. (2)

- (b) Solve the following differential equation

$(y - px)^2 = 1 + p^2$. (2)

- (c) Solve the differential equation

$\frac{d^3y}{dx^3} - 13\frac{dy}{dx} - 12y = 0$. (2)

315/4000/KD/34

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315/4000/KD/34

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(d) Solve $p \tan x + q \tan y = \tan z$. (2)

(e) Find the complete integral of
 $p - 3x^2 = q^2 - y$. (2)

UNIT-I

2. (a) Solve the differential equation :
 $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x$. (5)

(b) Solve :
 $(xy^2 + 2x^2y^3)dx + (x^2y - x^3y^2)dy = 0$. (5)

3. (a) Solve the differential equation
 $x - yp = ap^2$. (5)

(b) Find the orthogonal trajectories of the cardioid
 $r = a(1 - \cos \theta)$, where a is the parameter. (5)

UNIT-II

4. (a) Solve the differential equation
 $\frac{d^2y}{dx^2} + 4y = e^x + \sin 2x$. (5)

(b) Solve the differential equation
 $\frac{d^3y}{dx^3} - 7\frac{dy}{dx} - 6y = x^2e^{2x}$. (5)

5. (a) Solve the differential equation :
 $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} - 3y = x^2 \log x$. (5)

(b) Solve the differential equation :
 $x^2 \frac{d^2y}{dx^2} - 2x(1+x) \frac{dy}{dx} + 2(1+x)y = x^3$. (5)

UNIT-III

6. (a) Solve the simultaneous equations
 $\frac{dx}{dt} + 4x + 3y = t$

$\frac{dy}{dt} + 2x + 5y = e^t$. (5)

(b) Solve the simultaneous equations
 $\frac{xdx}{z^2 - 2yz - y^2} = \frac{dy}{y + z} = \frac{dz}{y - z}$. (5)

7. (a) Solve the total differential equation
 $2yz \, dx + zx \, dy - xy(1 + z)dz = 0$. (5)

(b) Solve the partial differential equation
 $(x^2 - y^2 - yz)p + (x^2 - y^2 - zx)q = z(x - y)$. (5)

UNIT-IV

8. (a) Find the integral surface of the partial differential equation

$(x - y)p + (y - x - z)q = z$
 through the circle $z = 1, x^2 + y^2 = 1$. (5)

NGSM/D-25

339

MATHEMATICS

(Differential Equations)

Paper : B23-MAT-304

Time : Three Hours]

[Maximum Marks : 50

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) Find the differential equation of the family of curves $y = Ae^x + Be^{-x}$, where A and B are arbitrary constants. (2)
- (b) Find the integrating factor of $x^2 y dx - (x^3 + y^3) dy = 0$. (2)
- (c) Prove that $\frac{1}{D} D = \int X dx$, no arbitrary constant being added. (2)
- (d) Prove that $y = x^3 + x^{-3}$ satisfy $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - 9y = 0$. (2)
- (e) Show that the equations $p = 6x + 3y$, $q = 3x - 4y$ are compatible. (2)

UNIT-I

2. (a) Solve the differential equation

$$x \frac{dy}{dx} + 2y = x^2 \log x. \quad (5)$$
- (b) Find the integrating factor and solve the differential equation $ydx - xdy + \log x \, dx = 0$. (5)
3. (a) Solve $p^2(x^2 - a^2) - 2pxy + y^2 - b^2 = 0$. (5)
- (b) Solve $(x^2 + y^2 + 2x)dx + 2ydy = 0$. (5)

UNIT-II

4. (a) Show that the system of confocal conics

$$\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$$
is self-orthogonal. (5)
- (b) Solve $\frac{d^2y}{dx^2} + y = \sec x$. (5)
5. (a) Solve the differential equation

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = x + \sin x. \quad (5)$$
- (b) A family of parabolas has a common focus and common axis. Find the orthogonal family. (5)

UNIT-III

6. (a) Apply the method of variation of parameters to solve the equation

$$(1-x) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = (1-x)^2. \quad (5)$$

- (b) Solve the following simultaneous equations

$$\frac{dx}{z(x+y)} + \frac{dy}{z(x-y)} = \frac{dz}{x^2 + y^2}. \quad (5)$$

7. (a) Solve the following differential equation by using the method of undetermined coefficient

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} - 6y = 10e^{2x} - 18e^{3x} - 6x - 11. \quad (5)$$
- (b) Solve the differential equation

$$(x^2D^2 - 3xD + r)y = x^m. \quad (5)$$

UNIT-IV

8. (a) Solve $p \tan x + q \tan y = \tan z$. (5)
- (b) Find the complete integral of $q + xp = p^2$ using Charpit's method. (5)
9. (a) Find the complete integral of $p^2y(1+x^2) = qx^2$. (5)
- (b) Solve $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = \sin x$. (5)

Roll No.

Total Pages : 3

343

NGSM/D-25
CHEMISTRY
(Minor Chemistry-III)
Paper-B23-CHE-304

Time : Three Hours]

[Maximum Marks : 50

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

Compulsory Question

1. (a) Write the formula of Inorganic benzene. Why is it so called? (2½)
- (b) Discuss the effect of dilution on specific conductance and molar conductance. (2½)
- (c) Define internal energy. Why absolute value of internal energy cannot be calculated? (2½)
- (d) Explain homolytic and heterolytic bond fission with suitable example. (2½)

UNIT-I

2. (a) Discuss the preparation and structure of Diborane. (5)
- (b) Draw the structure of P_4O_6 & P_4O_{10} and identify the number of single and Double P-O bonds present in the structures. (5)

343/850/KD/1069

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3. (a) Explain, H_3PO_3 is dibasic while H_3PO_4 is tribasic in nature. (3)

(b) Discuss the acidic strength of the followings with suitable reasons :

HOCl , HClO_2 , HClO_3 , HClO_4 . (7)

UNIT-II

4. (a) Define the following terms :

(i) Molar conductance.

(ii) Specific conductance.

(iii) Buffer action and solution. (6)

(b) Define buffer solutions. Give the importance of buffer solutions in industrial process. (4)

5. (a) State and explain Kohlrausch's Law. (5)

(b) The equivalent conductance at infinite dilution for HCl , CH_3COONa and NaCl are 396, 78 and $109 \text{ S cm}^2 \text{ eq}^{-1}$ respectively. Calculate the equivalent conductance at infinite dilution of CH_3COOH . (5)

UNIT-III

6. (a) Define system. Explain types of systems with example. (6)

(b) Define isothermal and isochoric processes. (4)

7. (a) Explain extensive and intensive properties giving two examples of each. (6)

(b) State and explain *first law of thermodynamics*. (4)

UNIT-IV

8. (a) What are reactive intermediates? Classify them. (2+3=5)

(b) Explain different types of organic reactions. (5)

9. (a) Define electrophiles and nucleophiles. Discuss their classification. (6)

(b) Discuss the structure and stability of carbenes. (4)

Roll No.

Total Pages : 05

GSM/D-25 **1204**

SOLID GEOMETRY

Paper : BM-113

Time : Three Hours]

[Maximum Marks : 40

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

(Compulsory Question)

1. (a) Find the equation of tangent to the conic :

$$x^2 + 2xy - y^2 + 2x + 4y + 1 = 0$$

at the point $(-2, 1)$.

2

- (b) Show that the two spheres :

$$x^2 + y^2 + z^2 + 6y + 2z + 8 = 0$$

$$\text{and } x^2 + y^2 + z^2 + 6x + 8y + 4z + 20 = 0$$

are orthogonal.

2

- (c) Find the equation of the right circular cylinder whose axis is the z -axis and radius a .

2

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(b) Find the limiting points of the co-axial system of

spheres :

$$x^2 + y^2 + z^2 + 3x - 3y + 6 = 0,$$

$$x^2 + y^2 + z^2 - 6y - 6z + 6 = 0.$$

5. (a) Find the equation of the right circular cone with vertex $(1, -2, -1)$, semi-vertical angle 60° and axis :

$$\frac{x-1}{3} = \frac{y+2}{-4} = \frac{z+1}{5}.$$

Prove also that the plane $3x - 4y + 5z = 56$ cuts it in a circle.

- (b) Find the angle between the lines of section of the plane $x + 3y - 2z = 0$ and the cone $x^2 + 9y^2 - 4z^2 = 0$.

Section III

6. (a) Find the equations of the two tangent planes which contain the lines given by :

$$7x + 10y = 30, \quad 5y - 3z = 0$$

and touch the ellipsoid $7x^2 + 5y^2 + 3z^2 = 60$.

- (d) Define conjugate diameters. 1

- (e) Write any one property of generating lines of hyperbolic paraboloid. 1

Section I

2. Show that the conic $8x^2 - 24xy + 15y^2 + 48x - 48y = 0$ represents a hyperbola and hence find its eccentricity, lengths and equations of the axes and foci. 8

3. (a) Find the equation of parabola which touches the conic :

$$x^2 + xy + y^2 - 2x - 2y + 1 = 0$$

at the point where it is cut by the line $x + y + 1 = 0$.

- (b) Prove that the confocal conics through any point in the plane of ellipse intersect orthogonally. 4

Section II

4. (a) Obtain the equation of the sphere having the circle :

$$x^2 + y^2 + z^2 + 7y - 2z + 2 = 0,$$

$$2x + 3y + 4z - 8 = 0$$

as a great circle. 4

- (b) Find the radius of curvature for the curve
 $\vec{r} = 3a \cos 2\theta \hat{i} + 4c \sin^3 \theta \hat{j} + 4c \cos^3 \theta \hat{k}$ at $\theta = \frac{\pi}{4}$.
 (4)

9. (a) Find the involutes of the twisted cubic

$$x = u, y = u^2, z = u^3. \quad (4)$$

- (b) Find the envelope of the sphere

$$(x - a \cos \theta)^2 + (y - a \sin \theta)^2 + z^2 = b^2. \quad (4)$$

Roll No.

Total Pages : 4

1402

GSM/D-25
MATHEMATICS
 (Advanced Calculus)
 Paper-BM-231

Time : Three Hours] [Maximum Marks : 40

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

Compulsory Question

1. (a) Prove that $f(x) = |x|$ is continuous. (2)
- (b) Write the statement of Lagrange's mean value theorem. (1½)
- (c) If $u = e^{xy}$ then find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$. (1½)
- (d) Define Saddle point. (1½)
- (e) Define osculating plane. (1½)

SECTION-I

2. (a) Prove that the function defined by

$$f(x) = \sin \frac{1}{x}, x \in \mathbb{R}^+$$

is continuous but not uniformly continuous on $\mathbb{R}^+$. (4)

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1402/800/KD/14

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- (b) Verify Rolle's theorem for the function $f(x) = (x-a)^m(x-b)^n$ in interval $[a, b]$ where m, n are positive integers. (4)

3. (a) Expand $e^{ax} \sin bx$ by Maclaurin's theorem with Cauchy's form of remainder after n terms. (4)

(b) Show that $\lim_{x \rightarrow 0^+} \frac{(1+x)^{1/x} - e + \frac{ex}{2}}{x^2} = \frac{11e}{24}$ (4)

SECTION-II

4. (a) Let $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ be defined by $f(x, y) = x \sin \frac{1}{y} + y \sin \frac{1}{x}$, $x \neq 0, y \neq 0$

Prove that $\lim_{(x,y) \rightarrow (0,0)} f(x, y) = 0$. (4)

- (b) Show that the function

$$f(x, y) = \begin{cases} \frac{xy}{\sqrt{x^2 + y^2}}; & (x, y) \neq (0, 0) \\ 0 & ; (x, y) = (0, 0) \end{cases}$$

is continuous at $(0, 0)$. (4)

5. (a) If $\theta = t^n e^{-r^2/4t}$, find the value of n for which $\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \theta}{\partial r} \right) = \frac{\partial \theta}{\partial t}$. (4)

- (b) If $u = \tan^{-1} \frac{x^3 + y^3}{x - y}$, prove that

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \sin^2 u (1 - 4 \sin^2 u). \quad (4)$$

SECTION-III

6. (a) Show by an example that function f is differentiable at a point whereas f_x, f_y exist but discontinuous at that point. (4)

- (b) For the function

$$f(x, y) = \begin{cases} \frac{1}{4}(x^2 + y^2) \log(x^2 + y^2), & (x, y) \neq (0, 0) \\ 0 & , (x, y) = (0, 0) \end{cases}$$

show that $f_{xy} = f_{yx}$ for all x, y but the conditions of Schwarz's theorem are not satisfied. (4)

7. (a) Examine the maximum and minimum values of the function $\sin x + \sin y + \sin(x + y)$. (4)
- (b) Find the maximum and minimum distance of the point $(3, 4, 12)$ from the sphere $x^2 + y^2 + z^2 = 1$ using Lagrange's method of multipliers. (4)

SECTION-IV

8. (a) Find the equation of osculating plane of the curve $x = 2 \log t, y = 4t, z = 2t^2 + 1$. (4)

9. (a) Find the temperature in a bar whose ends $x = 0$ and $x = 1$ are insulated and initial temperature is $k \sin 2\pi x$. (4)

- (b) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, which satisfies the boundary conditions

$$u(0, y) = u(\pi, y) = 0 \text{ for all } y, \quad u(x, 0) = k, \\ 0 < x < \pi, \text{ and } u(x, \infty) = 0, \quad 0 < x < \pi. \quad (4)$$

Roll No. Total Pages : 4

1403

GSM/D-25
MATHEMATICS
(Partial Differential Equations)
Paper-BM-232

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) Find the differential equations of the set of all right circular cones whose axes coincide with z axis. (1½)

- (b) Examine whether the partial differential equations are compatible or not

$$p = 6x + 3y, \quad q = 3x - 4y. \quad (1½)$$

- (c) Write Charpit's Auxiliary equations for the partial differential equation

$$z^2 = 1 + p^2 + q^2. \quad (1½)$$

- (d) Classify the partial differential equation

$$\frac{\partial^2 z}{\partial x^2} + x^2 \frac{\partial^2 z}{\partial y^2} = 0, \quad x \neq 0. \quad (1½)$$

- (e) Find the characteristics equation of

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 0. \quad (2)$$

UNIT-I

2. (a) Obtain a partial differential equation by eliminating functions from

$$z = f(x - ay) + g(x + ay). \quad (4)$$

- (b) Solve the equation :

$$(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx. \quad (4)$$

3. (a) Find the Complete integral of $q + xp = p^2$ by using Charpit's method. (4)

- (b) Solve the partial differential equation

$$z^2(p^2 + q^2 + 1) = 1. \quad (4)$$

UNIT-II

4. (a) Solve $(D^3 - 4D^2D' + 4DD'^2)z = 2 \sin(3x + 2y)$. (4)

- (b) Solve $(D^2 + 2DD' + D'^2)z = e^{2x+3y}$. (4)

5. (a) Solve

$$x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} + x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} - z = 0. \quad (4)$$

- (b) Solve

$$x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} = x^2 y. \quad (4)$$

UNIT-III

6. (a) Classify and reduce the equation

$$\frac{\partial^2 z}{\partial x^2} - 5 \frac{\partial^2 z}{\partial x \partial y} + 6 \frac{\partial^2 z}{\partial y^2} = 0 \text{ to Canonical form.} \quad (4)$$

- (b) Reduce

$$y^2 \frac{\partial^2 z}{\partial x^2} - 2xy \frac{\partial^2 z}{\partial x \partial y} + x^2 \frac{\partial^2 z}{\partial y^2} = \left(\frac{y^2}{x} \right) \frac{\partial z}{\partial y} + \left(\frac{x^2}{y} \right) \frac{\partial z}{\partial y}$$

to Canonical form and hence solve it. (4)

7. (a) Solve $(q + 1)s = (p + 1)t$. (4)

- (b) Solve $2pr + 2qt - 4pq(rt - s^2) = 1$. (4)

UNIT-IV

8. (a) Find the characteristics of

$$y^2 \frac{\partial^2 z}{\partial x^2} - x^2 \frac{\partial^2 z}{\partial y^2} = 0. \quad (4)$$

- (b) Solve the Cauchy problem for the equation

$$\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 0, \text{ subject to the initial conditions}$$

$$z(x, 0) = f(x) \text{ and } \frac{\partial z}{\partial y} \Big|_{y=0} = g(x). \quad (4)$$

Roll No.

Total Pages : 5

1404

GSM/D-25
MATHEMATICS
(Statics)

Paper : BM-233

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 the component of a force F along two directions making angles 45° and 30° with it in opposite sides.
- (b) Find the resultant of two unlike parallel forces 40 N and 5 N acting at A and B respectively where $AB = 40$ cm.
- (c) What are the conditions of equilibrium of any number of coplanar forces acting on a rigid body?
- (d) Find the equation of the conjugate line of the given line

$$\frac{x-f}{l} = \frac{y-d}{m} = \frac{z-h}{n}.$$

1404/800/KD/41

121 [P.T.O.]

SECTION-I

2. (a) Two forces $P + Q$ and $P - Q$ make an angle 2α with one another and their resultant makes an angle Θ with the bisector of angle between them, show that $P \tan \Theta = Q \tan \alpha$.
 (b) Two like parallel forces P and Q act at a given points of body. If Q be changed to $\frac{P^2}{Q}$ show that the line of action of the resultant is same as it would be if the forces were simply interchanged.
3. (a) Forces P, Q, R act respectively along the sides BC, CA, AB of a triangle ABC . Show that if their resultants pass through the orthocenter then $P \sec A + Q \sec B + R \sec C = 0$.
 (b) Three forces $3P, 7P, 5P$ act along the sides AB, BC, CA of an equilateral triangle ABC . Find the magnitude and direction of their resultant and also find the point E in which line of action meet BC .

SECTION-II

4. (a) A uniform rod AB can turn freely about a hinge at A and to the other end B is attached to a string which passes over a smooth pulley at C , vertically above A and supports a mass of weight P at its free end. Prove that in the position of equilibrium, $BC = \frac{2P}{W} \cdot AC$.
 (b) Find the Centre of gravity of a right circular solid cone.
5. (a) A uniform beam of length $2a$, rests in equilibrium against a smooth vertical wall and upon a peg at a distance ' b ' from the wall. Show that the inclination of the beam to vertical is $\sin^{-1} (b/a)^{1/3}$.
 (b) A heavy body is placed on a rough inclined plane of inclination α greater than the angle of friction, being acted upon by a force parallel to the plane and along the line of greatest slope. Find the limits between which the force must lie.

SECTION-III

6. Four equal jointed rods each of length a , are hung from an angular point which is connected by an elastic string with the opposite point. If the rods hang in the form of a square and if the modulus of elasticity of the string be equal to the weight of a rod, show that the natural length of the string is

$$\frac{a\sqrt{2}}{3}.$$

7. Equal forces act along the co-ordinate axis and the straight line. $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$. Find the equation

of the central axis of the system where $\langle l, m, n \rangle$ are directional cosines of the line.

SECTION-IV

8. Show that a given system of forces can be replaced by two forces, equivalent to the given system in an infinite number of ways and the tetrahedron formed by the two forces is of constant volume.
9. (a) Show that among the null lines of any system of forces four are generators of any hyperbolical two belonging to one system of generators and two to the other.

- (b) A heavy uniform beam rests between two smooth planes, each inclined at an angle $\frac{\pi}{4}$ to the horizontal, so that the beam is in a vertical plane and perpendicular to the line of intersection of the planes. Find the equilibrium position of the beam and test the stability.

Roll No.

Total Pages : 3

1407

GSM/D-25

PHYSICS

(Computer Programming and Thermodynamics)

Paper-V

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt *five* questions in all, selecting at least *one* from each unit. Question No. 1 is compulsory. Use of scientific (Non-Programmable) calculator is allowed.

Compulsory Question

1. (a) Convert the decimal number 99.5625 to binary number. (2)
- (b) How do declare the 'array' in Fortran? (2)
- (c) Explain why temperature of absolute zero as Kelvin scale cannot be attained? (2)
- (d) What is a triple point on a phase diagram? (2)

UNIT-I

2. What do you understand by term computer organization? Explain in detail. (8)

1407/650/KD/16

428/P.T.O.
20/12

3. (a) What is a 'If' statement? Give its types used in FORTRAN. (4)
- (b) What is 'rested-Do Loop'? Explain. (4)

UNIT-II

4. Develop an algorithm, flow-chart and write a program to solve quadratic equation. (8)
5. Write an algorithm, flow-chart and program to compute product of two matrices A and B of different dimensions. (8)

UNIT-III

6. What is Joule-Thomson effect? Deduce an expression for Joule-Thomson cooling produced in a vander Waal's gas. (8)
7. (a) State Carnot's theorem. Prove that the efficiency of a reversible heat engine is maximum. (5)
- (b) A Carnot engine has the same efficiency between 800 K and 400 K and between x K and 600 K (this being the temperature of the sink). Calculate x . (3)

UNIT-IV

8. (a) Derive Clapeyron's Latent heat equation :

$$\frac{dp}{dT} = \frac{L}{T(V_2 - V_1)}.$$
 (6)
- (b) Calculate the decrease in the melting point of ice, when the pressure increases by 1 atm. Given latent heat of ice = $3.36 \times 10^5 \text{ J kg}^{-1}$. The specific volumes of ice and water at 0°C are $1.091 \times 10^{-3} \text{ m}^3 \text{ kg}^{-1}$ and $10^{-3} \text{ m}^3 \text{ kg}^{-1}$ respectively. (2)
9. Define the four thermodynamical functions and hence derive Maxwell's thermodynamical relations. (8)

Roll No.

Total Pages : 3

GSM/D-25

1408

PHYSICS

(Wave and Optics-I)

Paper-VI

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt *five* questions in all. Q. No. 1 is compulsory. Select *one* question from each unit.

Compulsory Question

1. (a) Intensities of light due to two slits of young's double slit experiment are I and 4I. How far from the central maximum will the intensity be equal to the average intensity on the screen? (β is the fringe width). 2
- (b) Diffraction pattern is observed using green light. When green light is replaced by red light then bands become narrower and crowded? Defend or refute (with reason). 2
- (c) In what respect a zone plate is different from a convex lens? 2
- (d) Up to what order, a diffraction grating with 8000 lines per inch can exhibit diffraction, when the wavelength of light is 625 nm? 2

UNIT-I

2. (a) Explain Stoke's treatment of Reflection. 3

1408/650/KD/249

^{3/2}
[P.T.O.]
23/12

- (b) Describe the method to find thickness of a thin transparent sheet using biprism. Can you find thickness of a thick sheet also? 5

3. (a) An interference is observed due to two coherent sources A and B separated by a distance 4λ along the y-axis, where λ is the wavelength of the sources. A detector D is moved along the positive x-axis. Find the number of points on the x-axis, excluding the points $x = 0$ and $x = \infty$, at which the maxima will be observed. 3
- (b) Describe Fresnel's biprism. Explain in detail, how the wavelength of monochromatic source of light can be determined with its help? 5

UNIT-II

4. (a) The diameter of 40th Newton's ring in case of air film is 10 cm. If diameter of this ring shrinks to 8 cm in an oil film, then find the refractive index of oil. 3
- (b) Find expression for fringe width produced in case of interference in a wedge shaped film. 5
5. (a) If a shift of 100 circular fringes is observed then the movable mirror of Michelson Interferometer is shifted by 0.03 mm, then find wavelength of light used. 3
- (b) Describe an experimental arrangement for producing Newton's rings in reflected light. Derive an expression for radius. 3

UNIT-III

6. (a) Show that a zone plate has multiple foci. 3
- (b) Discuss the phenomenon of diffraction of a straight edge and find the positions of maxima and minima. 5

7. (a) How will you compare and contrast Fresnel and Fraunhofer Diffraction? 3
- (b) Discuss the formation of diffraction pattern when monochromatic light passes through (i) wide rectangular aperture (ii) narrow rectangular aperture. 5

UNIT-IV

8. A plane transmission grating having 500 lines per mm is used in a laboratory experiment. A plane wavefront of white light (390 nm to 780 nm) is incident on the grating.
- (a) What is the highest order of spectrum that can be observed for the wavelength $\lambda = 400$ nm? 2
- (b) With what wavelength (λ') does the above mentioned wavelength $\lambda = 400$ nm coincide in its third order of spectrum? 2
- (c) What orders of spectra are found to be absent if the width of opaque part is double the slit width? 2
- (d) "Higher the order of spectrum, higher will be the dispersion." Justify. 2
9. (a) Discuss analytically the diffraction at N-slits. 6
- (b) What will be the maximum number of intensity minima that can be observed in a Fraunhofer diffraction pattern of a single slit (width $10 \mu\text{m}$) illuminated by a laser beam (wavelength $0.630 \mu\text{m}$). 2

1409

GSM/D-25

CHEMISTRY

(Inorganic Chemistry (Theory))

Paper : VIII (CH-201)

Time : Three Hours]

[Maximum Marks : 32

Note :(i) Question paper contains 9 questions in all, out of which students will be required to attempt five questions.

(ii) Question No. 1 will be compulsory and students will be required to attempt atleast *two* questions from each Section.

Compulsory Question

1. (a) Write down electronic configuration of Mn (Z=25) and Hg (Z=80). (1.5)
- (b) Calculate spin magnetic moment of V^{3+} ion. (1.5)
- (c) Draw structure of EDTA ligand. (1.5)
- (d) Explain. AgCl is soluble in Liquid ammonia. (1.5)

1409/450/KD/468

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2/12

SECTION-A

2. (a) What are d-block elements? Why are they called transition elements? (4)
- (b) Describe the oxidizing reaction of potassium permanganate (KMnO_4) in acidic and basic medium. (3)
3. (a) Why transition metals are less reactive than s-block elements? (4)
- (b) Explain, Cu^{2+} is coloured and paramagnetic while Zn^{2+} is colourless and diamagnetic. (3)
4. (a) Explain structure and properties of TiO_2 . (4)
- (b) Write a note on spectral properties of d-block elements. (3)
5. (a) Explain, complexes of first transition series are mainly high spin while those of second and third transition series are of low spin. (4)
- (b) Explain Latimer diagram of Iron in acidic solution. (3)

SECTION-B

6. (a) List the basic postulates of Werner's theory of coordination compounds. (3)

1409/450/KD/468

2

- (b) Write the chemical formula of tetraaquadichlorochromium(III) nitrate and hexaaquanickel (IIperchlorate.) (3)
7. (a) How does Valence Bond Theory account for the fact that $[\text{CoF}_6]^{3-}$ is paramagnetic while $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic although both are octahedral. (3)
- (b) What do you mean by Chelate and Chelating agent? Explain with examples. (3)
8. (a) What are cationic and anionic complexes? Give one example of each. (3)
- (b) Write IUPAC name of following :
 $\text{K}_4[\text{Ni}(\text{CN})_4]$ and $\text{K}[\text{Ag}(\text{CN})_2]$ (3)
9. (a) Explain EAN rule and which of the two :
 $[\text{PdCl}_4]^{2-}$ or $[\text{Pd}(\text{NH}_3)_6]^{4+}$ (3)
- (b) Write and explain reactions in liquid SO_2 with suitable examples. (3)

1409/450/KD/468

3

Roll No.

Total Pages : 3

1410

GSM/D-25

PHYSICAL CHEMISTRY (THEORY)

Paper-IX (CH-202)

Time : Three Hours]

[Maximum Marks : 32

Note : Question No. 1 is compulsory. Attempt *five* questions in all, selecting at least *two* questions from each section.

Compulsory Question

1. (a) What is physical significance of Internal Energy? 2
- (b) Define heat and calorie. 2
- (c) Explain chemical potential. 2
- (d) Why zinc is used for desilverisation of lead in Purple's process? 2

SECTION-A

2. (a) Explain first law of thermodynamics mathematically and explain one application of it. 4
- (b) Derive the relationship $C_p - C_v = nR$. 2
3. (a) Explain the work done in a reversible contraction is minimum. 3
- (b) Define Joule-Thomson co-efficient (μ) and explain its significance. 3

1410/450/KD/250

P.T.O.

4/12

4. (a) Derive the relation $\mu = \frac{1}{C_p} \left[\frac{2a}{RT} - b \right]$. 4
 (b) Calculate inversion Temperature (T_i) from above equation. 2
5. (a) Calculate w , q , ΔU and ΔH is an isothermal expansion of an ideal gas. 4
 (b) Compare isothermal and adiabatic expansion of ideal gases. 2
9. (a) What is degree of hydrolysis? Give expression for degree of hydrolysis (K_h) is salts of
 (i) Weak acid and strong base. 4
 (ii) Strong acid and weak base. 4
 (iii) Weak acid and weak base. 4
 (b) Why 100% extraction is not possible during any number of lots of solvent are used? 2

SECTION-B

6. (a) Give thermodynamic derivation of law of mass action. 4
 $\Delta G^\circ = -RT \ln K_p$. 4
 (b) The standard free energy change ΔG° of a reaction at 298 K is 28.5 kJ. Calculate value of K_p . 2
7. (a) Derive Van't Hoff equation for reaction isochore

$$\frac{d \ln K_p}{dT} = \frac{\Delta H}{RT^2}$$

- Also write down its integrated form. 4
- (b) What is the condition that equilibrium constant (K) does not changes with temperature. 2
8. (a) Derive Nernst distribution law thermodynamically. 3
 (b) Derive modified Nernst distribution law when solute undergoes dissociation. 3

Roll No.

Total Pages : 3

1411

GSM/D-25
CHEMISTRY
Organic Chemistry-(Theory)
Paper-X (CH-203)

Time : Three Hours] [Maximum Marks : 32

Note : Attempt *five* questions in all, selecting at least *two* questions from each Section. Question Number 1 carry 8 marks and all questions in Section A & B carry 6 marks each. Question Number 1 is compulsory.

Compulsory Question

1. (a) Compare the acidic character of 1°, 2° and 3° alcohols.
- (b) Which is stronger acid phenol or p-nitrophenol? Give reason.
- (c) How can we distinguish between cis-and trans-isomers of stilbene on the basis of UV spectroscopy? Explain.
- (d) Describe Hunsdiecker reaction. (2,2,2,2)

1411/450/KD/521

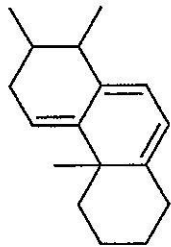
127 [P.T.O.
6/12

SECTION-A

2. (a) Discuss the mechanism of pinacol-pinacolone rearrangement?
(b) Discuss the mechanism of reduction of aldehydes with LiAlH_4 . (3,3)
3. (a) Discuss the mechanism of reaction of alcohols with phosphorus halides?
(b) Write the mechanism of Rierner-Tiemann reaction. (3,3)
4. (a) Write the mechanism of Fries Rearrangement reaction.
(b) How will you bring out the following conversions?
Write the chemical reactions :
(i) Phenol into picric acid.
(ii) Chlorobenzene into Phenol. (3,3)
5. (a) Describe the Dow's process for the manufacture of Phenol.
(b) Give the mechanism of base-catalysed hydrolysis of unsymmetrical epoxides. (3,3)

SECTION-B

6. (a) Using Woodward-Fieser rules, calculate the value of absorption maximum for the following compound.



- (b) Explain the principle of UV spectroscopy. (3,3)
7. (a) What type of electronic transitions are possible for each of the following compounds :
(i) Dimethyl ether
(ii) Acetaldehyde
(iii) Cyclopentene.
(b) Explain why a polar (protic or aprotic) solvent usually shifts the $\pi-\pi^*$ transition to longer wavelength and $n-\pi^*$ transition to shorter wavelength. (3,3)
8. (a) Compare and explain the acidic strength of o-, m- and p-chlorobenzoic acids with that of benzoic acid.
(b) Define auxochromes and chromophores. Give examples. (3,3)
9. (a) Discuss the relative stability and order of reactivity of acid derivatives towards nucleophilic substitution reactions.
(b) Discuss the mechanism of alkaline hydrolysis of esters. (3,3)

Roll No.

Total Pages : 3

1416

GSM/D-25

ZOOLOGY

(Life and Diversity of Chordates-I)

Paper-I

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt 5 questions in all. Question No. 1 is compulsory. The student must attempt 4 more questions selecting at least *two* questions each from Unit A and B.

Compulsory Question

1. Answer the following questions.

- (a) What are the three basic characteristics of chordates?
- (b) *Molgula* belongs to which order?
- (c) Write the complete classification of *Herdmania*?
- (d) Write the name of the structure which regulates the flow of blood in *Herdmania*.
- (e) Name the excretory organs present in *Branchiostoma*.
- (f) Why *Petromyzon* is included in Agnatha?
- (g) What is a Nursery pond?

1416/250/KD/133

96 [P.T.O.]

(h) What is bulbous arteriosus?

(i) What are Weberian ossicles?

(j) Name the fish with a brood pouch in male?
(1.5×10=15)

UNIT-I

2. Give an account of the blood vascular system of Herdmania and the course of circulation. (6.25)

3. (a) Make a well labelled diagram of neural complex of *Herdmania*. (3)

(b) Write a note on reproductive system of *Herdmania*. (3.25)

4. Describe the structure of notochord in Amphioxus. Discuss its homology in the hemichordate and tunicate. (6.25)

5. Write short notes on :

(a) Solenocytes. (3)

(b) Wheel organ. (3.25)

SECTION-B

6. Describe in detail the urinogenital system of *Labeo*. (6.25)

7. Write notes on :

(a) Well labelled diagram of Buccal funnel of *Petromyzon*. (3)

(b) Skeleton in *Petromyzon*. (3.25)

8. Explain the digestive system of *Labeo*. (6.25)

9. Write notes on :

(a) Lateral line system of *Labeo*. (3.25)

(b) Fish fins. (3)

9. Write short notes on the following :

निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :

(a) Types of Bones.

हड्डियों के प्रकार।

(b) Bone growth and resorption.

अस्थि वृद्धि और पुनर्अवशोषण।

3.25

3

Roll No.

Total Pages : 4

1417

GSM/D-25

ZOOLOGY

(Mammalian Physiology-I)

Paper-II

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt *five* questions in all, selecting *two* questions from each unit. Question No. 1 is compulsory.

नोट : प्रत्येक इकाई से दो प्रश्न चुनकर कुल पाँच प्रश्न हल कीजिए। प्रश्न संख्या 1 अनिवार्य है।

Compulsory Question

(अनिवार्य प्रश्न)

1. Answer in less than 20 words :

20 शब्दों से कम में उत्तर दीजिए :

(a) Define amphipathic molecules with example.

उभयचर अणुओं को उदाहरण सहित परिभाषित कीजिए।

(b) What is the isoelectric point of a protein?

प्रोटीन का समविद्युत बिंदु क्या है?

(c) Give an example of a coenzyme.

सहएंजाइम का एक उदाहरण दीजिए।

1417/250/KD/65

4

1417/250/KD/65/Trans.

106 [P.T.O.]

- (d) State one difference between passive and active transport.
निष्क्रिय और सक्रिय परिवहन के बीच एक अंतर बताइए।
- (e) Name one physiological buffer system in mammals.
स्तनधारियों में एक शारीरिक बफर तंत्र का नाम बताइए।
- (f) Define Basal Metabolic Rate (BMR).
आधारीय उपापचय दर (BMR) को परिभाषित कीजिए।
- (g) What is tetanus in muscles?
मांसपेशियों में टिटनेस क्या है?
- (h) Mention one role of Vitamin D.
विटामिन D की एक भूमिका बताइए।
- (i) Name the structural unit of bone.
हड्डी की संरचनात्मक इकाई का नाम बताइए।
- (j) State one function of smooth muscle.
चिकनी पेशी का एक कार्य बताइए। (10×1.5=15)

UNIT-I (इकाई-I)

2. Write short notes on the following :
निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :
(a) Classification of carbohydrates.
कार्बोहाइड्रेट का वर्गीकरण। 3.25
- (b) General properties of lipids.
लिपिड के सामान्य गुण। 3
3. Explain the Mechanism of enzyme action.
एंजाइम क्रिया की क्रियाविधि समझाइए। 6.25

1417/250/KD/65

2

4. (a) Describe the classification of enzymes.
एंजाइमों के वर्गीकरण का वर्णन कीजिए। 3.25
- (b) Differentiate between active and passive transport.
सक्रिय और निष्क्रिय परिवहन में अंतर बताइए। 3
5. Discuss the properties and functions of physiological buffers in maintaining pH homeostasis.
pH समस्थिति बनाए रखने में शारीरिक बफर्स के गुणों और कार्यों की चर्चा कीजिए। 6.25

UNIT-II (इकाई-II)

6. Explain the digestion of proteins.
प्रोटीन के पाचन की व्याख्या कीजिए। 6.25
7. Write short notes on the following :
निम्नलिखित पर संक्षिप्त टिप्पणियाँ लिखिए :
(a) Symbiotic digestion.
सहजीवी पाचन। 3
- (b) Control of enzyme secretion.
एंजाइम स्राव का नियंत्रण। 3.25
8. Describe the biochemical and physical events during muscle contraction.
पेशी संकुचन के दौरान जैव रासायनिक और भौतिक घटनाओं का वर्णन कीजिए। 6.25

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3

[P.T.O.]

1421

GSM/D-25

ELECTRONICS

(Digital Electronics-II)

(Theory)

Paper-II

Time : Three Hours]

[Maximum Marks : 40

Note :(i) There are *nine* questions in this paper. All questions carry equal marks.

(ii) Attempt *five* questions in all.

(iii) Question No. 1 is compulsory.

(iv) Attempt remaining *four* questions by selecting only *one* question from each unit.

Compulsory Question

1. (a) Write the uses of multiplexer. (2)
- (b) Name the asynchronous input signals in a flip-flop. Also write their uses. (2)
- (c) What do you mean by Binary counter? Write the uses of a counter. (2)
- (d) Write the applications of shift registers. (2)

1421/100/KD/137

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16/12

UNIT-I

2. (a) What is multiplexer? Design a full-adder using two 4 : 1 multiplexers. (4)
- (b) Design a full-adder using 3-to-8-line decoder. (4)
3. Explain BCD to seven-segment code converter and design using NAND gates only. (8)

UNIT-II

4. (a) Design a J-K flip-flop using D flip-flop. (4)
- (b) With the help of a schematic arrangement, explain how a J-K flip-flop can be used as a T flip-flop? (4)
5. (a) What is a clocked J-K flip-flop? What improvement does it have over a clocked R-S flip-flop? Also explain the synchronous behaviour of J-K flip-flop. (4)
- (b) With the help of a schematic arrangement, explain how a J-K flip-flop can be used as a D flip-flop. (4)

UNIT-III

6. Design a modulo-8 up-down counter using T-flip-flops. (8)

7. (a) Design a synchronous decade counter using T-flip-flops. (4)
- (b) Design a modulo-7 counter using T-flip-flops. (4)

UNIT-IV

8. (a) With the help of the circuit diagram explain the working of a 4-bit Parallel-in Serial-out (PISO) Shift Register. (6)
- (b) What are the differences between Ring counter and Johnson counter? (2)
9. (a) Discuss the working of Parallel-in Parallel-out (PIPO) shift register with circuit diagram. (4)
- (b) Explain, how a shift register can be used as Ring Counter? (4)

Roll No.

Total Pages : 3

1422

GSM/D-25

COMPUTER SCIENCE

(Data Structures)

Paper-I

Time : Three Hours]

[Maximum Marks : 40

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

Compulsory Question

1. (a) What is meant by a data field?
(b) What is pattern matching?
(c) What is an array?
(d) What is the key advantage of linked lists over arrays?
(e) What is a stack?
(f) In a simple queue, when does "front = rear = -1" occur.
(g) What is a tree?
(h) Name one advantage of adjacency list representation.

(8×1=8)

1422/250/KD/545

[P.T.O.]

2/12

UNIT-I

2. (a) Describe the different categories of data structures with examples. (4)
(b) Explain any four basic operations performed on data structures. (4)
 3. (a) Write a note on applications of data structures in real life. (4)
(b) Explain time-space trade-off with examples. (4)
- ### UNIT-II
4. (a) Describe array traversal, insertion, and deletion operations with suitable examples. (6)
(b) Write a short note on multidimensional arrays. How is a 2D array stored in memory. (2)

UNIT-III

6. (a) Explain the primitive operations on a stack with examples. (4)
(b) Write the algorithm for insertion (enqueue) and deletion (dequeue) in a simple linear queue. (4)

7. (a) Explain queue representation using arrays. (4)
(b) Describe stack representation using arrays. (4)
- ### UNIT-IV
8. (a) Describe various representation of a binary tree. (4)
(b) Write the algorithm for inorder traversal. (4)
 9. Describe different types of graphs: directed, undirected, weighted, simple, and complete graphs with diagrams. (8)

1423

GSM/D-25

COMPUTER SCIENCE
(Software Engineering)
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 marks.

Compulsory Question

1. (a) What do you understand by software crisis?
(b) What is control coupling?
(c) What are the factors affecting the cost of software?
(d) What is the objective of testing? What are the attributes of a good test?

UNIT - I

2. (a) What are the merits and demerits of waterfall model of software development?
(b) Define software engineering. Differentiate between evolutionary prototyping and throwaway prototyping.

1423/250/KD/475

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4/12

3. (a) What is software metric? Discuss LOC along with its limitations.
- (b) Write a note on spiral model of software development.

UNIT-II

4. (a) What do you understand by cohesion? Discuss the different types of cohesion using suitable examples.
- (b) Describe the technique of Interviews as an information gathering tool. What are the key advantages and disadvantages of using this method?

5. (a) What is SRS? Discuss what it means for an SRS requirement to be Verifiable and Traceable.
- (b) Differentiate between Functional Requirements and Non-Functional Requirements. Give one specific example for each in the context of an online banking system.

UNIT-III

6. (a) What are the quality attributes of software? What activities are to be carried out in software quality assurance? Explain.

- (b) What is the aim of analysis? What are the major problems during analysis? Explain the structured analysis technique using suitable examples.

7. (a) What is COCOMO model? Discuss in detail the different steps to estimate the cost of software using COCOMO.
- (b) Differentiate between the three main types of relationships (1 : 1, 1 : M, M : N) used in ER Diagrams. Give a suitable example of each.

UNIT-IV

8. (a) What do you understand by equivalence class partitioning? Discuss the process of identifying equivalent classes using suitable examples.
- (b) What is McCabe's Cyclomatic complexity? How do you compute it?
9. (a) What is boundary value analysis? What types of errors are detected by it?
- (b) What do you understand by structural testing and functional testing? What types of errors are detected by them?

हिन्दी (अनिवार्य) --for B.Sc.

Time : Three Hours]

[Maximum Marks : 40

नोट : निर्देशानुसार सभी प्रश्नों के उत्तर दीजिए।

1. निम्नलिखित में से किन्हीं दो अवतरणों की सप्रसंग व्याख्या कीजिए :

(क) वह सामरिक सिद्धांत भी औदार्य-पूर्ण पवित्र था-

भी युद्ध में ही शत्रुता, अन्यत वैरी मित्र था।

जय-लौभ में भी छल-कपट आने न पाता पास था,

प्रतिपक्षियों को भी हमारे सत्य का विश्वास था।

(ख) पैरों से ही लिपटा-लिपटा कर लूँगा निज पद निधरा।

अब तो छोड़ नहीं सकता हूँ, पाकर प्राप्य तुम्हारा द्वारा।

सुप्रभात मेरा भी होवे, इस रजनी का दुःख अपरा।

मिट जावें जो तुमको देखूँ, खोलो प्रियतम! खोलो द्वारा।।

(ग) हरे-हरे ये पात,

डालियाँ, कलियाँ कोमल गात।

मैं ही अपना स्वप्न मृदुलकर

फेरूँ निद्रित कलियों पर

जगा एक प्रत्यूष मनोहर।

(घ) दिये हैं मैंने जगत् को फूल-फल,

किया है अपनी प्रभा से चकित-चलः

पर अनश्वर था सफल पल्लवित पल-

ठाठ जीवन का वही।

(6×2=12)

2. जयशंकर प्रसाद अथवा मैथिलीशरण गुप्त में से किसी एक का साहित्यिक परिचय दीजिए। (6×1=6)

3. निम्नलिखित में से किसी एक विषय पर निबंध लिखें :

(क) नैतिक शिक्षा।

(ख) विज्ञान और औद्योगीकरण।

(ग) वैश्वीकरण और विज्ञान।

(घ) दूरदर्शन।

(ङ) मद्यनिषेध।

(8×1=8)

4. प्रशिक्षण स्तर में सुधार लाने हेतु सरकारी पत्र लिखिए।

अथवा

स्कूल बनवाने हेतु सरकारी पत्र लिखें।

(9×1=9)

5. निम्नलिखित शब्दों के हिंदी तकनीकी अर्थ लिखिए :

(क) गुच्छ।

(ख) अंशना।

(ग) वायुमंडल।

(घ) ज्वलन

(ङ) घर्षण।

(5×1=5)

Time : Three Hours]

[Maximum Marks : 40

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

नोट : प्रत्येक इकाई से दो प्रश्नों का चयन करते 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 :
निम्नलिखित पर संक्षिप्त टिप्पणी लिखिए :

(a) Balanced Diet.

संतुलित आहार।

(b) Dietary guidelines for Indians.

भारतीयों के लिए आहार संबंधी दिशानिर्देश।

(c) National Institute of Nutrition.

राष्ट्रीय पोषण संस्थान।

(d) Reference Man and Reference Woman. (2×4=8)

संदर्भ पुरुष और संदर्भ महिला।

UNIT-I (इकाई-I)

2. Define Meal Planning. Elaborate the principles applied for meal planning. 8

भोजन योजना को परिभाषित कीजिए। भोजन योजना के अंतर्निहित सिद्धांतों का विस्तार से वर्णन करें।

3. Describe the nutritional needs of infancy. Why is infancy considered as the critical period of growth and development. 8

शैशवावस्था की पोषण संबंधी आवश्यकताओं का वर्णन कीजिए। शैशवावस्था को वृद्धि और विकास का महत्वपूर्ण काल क्यों माना जाता है?

4. Discuss the following :

(a) Nutrition for school going children.

(b) Types of Supplementary Foods. (4×2=8)

निम्नलिखित पर चर्चा करें :

(क) स्कूल जाने वाले बच्चों के लिए पोषण।

(ख) पूरक खाद्य पदार्थों के प्रकार।

5. What are the principles of Diet Planning for adolescents? Enlist various problems faced at this stage of life cycle. 8

किशोरों के लिए आहार योजना के सिद्धांत क्या हैं? जीवन चक्र के इस चरण में आने वाली विभिन्न समस्याओं की सूची बनाइए।

UNIT-II (इकाई-II)

6. Discuss in detail the nutritional requirements for heavy, moderate and sedentary adult male worker. 8

भारी श्रमिक, मध्यम श्रमिक और गतिहीन श्रमिक वयस्क पुरुषों के लिए पोषण संबंधी आवश्यकताओं की विस्तार से चर्चा करें।

7. What are the various physiological changes associated with pregnancy? Describe the nutritional needs of a moderate worker pregnant woman. 8

गर्भावस्था से जुड़े विभिन्न शारीरिक परिवर्तन क्या हैं? एक मध्यम श्रमिक गर्भवती महिला की पोषण संबंधी आवश्यकताओं का वर्णन करें।

8. Enumerate the hormonal changes during lactation. What points are to be considered for planning meals of lactating mothers? 8

स्तनपान के दौरान होने वाले हार्मोनल परिवर्तनों को सूचीबद्ध करें। स्तनपान कराने वाली माताओं के भोजन की योजना बनाने समय किन बातों का ध्यान रखना चाहिए?

9. Elaborate various physiological changes and problems during old age. Suggest dietary modifications for an old person. 8

वृद्धावस्था में होने वाले विभिन्न शारीरिक परिवर्तनों और समस्याओं का वर्णन कीजिए। एक वृद्ध व्यक्ति के लिए आहार संशोधनों का सुझाव दें।

Roll No.

Total Pages : 5

1450

GSM/D-25

FAMILY DYNAMICS

Paper-203

Time : Three Hours]

[Maximum Marks : 40

Note : The candidate will attempt *five* questions in all, selecting *two* questions from each unit (Unit I and Unit II) Question No. 1 is compulsory.

नोट : उम्मीदवार प्रत्येक इकाई (इकाई I और इकाई II) से दो प्रश्नों का चयन करते हुए, कुल मिलाकर पाँच प्रश्नों का उत्तर दें। प्रश्न संख्या 1 अनिवार्य है।

Compulsory Question

(अनिवार्य प्रश्न)

1. Attempt any *eight* of the following :
निम्नलिखित में से कोई आठ प्रश्न करें :
 - (i) The movement from joint to nuclear family is a consequence of :
 - (a) Urbanization
 - (b) Industrialization
 - (c) Tertiary occupation
 - (d) All of the above.

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U84 [P.T.O.
18/12

संयुक्त से एकल परिवार की ओर बढ़ना परिणाम है :

- (अ) शहरीकरण का
- (ब) औद्योगीकरण का
- (स) तृतीयक व्यवसाय का
- (द) उपरोक्त सभी।

(ii) Name any *two* specific needs for intervention in the Indian context for reaching out to lower economic groups.

निम्न आर्थिक समूहों तक पहुंचने के लिए भारतीय संदर्भ में हस्तक्षेप की किन्हीं दो विशिष्ट आवश्यकताओं का नाम बताइए।

(iii) Define Population Education.

जनसंख्या शिक्षा को परिभाषित करें।

(iv) The concept of Single Parent family falls under which major change in the family structure?

एकल अभिभावक परिवार की अवधारणा पारिवारिक संरचना में किस प्रमुख परिवर्तन के अंतर्गत आती है?

(v) State one difference between demography and population dynamics.

जनसांख्यिकी और जनसंख्या गतिशीलता के बीच एक अंतर बताएं।

(vi) List two factors affecting family planning.

परिवार नियोजन को प्रभावित करने वाले दो कारकों की सूची बनाएं।

(vii) Which family function relates to the development of primary personality characteristics in children?

कौन सा पारिवारिक कार्य बच्चों में प्राथमिक व्यक्तित्व विशेषताओं के विकास से संबंधित है?

(viii) Name a Government of India policy/program that directly impacts the family's economic status.

भारत सरकार की एक नीति/कार्यक्रम का नाम बताएं जो परिवार की आर्थिक स्थिति पर सीधा प्रभाव डालता है।

(ix) Reproductive rights of women are a component of infant mortality and morbidity studies.

(True /False)
महिलाओं के प्रजनन अधिकार शिशु मृत्यु दर और रूग्णता अध्ययन का एक घटक हैं। (सही/गलत)

(x) What are the names of the widely used family planning programs in India? (8×1=8)

भारत में व्यापक रूप से उपयोग किए जाने वाले परिवार नियोजन कार्यक्रमों के नाम क्या हैं?

UNIT-I (इकाई-I)

(Attempt any *two*)

2. Define Family. Elaborate on the meaning and types of the family in detail. 8

परिवार को परिभाषित करें। परिवार के अर्थ एवं प्रकारों पर विस्तार से प्रकाश डालिए।

3. Discuss the meaning and functions of marriage. What are the key criteria considered for mate selection in the Indian context? 8

विवाह के अर्थ और कार्यों पर चर्चा करें। भारतीय संदर्भ में साथी चयन के लिए मुख्य मानदंड क्या माने जाते हैं?

4. What do you understand by changing face of the Indian family. Analyze the social and economic consequences of change, such as moving from joint to nuclear family. 8

भारतीय परिवार के बदलते स्वरूप से आप क्या समझते हैं? सामाजिक और आर्थिक परिणामों के परिवर्तन जैसे संयुक्त से एकल परिवार की ओर बढ़ना का विश्लेषण करें।

5. How does the influence of Media impact the structure and functions of the Indian family? 8

भारतीय परिवार की संरचना और कार्यों पर मीडिया किस प्रकार प्रभाव डालता है?

UNIT-II (इकाई-II)

(Attempt any two)

6. Define Family Planning. Describe the importance and permanent methods of family planning practices in India. 8

परिवार नियोजन को परिभाषित करें। भारत में परिवार नियोजन की प्रथाओं के महत्व और स्थायी तरीकों का वर्णन करें।

7. What is Demography? Highlight the need for population policy in India. 8

जनसांख्यिकी क्या है? भारत में जनसंख्या नीति की आवश्यकता पर प्रकाश डालिए।

8. Discuss the role of any two either national, or international agencies in population statistics. 8

जनसंख्या सांख्यिकी में किन्हीं दो राष्ट्रीय या अंतरराष्ट्रीय एजेंसियों की भूमिका पर चर्चा करें।

9. How do reproductive rights of women influence the success of health programmes like RCH? 8

महिलाओं के प्रजनन अधिकार आर.सी.एच. जैसे स्वास्थ्य कार्यक्रमों की सफलता को कैसे प्रभावित करते हैं?

GSM/D-25

1451

HOUSE HOLD EQUIPMENT AND
CONSUMER PROTECTION

Paper – 204

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt *five* questions in all, selecting *two* questions from each unit as well as compulsory question.

अनिवार्य प्रश्न के साथ प्रत्येक इकाई से दो प्रश्न चुनते हुए,
कुल पांच प्रश्न कीजिए।

Compulsory Question (अनिवार्य प्रश्न)

1. (a) Characteristics of good household equipments.
(b) Qualities of equipments design.
(c) Duties of consumer.
(d) Write name of government agencies for consumer protection.
(क) अच्छे घरेलू उपकरणों की विशेषताएं।
(ख) उपकरणों के डिजाइन के गुण।
(ग) उपभोक्ता के कर्तव्य।
(घ) उपभोक्ता संरक्षण के लिए सरकारी एजेंसियों के नाम लिखें।

(4×2=8)

UNIT-I (इकाई-I)

2. What is the difference between household equipments and tools?
Write about the factor affecting requirement of household equipments.

8

1451/50/KD/1123/Trans.

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घरेलू उपकरणों और औजारों में क्या अंतर है? घरेलू उपकरणों की आवश्यकता को प्रभावित करने वाले कारकों के बारे में लिखें।

3. How household equipment affect body posture and work efficiency? 8
घरेलू उपकरण शरीर की मुद्रा और कार्य क्षमता को कैसे प्रभावित करते हैं?

4. Write in detail about the following :

- (a) Hand operated and electrical equipments. 4
(b) Equipments for personal care and recreation. 4
निम्नलिखित के बारे में विस्तार से लिखें :
(क) हाथ से चलने वाले और बिजली के उपकरण।
(ख) व्यक्तिगत देखभाल और मनोरंजन के लिए उपकरण।

5. How can the structure and size of cleaning and washing equipments affect the time and effort required for household chores? 8
सफाई और धुलाई के उपकरणों की संरचना और आकार घरेलू कामों के लिए आवश्यक समय और प्रयास को कैसे प्रभावित कर सकते हैं?

UNIT-II (इकाई-II)

6. How do consumer rights and responsibility interact to create a balanced for both buyers and sellers? Explain. 8
उपभोक्ता अधिकार और जिम्मेदारी खरीदारों और विक्रेताओं दोनों के लिए संतुलन बनाने के लिए कैसे बातचीत करते हैं? व्याख्या कीजिए।

7. (a) Write in detail about the standards apply for the benefit of consumer protection. 5
(b) Discuss about the responsibilities of agencies for consumer protection. 3

(क) उपभोक्ता संरक्षण के फायदे के लिए लागू मानकों के बारे में विस्तार से लिखें।

(ख) उपभोक्ता संरक्षण के लिए एजेंसियों की जिम्मेदारियों के बारे में चर्चा करें।

8. Write the difference about the following :

- (a) Contract and instalment sales. 4
(b) Contract credit bank and approval buying. 4
नीचे दिए गए के बारे में अंतर लिखें
(क) अनुबंध और किस्तों में बिक्री।
(ख) अनुबंध और क्रेडिट बैंक अनुमोदन खरीदारी।

9. Explain legal problem in India faced by both buyer and seller. Write about the precautionary steps used by the government for minimise the legal problem in market. 8
भारत में खरीदार और बेचने वाले दोनों को होने वाली कानूनी समस्याओं के बारे में व्याख्या कीजिए। बाजार में कानूनी समस्याओं को कम करने के लिए सरकार द्वारा उठाए गए एहतियाती कदमों के बारे में लिखें।

Roll No.

Total Pages : 03

NGSM/D-25 37037

BASICS OF CLOTHING CONSTRUCTION
AND APPAREL DESIGN
B23-HSC-301

Time : Three Hours]

[Maximum Marks : 50

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

प्रत्येक इकाई से एक 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. Define the following in 2-3 lines each : 5×2=10

- (a) Apparel
- (b) Design
- (c) Weaving
- (d) Anthropometry
- (e) Fashion

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निम्नलिखित को 2-3 पंक्तियों में परिभाषित कीजिए :

- (अ) परिधान
- (ब) डिजाइन
- (स) बुनाई
- (द) मानवमिति
- (इ) फैशन ।

Unit I (इकाई I)

2. Write the down importance of apparel designing. 10
परिधान डिजाइनिंग का महत्त्व लिखिए ।
3. Explain application of elements of arts in apparel designing. 10
परिधान डिजाइनिंग में कला के तत्वों के अनुप्रयोग की व्याख्या कीजिए ।

Unit II (इकाई II)

4. Discuss the functions of loom. 10
करघे के कार्यों की चर्चा कीजिए ।
5. Write down about felted fabrics. 10
फेल्टेड कपड़ों के बारे में लिखिए ।

Unit III (इकाई III)

6. Explain advantage and disadvantage of drafting. 10

ड्राफ्टिंग के लाभ और हानि की व्याख्या कीजिए ।

7. Discuss principles of paper pattern. 10
पेपर पैटर्न के सिद्धांतों की चर्चा कीजिए ।

Unit IV (इकाई IV)

8. Write down the importance of fashion. 10
फैशन का महत्त्व लिखिए ।
9. Explain common fitting problems and their remedies. 10
फिटिंग सम्बन्धी सामान्य समस्याओं और उनके समाधानों की व्याख्या कीजिए ।



Roll No.

Total Pages : 02

NGSM/D-25

37039

LIFE SPAN DEVELOPMENT-I

B23-HSC-303

Time : Three Hours]

[Maximum Marks : 50

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. Explain the following : 4×2.5=10
- (a) Signs of pregnancy
 - (b) Normal birth process
 - (c) Reflexes in Infants
 - (d) Role of Family in child's socialization.

Unit I

2. Write about Teratogens and hazards to prenatal development. 10
3. Define stages of prenatal development. Explain prenatal growth and activities in the first trimester of pregnancy. 10

(8-18/5) L-37039

P.T.O.

Unit II

4. Explain the stages of delivery of baby and placenta. 10
5. Write about the complications during delivery. 10

Unit III

6. What are the common diseases and immunisation schedule during Infancy ? 10
7. Write about the Physical and Motor developments during Infancy. 10

Unit IV

8. Explain the following : 2×5=10
 - (a) Social and emotional development(3-6yrs)
 - (b) Role of peers in socialisation of a child.
9. Write notes on the following : 2×5=10
 - (a) Advantages of mobile phones in a young child's life
 - (b) Disadvantages of television in a young child's life.



Roll No.

Total Pages : 03

NGSM/D-25

37040

HYGIENE AND HUMAN PHYSIOLOGY

B23-HSC-304

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt *Five* questions in all. Q. No. 1 is compulsory.

Attempt *four* more questions, selecting *one* question from each Unit. All questions carry equal marks.

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

Compulsory Question (अनिवार्य प्रश्न)

1. (a) Define the term 'hygiene'.
'स्वच्छता' शब्द को परिभाषित कीजिए ।
- (b) What are the causes of AIDS ?
एड्स के कारण क्या हैं ?
- (c) Draw a well labelled diagram of animal cell.
जंतु कोशिका का एक सुसज्जित चित्र बनाइए ।

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P.T.O.

- (d) List the functions of adrenal gland. 4×2.5=10
अधिवृक्क ग्रंथि के कार्यों की सूची बनाइए ।

Unit I (इकाई I)

2. What are the different types of hygiene ? Explain in detail. 10
स्वच्छता के विभिन्न प्रकार क्या हैं ? विस्तार से समझाइए ।
3. Give an account of vaccination schedule. 10
टीकाकरण अनुसूची का विवरण दीजिए ।

Unit II (इकाई II)

4. Discuss the causes, symptoms and prevention of malaria. 10
मलेरिया के कारण, लक्षण और रोकथाम पर चर्चा कीजिए ।
5. What are the causes, symptoms and prevention of typhoid ? 10
टाइफाइड के कारण, लक्षण और रोकथाम क्या हैं ?

Unit III (इकाई III)

6. Compare and contrast mitosis and meiosis. 10
समसूत्री और अर्धसूत्री विभाजन की तुलना और अंतर बताइए ।

7. Explain structure and functions of liver. 10
यकृत की संरचना और कार्यों की व्याख्या कीजिए ।

Unit IV (इकाई IV)

8. Write in detail about composition and functions of blood. 10
रक्त की संरचना और कार्यों के बारे में विस्तार से लिखिए ।
9. Discuss structure and functions of pituitary gland. 10
पीयूष ग्रंथि की संरचना और कार्यों पर चर्चा कीजिए ।

26683

BSIT/D-25

TRANSISTOR & LINEAR INTEGRATED CIRCUITS

Paper : BSIT-302

Time : Three Hours]

[Maximum Marks : 40

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

Compulsory Question

1. (a) Why transistor h-parameter model is preferred over other models ? 2
- (b) What are the advantages of Integrated Circuit? 2
- (c) Why buried layer is required? 2
- (d) Explain the term virtual ground in an Operational amplifier. 2

UNIT-I

2. (a) Define in words & also as a partial derivative.
(i) h_{ic}
(ii) h_{rc}
Indicate what variable is held constant and give the dimension of each h-parameter. 4
- (b) Draw the circuit of a CE transistor configuration & give its h-parameter model. 4

26683/50/KD/743

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8/12

3. (a) Draw the circuit of an emitter follower. List its three most important characteristics. 4
- (b) Compare the three different configurations (CB, CE & CC). 4

UNIT-II

4. (a) Discuss the concept beam lead isolation. 3
- (b) Describe the process of Photolithography. 5
5. (a) Write a short note on Crystal Growth of substrate. 4
- (b) Describe the process of Epitaxial Growth. 4

UNIT-III

6. (a) How diodes are fabricated in Monolithic IC? Sketch the Cross-section of :
 - (i) Two types of Emitter base diode.
 - (ii) A diode pair using collector base region if the cathode is Common & anode is common. 4
- (b) Describe a Lateral pnp transistor. 4
7. (a) Define Sheet Resistance R_s . What is the order of magnitude of R_s for the base region & also for the emitter region? Sketch the Cross-section of an IC resistor along with its equivalent circuit. 6
- (b) How JFET is formed in an IC? 2

UNIT-IV

8. (a) Draw the circuit of Summing amplifier & derive the expression for its output voltage. 4
- (b) Discuss the Non-inverting amplifier & obtain the expression for its output voltage. 4
9. (a) An Inverting amplifier has $R_i = 20 \text{ k}\Omega$ and $R_f = 100 \text{ k}\Omega$. Assuming an ideal amplifier, determine the voltage gain & Output voltage. 2
- (b) Draw & explain the circuit of Double ended differential amplifier. Derive the expression for its output voltage. 6

26685

BSIT/D-25
MICROPROCESSOR, ARCHITECTURE
AND PROGRAMMING-I
Paper-BSIT-304

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. (i) Discuss EI and DI instructions.
- (ii) If the carry flag is zero, then show that the RAL instruction produces a multiplication of the accumulator contents by a factor of 2.
- (iii) Compare SAP-I, SAP-II, SAP-III and 8085 microprocessor.
- (iv) Discuss DAA instructions of 8085. Explain how flags are affected with this instruction. (4×2=8)

UNIT-I

2. (a) Name and discuss the different addressing modes to specify the instruction of SAP-II computers. (5)

26685/50/KD/1010

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(b) Write a program in assembly language using SAP-II instructions to complement a number lying at 2100 H memory location. Store the complement at 2101 H. (3)

3. (a) Draw the block diagram of SAP-I computer. Discuss the function of each block. (5)
- (b) Write an assembly language program that perform the following operation in SAP-I computer : $8 - 3 + 5 + 2 - 4$. Use memory locations 7H to BH for the data. (3)

UNIT-II

4. Explain what operations are performed when the following instructions are executed. Give at least one example for each operation. (i) LXI H, address, (ii) ADD M, (iii) PUSH and (iv) DAD H. (8)

5. (a) In how many groups the instruction set of SAP-III computers are classified. Explain with examples the instructions of Logical group. (6)

(b) What is the difference between the CMP reg and the SUB reg instructions? Explain with suitable examples. (2)

UNIT-III

6. Explain the following with reference to 8085 Microprocessor :

- (a) Program Counter.
- (b) Stack Pointer.
- (c) Program Status Word.
- (d) Timing & Control Unit.
- (e) Instruction register.
- (f) Memory address register.
- (g) Accumulator in 8085.
- (h) Flag register. (8)

7. (a) Explain the operations carried out when 8085 executes the instructions (i) MVI B, data, (ii) XCHG, (iii) DAD B and (iv) CALL. (6)
- (b) Write a short note on Fetch Execution overlap. (2)

UNIT-IV

8. What is the difference between software and hardware interrupts? Discuss the hardware interrupts of 8085. (8)
9. (a) Write a short note on : DMA. (4)
- (b) Explain RIM and SIM instructions. (4)

601

NGSQ/D-25

ECOLOGY & ENVIRONMENT

Paper-B23-ZOO-501

Time allowed : 3 Hours] [Maximum Marks : 50

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

प्रत्येक इकाई से एक प्रश्न का चयन करते हुए, कुल पाँच प्रश्नों के उत्तर दीजिए। प्रश्न संख्या 1 अनिवार्य है। सभी प्रश्नों के अंक समान हैं।

Compulsory Question (अनिवार्य प्रश्न)

1. Explain the following terms in about 20 words: 5×2=10

निम्नलिखित शब्दों की व्याख्या लगभग 20 शब्दों में कीजिए:

(i) Habitat

आवास

(ii) Ecosystem

पारिस्थितिकी तंत्र

(iii) Food Web

खाद्य जाल

(iv) Species

प्रजातियाँ

(v) Population.

जनसंख्या।

9. (a) Define pollution. Write about air pollution. 5

प्रदूषण को परिभाषित कीजिए। वायु प्रदूषण के बारे में लिखिए।

(b) Write in detail about Environment Impact Assessment. 5

पर्यावरण प्रभाव आकलन के बारे में विस्तार से लिखिए।

UNIT-I (इकाई-I)

2. (a) Explain the concept and functions of Ecosystem. 5
पारिस्थितिकी तंत्र की अवधारणा और कार्यों की व्याख्या कीजिए।
- (b) Explain about concept of Ecological Energetics. 5
पारिस्थितिक ऊर्जा विज्ञान की अवधारणा की व्याख्या कीजिए।
3. (a) Explain about concept of ecological pyramids. 5
पारिस्थितिक पिरामिड की अवधारणा की व्याख्या कीजिए।
- (b) Explain food chain and food web. 5
खाद्य शृंखला और खाद्य जाल की व्याख्या कीजिए।

UNIT-II (इकाई-II)

4. (a) Explain different biotic component of environment. 5
पर्यावरण के विभिन्न जैविक घटकों की व्याख्या कीजिए।
- (b) Explain the Nitrogen cycle. 5
नाइट्रोजन चक्र की व्याख्या कीजिए।
5. (a) Write different types of ecological succession. 5
पारिस्थितिक अनुक्रम के विभिन्न प्रकार लिखिए।
- (b) Explain in detail community ecology. 5
सामुदायिक पारिस्थितिकी की विस्तार से व्याख्या कीजिए।

UNIT-III (इकाई-III)

6. (a) Discuss the various types of population interactions. 5
विभिन्न प्रकार की जनसंख्या अंतःक्रियाओं की चर्चा कीजिए।
- (b) Discuss various levels of biodiversity. 5
जैव विविधता के विभिन्न स्तरों की चर्चा कीजिए।
7. (a) Discuss concept of population and its growth. 5
जनसंख्या और उसकी वृद्धि की अवधारणा पर चर्चा कीजिए।
- (b) Explain the concept of biodiversity conservation in India. 5
भारत में जैव विविधता संरक्षण की अवधारणा की व्याख्या कीजिए।

UNIT-IV (इकाई-IV)

8. (a) Discuss various environment pollution management strategies. 5
विभिन्न पर्यावरण प्रदूषण प्रबंधन रणनीतियों पर चर्चा कीजिए।
- (b) Write various aspects of climate change. 5
जलवायु परिवर्तन के विभिन्न पहलुओं को लिखिए।

NGSQ/D-25 613

CHEMISTRY-V

Paper-B23-CHE-501

Time allowed : 3 Hours] [Maximum Marks : 50

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. Attempt all questions:

- | | |
|---|----|
| (i) Is $[\text{NiCl}_4]^{2-}$ paramagnetic or diamagnetic? | 2 |
| Comment. | |
| (ii) What is reduced phase rule? | 1½ |
| (iii) State third law of thermodynamics. | 1½ |
| (iv) What is Hamiltonian operator? | 1 |
| (v) Why vibrational degree of freedom is different for CO_2 and H_2O , however both are triatomic molecules? | 2 |
| (vi) Compare the basicity of Pyridine and Pyrrole. | 2 |

UNIT-I

2. (a) What is EAN? How does EAN help in predicting the formula of several coordination compounds? 3

613/K/50/1700

4

613/K/50/1700

P.T.O.

- (c) Write a note on rotational spectra of diatomic molecules. How it is helpful in calculating the bond length of diatomic molecules? 3

UNIT-IV

8. (a) Write down the structure of products that may be formed when Claisen or Claisen type condensation is carried out on ethyl acetate and ethyl formate pair. 3½

- (b) Why are α -Hydrogens of carbonyl compounds usually acidic as compared to the hydrogen of an ordinary C-H bond? 3

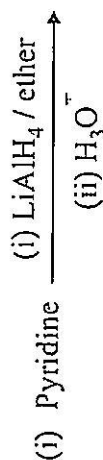
- (c) How is diethylmalonate prepared in the laboratory? Starting from diethylmalonate, how will you synthesize 2-methylbutane-1,3-diol? 3½

9. (a) Explain molecular orbital structure and aromatic character of Furan and Pyridine. 2

- (b) Discuss Paal-Knorr synthesis for preparation of Pyrrole derivative. 3

- (c) Write any one reaction for synthesis of thiophene. 2

- (d) Write the product of following reactions: 3



- (b) Draw all possible isomers of $[\text{Co(en)}\text{Cl}_4]$. 2
- (c) Give IUPAC name of followings:
- (i) $[\text{Co(en)}_3][\text{Cr}(\text{CN})_6]$. 2
- (ii) $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$. 2
- (d) Write the limitations of VSEPR theory. 3
3. (a) With the help of labelled diagrams, describe the crystal field splitting of the d-orbitals of a transition metal ion, which placed in tetrahedral field. 3
- (b) Explain the effect of nature of ligands and geometry of complex on magnitude of crystal field splitting. 3
- (c) Give the relationship between magnetic susceptibility and magnetic moment of transition metal ion. 2
- (d) Why Cu(I) is diamagnetic while Cu(II) is paramagnetic in nature? 2

UNIT-II

4. (a) State Nernst heat theorem. 3
- (b) How the absolute entropy of a gas can be evaluated from third law of thermodynamics? 4
- (c) Calculate free energy change accompanying the compression of 1.0 mole of CO_2 at 57°C from 5.0 atm to 50.0 atm. Assume that CO_2 behaves like an ideal gas. 3

613/K/50/1700

2

5. (a) Derive phase rule and define all the terms involved. 3
- (b) Draw a labelled phase diagram of Pb-Ag system and discuss its important features. 4
- (c) What is triple point? Write its value for water system. 3

UNIT-III

6. (a) Derive Planck's radiation law for spectral distribution of black body radiations. 4
- (b) Evaluate the followings:
- (i) $\left[x^2, \frac{x^2}{2}\right]$ 2
- (ii) $\left(x + \frac{x^2}{dx}\right)^2$. 3

- (c) Write postulates of quantum mechanics. 3
7. (a) Derive the energy expression for a particle moving in one dimensional box of length 'a' and mass 'm'. 3

- (b) Write a note on degree of freedom. Calculate the vibrational degree of freedom of following molecules:

- (i) C_2H_2 (ii) CO_2
- (iii) H_2O (iv) CHCl_3 . 4

613/K/50/1700

3

P.T.O.

9. Write short notes on *any two* of the following :

- (a) Micro projectile bombardment.
- (b) Electroporation
- (c) Liposome mediated gene transfer
- (d) Calcium Phosphate mediated gene transfer.

Roll No.

Total Pages : 4

NGSQ/D-25

638

ECONOMIC BOTANY AND PLANT BIOTECHNOLOGY

Paper-B23-BOT-501

Time Allowed : 3 Hours] [Maximum Marks : 50

Note : Attempt five questions in all, selecting **one** question from each Unit. Question No. 1 is compulsory. All questions carry equal marks. Supplement your answers with diagram wherever necessary.

Compulsory Question

1. Answer the following questions in brief :

- (a) BAC.
- (b) Somatic embryogenesis.
- (c) Cosmid.
- (d) Write Botanical name of two Timber yielding plants.
- (e) Molecular Scissors.
- (f) Indian Ginseng.

(g) Name the Plant part used in *Cinchona*.

(h) Pearl millet.

(i) Origin of Potato.

(j) Medicinal importance of Ginger.

UNIT-I

2. Write origin, botanical description, cultivation and uses of Gram.

3. Write short notes on any two of the following :

(a) Rice.

(b) Jute.

(c) Groundnut.

(d) Maize.

UNIT-II

4. Answer any two of the following :

(a) Write the difference between spices and condiments with examples.

(b) Write a note on Botanical features and medicinal importance of *Rauwolfia*.

(c) Write a note on Botanical description and processing of Tea.

(d) Write the name of the Plant part used and brief idea of the Cultivation of Clove.

5. Write Botanical name, Botanical description, Cultivation and uses of Sugar.

UNIT-III

6. Define the Plant tissue culture. Discuss the scope and various applications of Plant tissue culture in Agriculture and Industry.

7. Write short notes on any two of the following :

(a) Somaclonal variations.

(b) Cryopreservation.

(c) Cybrids.

(d) Synthetic seeds.

UNIT-IV

8. Define the Genetic engineering. How does *Agrobacterium tumefaciens* mediate genetic transformation in Plants.

SEQUENCES & SERIES

Paper-B23-MAT-501

Time allowed : 3 Hours]

[Maximum Marks : 50

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. Attempt all questions:

(i) Find the supremum and infimum of the set:

$$\left\{ 1 + \frac{(-1)^n}{n}, n \in \mathbb{N} \right\}.$$

(ii) Write interior of set of rational numbers.

(iii) Give an example of a set which has two limit points.

(iv) Discuss the convergence of the series:

$$\sum_{n=1}^{\infty} \tan^{-1} \frac{1}{n}.$$

(v) Test the absolute convergence of infinite series:

$$\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{n}.$$

UNIT-I

2. (a) Define smallest members and infimum of a set. Give examples. Also prove that the smallest member of a set, if it exists, must be the infimum of the set.
- (b) Prove that the union of an arbitrary family of open sets is an open set.
3. (a) State and prove Bolzano Weierstrass Theorem for sets.
- (b) Define a compact set. Prove that union of a finite family of compact sets is compact.

UNIT-II

4. (a) Prove that denumerable union of denumerable sets is denumerable.
- (b) Prove that every convergent sequence is bounded but not conversely.
5. (a) Prove that the sequence $\langle a_n \rangle$ defined by

$$a_1 = \sqrt{2}, a_{n+1} = \sqrt{2 + a_n} \text{ converges to the positive root}$$

$$\text{of the equation } x^2 - x - 2 = 0.$$

- (b) Prove that the sequence $\langle a_n \rangle$ where

$$a_n = 1 + \frac{1}{4} + \frac{1}{7} - \dots + \frac{1}{3n-2}$$

is not convergent, while $\langle b_n \rangle$ defined as

$$b_n = \frac{1}{n} \cdot a_n \text{ converges to 0.}$$

UNIT-III

6. (a) Examine the convergence of the series $\sum_{n=3}^{\infty} n^{\log n} x^n$.

- (b) Test the convergence of the series

$$x + \frac{2^2 \cdot x^2}{2!} + \frac{3^3 \cdot x^3}{3!} + \frac{4^4 \cdot x^4}{4!} + \dots$$

7. (a) State and prove Gauss Test.
- (b) Using Cauchy's Integral Test, test the behavior of the series:

$$\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}, p > 0.$$

UNIT-IV

8. (a) State and prove Leibnitz's Test.
- (b) Test the convergence and absolute convergence of the series:

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^p}, p > 0.$$

9. (a) Test the convergence of the series

$$\sum_{n=1}^{\infty} \frac{\cos nx}{n^p}, p > 0.$$

- (b) Show that the Cauchy product of the convergent series:

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt{n}} \text{ with itself is not convergent.}$$

Roll No.

Total Pages : 2

NGSQ/D-25

674

DATA STRUCTURES

Paper-B23-CSE-501

Time allowed : 3 Hours]

[Maximum Marks : 50

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. Answer the following questions in brief: $5 \times 2 = 10$
 - (i) What are the applications of data structures?
 - (ii) Differentiate Time and Space Complexity of an algorithm.
 - (iii) What is Priority Queue? Explain with an example.
 - (iv) Write down the applications of stack.
 - (v) State the algorithm for performing binary search on a sorted array.

UNIT-I

2. Give the classification of Data Structures. Describe various data structure operations. 10
3. What is an array? How we can represent 2-D array? 10

674/K/72/1250

P.T.O.

UNIT-II

4. Describe the following algorithms on strings: 10
- (a) To calculate the Length of the string.
 - (b) To concatenate two strings.
5. Differentiate Array and Linked List. Describe various types of Linked List? 10

UNIT-III

6. Describe the following algorithms on stack: 10
- (a) To convert an expression into polish notation.
 - (b) To calculate factorial of a number using Recursion.
7. How a queue is different than stack? Describe various types of queue. 10

UNIT-IV

8. Give the algorithms on insertion and deletion of an element in a binary search tree. Explain with examples. 10
9. Explain algorithms on bubble sort and insertion sort with the help of appropriate examples. 10

Roll No.

Total Pages : 3

GSQ/D-25

1602

REAL ANALYSIS

Paper-BM-351

Time allowed : 3 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 marks.

Compulsory Question

1. Attempt all questions;

- (i) Prove that if f is continuous on $[a, b]$, then there exists $c \in [a, b]$ such that

$$\int_a^b f dx = f(c) (b - a).$$

2

- (ii) Examine the convergence of integral $\int_1^{\infty} \frac{1}{x} dx$.

1½

- (iii) Examine the convergence of integral

$$\int_0^4 \frac{1}{x(4-x)} dx.$$

1½

- (iv) Let (X, d) be a discrete metric space with

$$d(x, y) = \begin{cases} 1 & ; \text{if } x \neq y \\ 0 & ; \text{if } x = y \end{cases}$$

Describe the open spheres of X .

1½

1602/K/113/1450

P.T.O.

- (v) State finite intersection property. Also, give an example of a collection of subsets having finite intersection property. 1½

UNIT-I

2. (a) Show that the function f defined by

$$f(x) = \begin{cases} 1 & ; \text{ if } x \text{ is rational} \\ -1 & ; \text{ if } x \text{ is irrational} \end{cases}$$
 On $[0, 1]$, is bounded but not Riemann integrable. 4
 (b) Prove that every bounded and monotonically increasing function ' f ' defined on $[a, b]$ is integrable on $[a, b]$. 4

3. (a) Using the definition, evaluate $\int_0^{\frac{\pi}{2}} \sin x \, dx$. 4
 (b) Prove the inequality $\frac{\sqrt{3}}{8} \leq \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{\sin x}{x} \, dx \leq \frac{\sqrt{2}}{6}$. 4

UNIT-II

4. (a) Examine the convergence of integral $\int_0^t \frac{x^p \log x}{(1+x)^2} \, dx$. 4
 (b) Show that $\int_0^{\infty} \left(\frac{1}{1+x} - e^{-x} \right) \frac{dx}{x}$ is convergent. 4
 5. (a) Examine the convergence of $\int_0^{\infty} \sin x^p \, dx$ ($p > 1$). 4

- (b) Prove that if $\alpha > \beta$,

$$\int_0^{\frac{\pi}{2}} \log \left(\frac{\alpha + \beta \sin \theta}{\alpha - \beta \sin \theta} \right) \frac{d\theta}{\sin \theta} = \pi \sin^{-1} \frac{\beta}{\alpha} . \quad 4$$

UNIT-III

6. (a) Let A and B be subsets of a metric space (X, d) .
 Prove that $\delta(A \cup B) \leq \delta(A) + \delta(B) + d(A, B)$. 4
 (b) In a metric space, prove that the intersection of finitely many open sets is open. But, the result need not hold for infinitely many. 4
 7. (a) Prove that, derived set of a set is a closed set. 4
 (b) If $\{F_n\}$ be a decreasing sequence of non-empty closed subsets of a complete m.s. (X, d) such that $\delta(F_n) \rightarrow 0$ as $n \rightarrow \infty$, then $\bigcap_{n=1}^{\infty} F_n \neq \emptyset$ and contains exactly one point. 4

UNIT-IV

8. (a) Let (X, d) and (Y, d^*) be two metric spaces and let $f: X \rightarrow Y$. Then, f is continuous iff $f(\overline{A}) \subseteq \overline{f(A)}$, for all $A \subseteq X$. 4
 (b) Prove that a compact subset of a metric space is closed and bounded. 4
 9. (a) Prove that every compact metric space is complete. 4
 (b) Prove that a continuous image of a connected space is connected. 4

GSQ/D-25

1603

GROUP AND RINGS

Paper-BM-352

Time allowed : 3 Hours]

[Maximum Marks : 40

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

Compulsory Question

1. Answer the following questions:

- (i) Give an example of non-abelian group.
- (ii) If every element of a group is its own inverse, then show that the group is abelian.
- (iii) Define quotient ring.
- (iv) State Gauss Lemma.
- (v) Find the inverse of cycles:

- (i) (1 2 3 4) (ii) (2 3 4 5 6).

UNIT-I

2. (a) Let R be the set of all real numbers other than -1 and $'*'$ be the binary operation on R , defined by $a * b = a + b + ab$. Determine the identity element and inverse of a .

- (b) Show by an example that union of two subgroups need not be a subgroup.
3. (a) If H and K are two subgroups of a group G , then HK is a subgroup of G iff $HK = KH$.
- (b) State and prove Lagrange's Theorem.

UNIT-II

4. (a) If $f: G \rightarrow G'$ is a homomorphism, then prove that kernel of f is a normal subgroup of G .
- (b) Let G be a group and f be an automorphism of G . If $a \in G$ such that $o(a)$ is finite, then show that $(o(f(a))) = o(a)$.
5. (a) Let G be a non-abelian group such that $o(G) = p^3$, where p is a prime. Show that $o(Z(G)) = p$.
- (b) State and prove Cayley Theorem.

UNIT-III

6. (a) Prove that a division ring has no zero divisors.
- (b) Is sum of two subrings of a ring is subring of that ring? If not show by an example.
7. (a) Find the maximal ideals of Z_6 , the ring of integers modulo 6.
- (b) If $f: R \rightarrow R'$ be a homomorphism. Then f is one to one iff $\text{Ker } f = \{0\}$.

UNIT-IV

8. (a) Show that $\sqrt{-5}$ is a prime element of the ring $Z[\sqrt{-5}] = \{a + \sqrt{-5} : a, b \in Z\}$.
- (b) If R is an integral domain, then $R[x]$ is also an integral domain.
9. (a) In a UFD, every pair of non-zero elements have a g.c.d and l.c.m.
- (b) Show that the polynomial $x^4 - 6x + 2$ is irreducible over Q .

- (b) Using the Runge-Kutta method to solve

$$10 \frac{dy}{dx} = x^2 + y^2, y(0) = 1$$

for the interval $0 < x \leq 0.4$.

9. (a) The velocity v (km/min) of a bike which starts from rest, is given at fixed intervals of time t (min) as follows:

t	2	4	6	8	10	12	14	16	18	20
v	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes.

- (b) Explain Modified Euler's method.

Roll No.

Total Pages : 4

GSQ/D-25

1604

NUMERICAL ANALYSIS

Paper-353

Time allowed : 3 Hours]

[Maximum Marks : 30

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

Compulsory Question

- Answer the following:
 - Evaluate $\Delta(x \text{ Log } x)$.
 - State Newton-Gregory formula for Backward interpolation.
 - Define Binomial distribution.
 - State Euler's modified method.

UNIT-I

- (a) Find the missing terms in the following table.

x	1	2	3	4	5	6	7	8
y	1	8	-	64	-	216	343	512

- (b) State and prove Newton divided difference interpolation formula for unequal intervals.

3. (a) Use Lagrange's formula to find $f(6)$ from the following data:

x	2	5	7	10	12
$f(x)$	18	180	448	1210	2028

- (b) From the following table, find the number of students who obtained marks less than 45

Marks	No. of students
30-40	31
40-50	42
50-60	51
60-70	35
70-80	31

UNIT-II

4. (a) Use Sterling formula to find y_{28} given

x	20	25	30	35	40
y_x	49225	48316	47236	45926	44306

- (b) There are 6% defective items in a large bulk of items. Find the probability that a sample of 8 items will include not more than one defective item.

5. (a) State and prove Gauss forward interpolation formula.
 (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

UNIT-III

6. (a) Find the maximum value of $f(x)$ using the following data:

x	-1	1	2	3
$f(x)$	7	5	19	51

- (b) Transform the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

to tri-diagonal form by Given's method. Find the eigen vector corresponding to the largest eigen value from the eigen vectors of the tri-diagonal matrix.

7. (a) Find the first and second derivative of the function $f(x)$ tabulated below at the point $x = 4$

x	1	2	4	8	10
$f(x)$	0	1	5	21	27

- (b) Using Power method, find the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

UNIT-IV

8. (a) Derive Simpson's 3/8 Rule.

Roll No.

Total Pages : 3

GSQ/D-25

1607

QUANTUM & LASER PHYSICS

Paper-IX

Time allowed : 3 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 marks.

Compulsory Question

1. Attempt all questions:

4×2=8

- (i) Compare the Photoelectric effect and Compton effect.
- (ii) Write the Hamiltonian operator of a free particle moving in one dimension under the influence of zero potential energy.
- (iii) Find the lowest energy state of an electron confined in a cubical box each of side $5\text{\AA}$.
- (iv) Give some important applications of lasers in medicine and industry.

UNIT-I

2. Define phase velocity and the group velocity. Obtain expressions for the both and derive relation between them.

1607/K/117/1050

P.T.O.

- Show that phase velocity of associated waves is always greater than velocity of light in vacuum. 8
3. Establish the time dependent Schrödinger equation and separate out from it the time independent equation. 8

UNIT-II

4. What is a potential barrier? Solve Schrödinger wave equation and derive the expression of Reflection and Transmission coefficients when $E > V_0$. 8
5. Define a potential step. If the energy of the particle is $E < V_0$.
- (a) Find the reflection and transmission coefficient.
- (b) Show that there is finite probability of locating the particle in classically forbidden region. 8

UNIT-III

6. (a) How do you distinguish between natural, collision and Doppler broadenings. 6
- (b) Why at optical frequencies spontaneous emission is predominant while at lower frequencies stimulated emission far exceeds the spontaneous emission. 2
7. (a) Derive an expression that connects optical absorption coefficient with population levels. 6
- (b) Find the coherence length of a laser source of monochromatic light with frequency width of 500 Hz. 2

UNIT-IV

8. Discuss the principle, construction and working of He-Ne laser with suitable diagrams. What considerations lead to the specific pressure ratio of He and Ne gases and the capillary shape of the laser tube. 8
9. Describe the main features of semi-conductor lasers. Obtain the necessary conditions for the laser action in a semiconductor. Mention two main conditions that must be fulfilled by semiconductor to act as a laser material. 8

Roll No.

Total Pages : 3

GSQ/D-25

1608

NUCLEAR PHYSICS

Paper-X

Time allowed : 3 Hours]

[Maximum Marks : 40

Note : Attempt five questions in all, selecting one question from each unit. Question No. I is compulsory. All questions carry equal marks. Non-programmable calculator is allowed.

Compulsory Question

1. Attempt all questions:

4×2=8

- (i) Why the electrons cannot exist inside an atomic nucleus?
- (ii) What is inverse beta decay? Give its importance.
- (iii) Give some advantages and disadvantages of a semiconductor counter.
- (iv) What are the main problems faced in fabricating a fusion reactor?

UNIT-I

2. (a) Describe the principle, construction and working of Bain Bridge mass spectrograph. Explain determination of nuclear mass using it. 6

1608/K/118/1050

P.T.O.

(b) X-Ray is operated at 18 kV. Find the minimum wavelength limit of X-Ray. 2

3. (a) What were the outcomes of Rutherford alpha scattering experiment? Explain the estimation of radius of nucleus using this experiment. 6

(b) Calculate the mass number of the nucleus whose radius is 4.8×10^{-15} m. 2

UNIT-II

4. Explain Photoelectric effect. Derive an expression for the change in the wavelength of X-rays. 8

5. What is alpha-decay? Describe energetics of alpha-decay to explain the energy carried by alpha particle and daughter nucleus. 8

UNIT-III

6. Give the principle, construction and working of cyclotron. Why it cannot be used for accelerating electron? 8

7. Describe the principle, construction, working and uses of ionisation chamber. 8

UNIT-IV

8. (a) Describe the conservation laws which hold in a nuclear reaction. Define Q-value of a nuclear reaction. 6

(b) Distinguish between a nuclear fission and nuclear fusion. 2

9. Explain the principle of nuclear reactor and its various components. Classify various types of nuclear reactor based upon fuel, moderator and coolant used in them. 8

Roll No.

Total Pages : 3

GSQ/D-25

1609

INORGANIC CHEMISTRY (THEORY)

Paper-XV : CH-301

Time allowed : 3 Hours]

[Maximum Marks : 32

Note : Attempt five questions in all, selecting two questions from each unit. Question No. 1 is compulsory.

Compulsory Question

1. Attempt all questions: 4×2=8

- (i) Why do d-orbitals of metal ion split in the presence of surrounding ligands?
- (ii) Name two weakest trans directing ligands.
- (iii) Differentiate between spin magnetic moment and orbital magnetic moment.
- (iv) Determine the ground state term symbol for nitrogen.

UNIT-I

2. (a) What do you understand by crystal field stabilisation energy? How do you represent CFSE in case of octahedral and tetrahedral complexes? 4
- (b) What are the limitations of Valence Bond Theory in explaining metal complexes? 2

1609/K/119/600

P.T.O.

3. (a) Calculate the CFSE in:
 - (i) d^5 octahedral system with strong field ligand. 4
 - (ii) d^6 tetrahedral system. 4
- (b) What are the basic assumptions of Crystal Field Theory? 2
4. (a) Discuss thermodynamic stability of a complex. 2

Derive a relationship between stepwise and cumulative stability constants. 4
- (b) Discuss the mechanism of nucleophile substitution reaction in square planar complexes. 2
5. (a) What is trans effect? What led scientist to develop this concept of trans effect? Explain. 3
- (b) Give two factors affecting the stability of metal complexes. 2
- (c) What is the Irving-Williams series? 1

UNIT-II

6. (a) Calculate the spin only magnetic moment in case of
 - (i) Ni^{2+} (ii) Ti^{3+} 3
 - (iii) Fe^{3+} . 3
- (b) Discuss briefly the Gouy's method for measuring the magnetic susceptibility. 3
7. (a) Discuss L-S coupling in transition metal complexes. 2

- (b) Why $Cu(I)$ is diamagnetic where as $Cu(II)$ is paramagnetic? 2
- (c) What is temperature independent paramagnetism? 2
8. (a) Explain the selection rules for d-d transitions in transition metal complexes. 3
- (b) Describe Orgel energy level diagrams for d^1 and d^9 states. 3
9. (a) How will you explain purple colour of $[Ti(H_2O)_6]^{3+}$ on the basis of electronic spectra? Explain. 3
- (b) What information is conveyed in the spectrochemical series? 2
- (c) What are microstates? 1

GSQ/D-25

1610

PHYSICAL CHEMISTRY (THEORY)

Paper-XVI : CH-302

Time allowed : 3 Hours]

[Maximum Marks : 32

Note : Attempt five questions in all, selecting two questions from each unit. Question No. 1 is compulsory. Use of simple calculators and a log table is allowed.

Compulsory Question

1. Attempt all questions: 4×2=8
- (i) What is the significance of de Broglie hypothesis? Explain.
- (ii) Define the term 'dipole moment'. Give expressions for dipole moment of molecule ABC.
- (iii) Describe different types of energies that a molecule possesses.
- (iv) What is the effect of isotopic substitution in vibration spectra of diatomic molecules?

UNIT-I

2. (a) What is Planck's radiation law? How do Wein's law and Rayleigh-Jean's law follow from it? 2

1610/K/120/600

P.T.O.

(b) Discuss pure vibrational Raman spectrum as exhibited by a diatomic molecule. 3½

(c) Why Stokes' lines are more intense than anti-Stokes' lines in the Raman spectrum of molecules? 1

1610/K/120/600

4

- (b) Discuss Heisenberg's uncertainty principle and give interpretation of Heisenberg's equation. 2
- (c) Calculate the de Broglie wavelength of an electron moving with a velocity of $2.40 \times 10^5 \text{ ms}^{-1}$. (mass of electron = $9.1 \times 10^{-31} \text{ kg}$) 2
3. (a) Show quantum mechanically that the position and momentum of a microscopic particle cannot be predicted simultaneously. 4
- (b) If $\hat{A}$ and $\hat{B}$ are two operators such that $[\hat{A}, \hat{B}] = 1$, find that value of $[\hat{A}, \hat{B}^2]$. 2
4. (a) What is the cause of optical activity? Write the factors on which optical rotation depends. 2
- (b) Discuss how dipole moment is measured using temperature method? 4
5. (a) A solution of optically active substance prepared by dissolving 1.38 g of it in 100 ml of water, rotated the plane of polarized light by 7.05° in a polarimeter having 25 cm long sample tube. The D-line of sodium vapour lamp was used as a light source. Calculate the specific rotation of solute. 2
- (b) What is meant by magnetic susceptibility of a substance? How is magnetic susceptibility measured? Explain. 4

1610/K/120/600

2

UNIT-II

6. (a) What is meant by electromagnetic spectrum? Discuss various regions of electromagnetic spectrum according to their wavelength and frequency. $3\frac{1}{2}$
- (b) What is Born-Oppenheimer approximation? What is its use in molecular spectroscopy? $2\frac{1}{2}$
7. (a) Deduce an expression for rotational energy of a diatomic molecule and discuss rotational transitions in view of the selection rules. $3\frac{1}{2}$
- (b) Discuss briefly the spectral intensity distribution using the Maxwell-Boltzmann distribution. $2\frac{1}{2}$
8. (a) The fundamental vibrational frequency of a CO molecule is 2143 cm^{-1} . What is the force constant of C $\equiv$ O bond? 2
- (b) What do you understand by normal modes of vibration of a polyatomic molecule? Show diagrammatically the different normal modes of vibration of CO_2 and H_2O molecules. 3
- (c) Which of the following molecules show rotational spectra:
 HCl , CO , O_2 and H_2 . 1
9. (a) What types of molecules exhibit Raman spectra? Explain. $1\frac{1}{2}$

1610/K/120/600

3

P.T.O.

- (b) How will you obtain the following by using suitable Grignard reagents:
- (i) A ketone (ii) An aldehyde
 - (iii) Primary alcohol. 3
9. (a) Describe de Bruyn van Ekenstein Rearrangement. 3
- (b) Discuss the main points of difference in structures of starch and cellulose. 3

Roll No. Total Pages : 4

GSQ/D-25 1611

ORGANIC CHEMISTRY (THEORY)

Paper-XVII : CH-303

Time allowed : 3 Hours [Maximum Marks : 32]

Note : Attempt five questions in all, selecting two questions from each unit. Question No. 1 is compulsory.

Compulsory Question

- I. Attempt all questions: 4×2=8
 - (i) Explain why TMS is chosen as the reference compound in NMR spectroscopy?
 - (ii) How many signals would you expect to find in the ^1H NMR spectrum of each of the following compounds:
 - (a) Vinyl bromide
 - (b) *trans*-1,2-Dibromoethane.
 - (iii) What happens when D-(+)-glucose and D-(-)-fructose is treated with dilute alkali solution.
 - (iv) What is the difference between epimers and anomers? Explain.

UNIT-I

2. (a) Explain the following terms as applied to PMR spectroscopy:

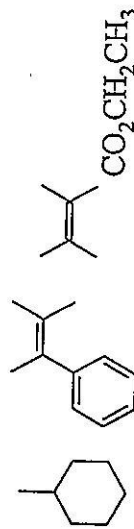
- (i) Coupling constant (ii) Spin-spin coupling
(iii) Shielding and deshielding. 3

- (b) The PMR spectral data of two isomeric monosubstituted aromatic esters having molecular formula $C_{10}H_{12}O_2$ are given below:

Compound A: δ 1.25 (t, 3H), 3.6 (s, 2H), 4.15 (q, 2H), 7.3-7.4 (m, 5H), Compound B: δ 2.65 (t, 2H), 2.95 (t, 2H), 3.68 (s, 3H), 7.2-7.3 (m, 5H).
Explaining all the spectral data, assign plausible structures to compounds A and B. 3

3. (a) Explain the principle and applications of NMR spectroscopy. 3

- (b) How many types of non-equivalent protons are there in the following compounds: 3



4. (a) PMR spectrum of an organic compound recorded on 80 MHz instrument shows a single signal at 98Hz. Compare the position of the signal using 120MHz spectrometer. What would be the position of the signal in δ units in each instrument? 3

1611/K/121/600

2

- (b) How will you distinguish between the following pair of compounds on the basis of PMR spectroscopy:

(i) CH_3CH_2CHO and CH_3COCH_3

(ii) $(CH_3)_3CCOOCH_3$ and $(CH_3)_3COCOCH_3$. 3

5. (a) What do you mean by enantiotopic protons? Explain giving example. Are these protons magnetically equivalent? 3

- (b) Explain any three factors influencing chemical shift in NMR spectroscopy. 3

UNIT-II

6. (a) Write a brief account of all the evidences which led to the cyclic structure of D-(+)-glucose. 3

- (b) What are carbohydrates? How are they classified? 3

7. (a) Write the modern mechanism for the formation of osazone of fructose. 3

- (b) What are Grignard reagents? How are they prepared? Discuss their synthetic importance. 3

8. (a) Oxidation of D-Fructose with Tollen's reagent yields a mixture of anions of D-Mannonic and D-gluconic acids. Explain. 3

1611/K/121/600

3

P.T.O.

Roll No.

Total Pages : 3

GSQ/D-25

1616

ENVIRONMENTAL BIOLOGY

Paper-I

Time Allowed : 3 Hours]

[Maximum Marks : 40

Note : Attempt five questions in all, selecting two questions from each Unit. Question No. I is compulsory.

Compulsory Question

1. Answer the following in about 20 words each: $10 \times 1\frac{1}{2} = 15$
- (a) Define Ecological succession.
 - (b) Name any two sedimentary Biogeochemical cycles.
 - (c) What is Ecological Energetics?
 - (d) Give two differences between Food web and food chain.
 - (e) Define carrying capacity.
 - (f) Mention and explain two in-situ methods of biodiversity conservation.
 - (g) Give two examples of parental care in fishes.
 - (h) Define parasitism with one suitable example.

1616/K/800/300

P.T.O.

3. Who is called 'Father of Palaeontology'? How can the age of fossils be determined? Explain in detail palaeontological evidences in support of organic evolution. 8

4. Describe in detail Darwinism and Neo Darwinism. 8

5. Describe the following in detail: 4

(a) Macroevolution. 4

(b) Evolution of Horse. 4

UNIT-II

6. Draw well labelled diagrams of the following: 4

(a) Extra embryonic membranes of Chick. 4

(b) Human sperm. 4

7. Describe the following in detail: 4

(a) Classify eggs on different basis. 4

(b) Vitellogenesis. 4

8. Give a detailed account of parthenogenesis. 8

9. Differentiate between the following: 4

(a) Reparative and restorative regeneration. 4

(b) Spermatogenesis and oogenesis. 4

1617/K/124/300

2

- (i) Explain two major sources of Soil pollution.
- (j) What is meant by Ecological Hotspot? Give one example from India.

UNIT-I

2. Discuss the effects of temperature and humidity as a climatic factor on living organisms. 6¼
3. Write short notes on the following :
 - (a) Desert Ecosystem
 - (b) Fresh-water Ecosystem. 3,3¼
4. Define Food Chain. List the characteristics of a Food Chain. Explain two types of food chains taking one example from each chain. 6¼
5. Define a Gaseous cycle. Explain the carbon cycle. Why is it called a self-regulated feedback system. 6¼

UNIT-II

6. Explain the causes of population explosion. How does the population explosion adversely affect Economic growth of a Country? 6¼
7. Write short notes on the following :
 - (a) Biosphere reserves.
 - (b) Habitat Destruction. 3¼,3

8. (a) Explain the stimulus for Bird Migration.

- (b) Briefly describe Parental care in the Eutherians. 2,4¼

9. What are the major sources of Water Pollution in our country? Discuss the nature of Pollutants involved and methods of control. 6¼

GSQ/D-25

1617

**EVOLUTION & DEVELOPMENT
BIOLOGY**

Paper-II

Time allowed : 3 Hours]

[Maximum Marks : 40

Note : Attempt five questions in all, selecting two questions from each unit. Question No. 1 is compulsory. Illustrate the examples with suitable diagrams wherever required.

Compulsory Question

1. Explain the followings: 8×1=8
- (i) Atavism
 - (ii) Eobionts
 - (iii) Splanchnopleur
 - (iv) Cro-Magnon Man
 - (v) Coeloblastula
 - (vi) Invagination and Involution
 - (vii) Retrogressive metamorphosis
 - (viii) Ontogeny repeats Phylogeny.

UNIT-I

2. Describe the following in detail:
- (a) Homologous and Analogous organs. 4
 - (b) Sympatric and Allopatric speciation. 4

1617/K/124/300

P.T.O.

3. Who is called 'Father of Palaeontology'? How can the age of fossils be determined? Explain in detail palaeontological evidences in support of organic evolution. 8
4. Describe in detail Darwinism and Neo Darwinism. 8
5. Describe the following in detail:
 - (a) Macroevolution. 4
 - (b) Evolution of Horse. 4

UNIT-II

6. Draw well labelled diagrams of the following:
 - (a) Extra embryonic membranes of Chick. 4
 - (b) Human sperm. 4
7. Describe the following in detail:
 - (a) Classify eggs on different basis. 4
 - (b) Vitellogenesis. 4
8. Give a detailed account of parthenogenesis. 8
9. Differentiate between the following:
 - (a) Reparative and restorative regeneration. 4
 - (b) Spermatogenesis and oogenesis. 4

Roll No.

Total Pages : 3

GSQ/D-25

1620

MICROPROCESSOR ARCHITECTURE & PROGRAMMING-I

Paper-I (Theory)

Time allowed : 3 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 marks.

Compulsory Question

1. Answer the followings:

4×2=8

- (i) Differentiate between Micro-instruction and Macro-instruction.
- (ii) Explain with an example the Implied addressing to specify the data of instructions of SAP-II computers.
- (iii) Write four possible instructions to clear the accumulator contents of SAP-III computer.
- (iv) Discuss PCHL instruction of 8085. Explain how this instruction is said to be used as unconditional jump instruction.

1620/K/127/100

P.T.O.

UNIT-I

2. (a) Write assembly program for SAP-I computer to solve the following problem:
 $15 + 22 + 16 - 32$.
 The numbers are given in decimal. 4
- (b) Explain with the help of timing diagram the fetch and execution cycle of SUB instruction. 4
3. Draw the block diagram of SAP-I computer. Discuss the function of each block. 8

UNIT-II

4. (a) Write the names and discuss the five different categories in which the instruction set of SAP-II computers are divided. 5
- (b) Write a program in assembly language using SAP-II instructions to get 2's complement of a number stored in memory location 2501 H. Store the answer at 2502 H. 3
5. (a) Discuss the different addressing modes to specify the instruction of SAP-II computers. 4
- (b) Write a program in assembly language using SAP-II instructions to add decimal numbers 70 and 36. Answer is to be stored in memory location 2100 H. 4

UNIT-III

6. (a) Write a program in assembly language using instructions of SAP-III computers to add two hexadecimal numbers stored in memory locations 2501 H and 2502 H. The answer should be stored in 2503 H memory location. The carry if any should be stored in 2504 H memory location. 4
- (b) What is the difference between the stack and stack pointer? Discuss PUSH and POP instructions. 4
7. (a) What will be contents of accumulator and flags (CY, S, P and Z), after the execution of SUB D instruction; if A = C3 H and D = 3D H. 4
- (b) Write a program in assembly language using instructions of SAP-III computer to multiply two 8 bit numbers. 4

UNIT-IV

8. Draw and discuss the architecture of 8085 microprocessor. 8
9. (a) Discuss *LHLD* address, *SHLD* address, *LDAX rp* and *STAX rp* instructions of 8085. 4
- (b) Discuss the functions of program counter, Stack pointer and status flags in the architecture of 8085 microprocessor. 4

GSQ/D-25

1621

ELECTRONIC COMMUNICATION

Paper-II (Theory)

Time allowed : 3 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 marks.

Compulsory Question

1. Answer the followings:

- (i) Explain the principle of Amplitude Modulation (AM). 2
- (ii) Which modulation technique is more suited for audio broadcasting and why? 2
- (iii) What is meant by saturation in color TV? 1
- (iv) Write the aspect ratio of a TV system. 1
- (v) What is chrominance signal? 1
- (vi) Define video bandwidth. 1

UNIT-I

- 2. (a) Compare and contrast the following forms of amplitude modulation: 4
 - (i) Double Sideband-Suppressed Carrier.
 - (ii) Single Sideband-Twin Carrier.

1621/K/128/100

P.T.O.

- (b) Derive the mathematical expression for a modulated carrier wave in Amplitude Modulation and derive the power relations. 4
- 3. (a) Discuss the grid modulated system and its application in AM generation. 5
- (b) What is percent modulation? Derive an expression for the percent modulation in AM. 3

UNIT-II

- 4. (a) Derive the mathematical expression for an FM wave. 4
- (b) Explain the concept of FM sidebands and discuss how the number of sidebands varies with the modulation index. 4
- 5. (a) Explain the working principle of an FM detector using a phase-shift detector. 4
- (b) What are the main differences between Amplitude Modulation and Frequency Modulation? 4

UNIT-III

- 6. Define horizontal and vertical resolution. Explain the factors affecting video bandwidth. 8
- 7. Discuss interlaced and progressive scanning in a TV system. Explain their advantages and limitations. 8

UNIT-IV

- 8. Draw and explain the block diagram of a monochrome TV transmitter. 8
- 9. Explain the concept of compatibility in color TV. Describe luminance, hue and saturation. 8

GSQ/D-25

1623

WEB DESIGNING

Paper-II

Time allowed : 3 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 marks.

Compulsory Question

1. Explain the following with suitable examples: 8
- (i) Web Servers (ii) DNS
- (iii) WWW (iv) HTTP.

UNIT-I

2. What is relation between Web Browsers, Web Server and HTTP? Explain by giving suitable example. 8
3. What are Search Engines? What are various search tools used to search an element? 8

UNIT-II

4. Explain Home Page in a Web Site. What are ways to choose contents of a Web Site? 8
5. What is Web Site? How Web Site is published and hosted? 8

1623/K/130/250

P.T.O.

UNIT-III

6. What is HTML? Explain basic HTML Tags like Header, Title, Body by a simple HTML Program. 8
7. What are various page layouts? Explain with the help of a program and it's output. 8

UNIT-IV

8. How a list is inserted in a HTML document? What are ordered and unordered lists? 8
9. Explain the working of Buttons in HTML with the help of suitable HTML program. 8

Roll No.

Total Pages : 5

0

GSQ/D-25

1651

**EARLY CHILDHOOD EDUCATION AND
CHILDREN WITH SPECIAL NEEDS**

Paper-303

Time Allowed : 3 Hours]

[Maximum Marks : 40

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

प्रत्येक इकाई से कम से कम दो प्रश्न का चयन करते हुए कुल पाँच प्रश्नों के उत्तर दीजिए। प्रश्न संख्या 1 अनिवार्य है। सभी प्रश्नों के अंक समान हैं।

Compulsory Question (अनिवार्य प्रश्न)

1. Attempt any eight of the following : 8×1=8

निम्नलिखित में से किन्हीं आठ प्रश्नों के उत्तर दीजिए:

(a) State the Primary difference between a 'Day Care' and a 'Balwadi'.

'डे केयर' और 'बालवाड़ी' के बीच प्राथमिक अंतर बताइए।

(b) Name two Pioneers of Nursery School Education from the historical development syllabus.

ऐतिहासिक विकास पाठ्यक्रम से नर्सरी स्कूल शिक्षा के दो अग्रदूतों के नाम बताइए।

1651/K/808/50/T

P. T. O.

(c) What is the purpose of the 'Transition' principle in Preschool Programme Planning?

प्रीस्कूल कार्यक्रम नियोजन में 'संक्रमण' सिद्धांत का उद्देश्य क्या है?

(d) Give one example of an essential indoor equipment and one essential outdoor equipment for an Early Childhood Education center.

प्रारंभिक बाल्यावस्था शिक्षा केंद्र के लिए एक आवश्यक इनडोर उपकरण और एक आवश्यक आउटडोर उपकरण का उदाहरण दीजिए।

(e) Define Cerebral Palsy.

सेरेब्रल पाल्सी को परिभाषित कीजिए।

(f) List two common characteristics of a Gifted child.

एक प्रतिभाशाली बच्चे की दो सामान्य विशेषताओं की सूची बनाइये।

(g) What is the full form of the Welfare Programme that provides integrated services for children in India?

भारत में बच्चों के लिए एकीकृत सेवाएं प्रदान करने वाले कल्याण कार्यक्रम का पूर्ण रूप क्या है?

(h) Explain the term 'Educational Provision' in the context of special needs children.

विशेष आवश्यकता वाले बच्चों के संदर्भ में 'शैक्षिक प्रावधान' शब्द की व्याख्या कीजिए।

(i) Name two professionals (other than teachers/parents) involved in counselling or therapy for a child with a speech disorder.

भाषण विकार वाले बच्चे के लिए परामर्श या चिकित्सा में शामिल दो पेशेवरों (शिक्षकों/अभिभावकों के अलावा) के नाम बताइए।

(j) True or False: Intellectual disability is the primary cause of Orthopedically Handicapped conditions.

सही या गलत: बौद्धिक विकलांगता अस्थि विकलांग स्थिति का प्राथमिक कारण है।

UNIT-I (इकाई-I)

2. Elaborate on the importance and objectives of Early Childhood Education (ECE). 8

प्रारंभिक बाल्यावस्था शिक्षा (ई.सी.ई.) के महत्व और उद्देश्यों पर विस्तार से प्रकाश डालिए।

3. Compare and contrast any three types of Early Childhood Education centers (e.g., Montessori, Kindergarten, and Anganwadi). Analyze the merits and demerits of each model. 8

प्रारंभिक बाल्यावस्था शिक्षा केंद्रों (जैसे, मोंटेसरी, किंडरगार्टन और आंगनवाड़ी) के किन्हीं तीन प्रकारों की तुलना और अंतर बताइए। प्रत्येक मॉडल के गुणों और अवगुणों का विश्लेषण कीजिए।

मानसिक रूप से मंद बच्चों की प्राथमिक जरूरतें क्या हैं? इस समूह की जरूरतों को पूरा करने के लिए स्कूल के माहौल में उपयुक्त बदलावों की सिफारिश कीजिए।

8. Critically analyze the attitude of Parents, Teachers and the Community towards children with Speech Disorders. Suggest ways to improve these attitudes for better Social and Educational inclusion. 8
वाणी विकार से ग्रस्त बच्चों के प्रति माता-पिता, शिक्षकों और समुदाय के रवैये का आलोचनात्मक विश्लेषण कीजिए। बेहतर सामाजिक और शैक्षिक समावेशन के लिए इन दृष्टिकोणों को सुधारने के उपाय सुझाइए।

9. Explain the principles of Guidance and Counseling used to support the Holistic Development of Children with Special needs. 8

विशेष आवश्यकता वाले बच्चों के समग्र विकास में सहायता के लिए उपयोग किए जाने वाले मार्गदर्शन और परामर्श के सिद्धांतों की व्याख्या कीजिए।

4. Trace the historical development of Nursery School Education by highlighting the contributions of any one International Pioneers (Rousseau, Pestalozzi, Froebel, or Montessori) and the role played by a key Indian figure (Gijubhai or Tagore) in this field. 8

किसी एक अंतर्राष्ट्रीय अग्रदूत (रूसो, पेस्टालोजी, फ्रोबेल, या मोंटेसरी) के योगदान और इस क्षेत्र में एक प्रमुख भारतीय व्यक्ति (गिजुभाई या टैगोर) द्वारा निभाई गई भूमिका पर प्रकाश डालते हुए नर्सरी स्कूल शिक्षा के ऐतिहासिक विकास का पता लगाएं।

5. Explain the Principles of Preschool Programme Planning in detail. 8

प्रीस्कूल कार्यक्रम नियोजन के सिद्धांतों को विस्तार से समझाइए।

UNIT-II (इकाई-II)

6. Define Children with Special Needs. Discuss the causes, characteristics, and educational provisions required for children with Visual Impairment. 8

विशेष आवश्यकता वाले बच्चों को परिभाषित कीजिए। दृष्टिबाधित बच्चों के कारणों, विशेषताओं और उनके लिए आवश्यक शैक्षिक प्रावधानों पर चर्चा कीजिए।

7. What are the Primary needs of children who are Mentally Retarded? Recommend suitable modifications in the school environment to address the needs of this group. 8

Roll No.

Total Pages : 3

26688

BSIT/D-25

COMPUTER SYSTEM ARCHITECTURE-I

Paper : BSIT-501

Time : Three Hours]

[Maximum Marks : 40

Note :(i) There are *Nine* questions in this paper. All questions carry equal marks.

(ii) Attempt *five* questions in all.

(iii) Question No. 1 is compulsory.

(iv) Attempt remaining *four* questions by selecting only *one* question from each unit.

Compulsory Question

1. (a) What is the role of the accumulator in a basic computer design? (2.0)
- (b) What are arithmetic micro operations, and how do they differ from logic micro operations? (2.0)
- (c) What is a microprogram sequencer, and how does it function? (2.0)
- (d) Write the advantages of RISC processor. (2.0)

26688/50/KD/371

[P.T.O.
6/12

UNIT-I

2. (a) Describe the function and types of computer registers. (4.0)
 - (b) Define instruction codes and explain their role in computer architecture. (4.0)
-
3. (a) What are memory reference instructions? Provide examples and their significance. (4.0)
 - (b) Explain the instruction cycle, including the steps involved from fetching to execution. (4.0)

UNIT-II

4. (a) Explain the concept of Register Transfer Language (RTL) and its importance in computer design. (4.0)
 - (b) Explain logic micro operations and their role in data manipulation. (4.0)
-
5. (a) Discuss shift micro operations and their applications in computing. (4.0)
 - (b) Explain the function of the Arithmetic Logic Shift Unit (ALU) in micro operations. (4.0)

UNIT-III

6. (a) Discuss the process of address sequencing in microprogramming. (4.0)
 - (b) Define control memory and explain its role in microprogrammed control. (4.0)
-
7. (a) Explain the significance of microinstructions in the operation of a microprogrammed control unit. (4.0)
 - (b) Discuss the design and function of a microprogram sequencer. (4.0)

UNIT-IV

8. (a) Describe the general register organization in a CPU and its advantages. (4.0)
 - (b) What are the data transfer and manipulation operations in a CPU? (4.0)
-
9. (a) Explain stack organization and its importance in program execution. (4.0)
 - (b) Explain the various addressing modes used in computer architecture. (4.0)

26689

BSIT/D-25
PROGRAMMING WITH C++ I
Paper-BS-IT-502

Time : Three Hours]

[Maximum Marks : 40

Note : Attempt any *five*, select *one* from each unit. Q. No.
1 is compulsory.

Compulsory Question

1. (a) Write Data types of C++.
- (b) What is recursion, discuss with example.
- (c) What is inline function, give an example.
- (d) Define class, object, member function and data abstraction.

UNIT-I

2. (a) Explain how C++ is appropriate for Object oriented programming.
 - (b) Discuss structure of C++ program with example.
3. (a) Explain logical, relational and bitwise operators of C++ with example.
 - (b) Discuss control flow statements.

26689/50/KD/572

228 [P.T.O.
12/12

UNIT-II

4. (a) Discuss struct and union.
(b) Write string operations available in C++ with example.
5. (a) Write a program with pointers to swap two variables.
(b) Write a program in C++ using 1-D array to sort 10 numbers stored in an array.

UNIT-III

6. Explain function overloading with a program as an example.
7. (a) Discuss call by value and call by reference with example.
(b) Discuss template function with example.

UNIT-IV

8. Explain use of class, object and member function using a program in C++.
9. Write note on :
(a) Constructor and its types.
(b) This operator and static class members.

Roll No.

Total Pages : 3

26690

BSIT/D-25
WEB-SITE DESIGN IMPLEMENTING
BASIC DESIGN TOOLS-I
Paper-BSIT-503

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. Write short notes on :
 - (a) Nesting Rules.
 - (b) PHRASE element.
 - (c) Internal Linking in webpage.
 - (d) Rowspan attribute in table. (4×2=8)

UNIT-I

2. Explain in detail the structure of an HTML document with suitable examples. 8
3. What are the categories of body elements in HTML? Explain block-level and inline elements with at least one example of each, highlighting how they affect page layout. 8

26690/50/KD/942

[P.T.O.
16/12

UNIT-II

4. Explain how an HTML document is classified and structured. Discuss the role and importance of various head-section elements using appropriate examples. 8
5. What is language information in HTML? Explain the use of the lang attribute in specifying language for the entire document as well as individual elements. Give suitable examples. 8

UNIT-III

6. Explain in detail the external linking elements in HTML. Discuss the purpose and usage of important link attributes such as HREF, anchor text, TITLE, NAME, and TARGET. Support your answer with appropriate examples. 8

7. What are absolute and relative URLs? Explain how internal links are created using URLs in HTML. Write HTML code to demonstrate internal navigation between multiple pages using both absolute and relative paths. 8

UNIT-IV

9. Write an HTML program to design a student mark sheet using proper HTML 4.0 table elements.

Table must include :

- A caption.
 - A header section.
 - A body section.
 - At least one merged cell.
 - Proper borders, cellpadding, and cellspacing.
 - Minimum 5 rows of sample data. 8
9. Explain in detail the HTML 4.0 Table Model. Describe the purpose and structure of major table elements. 8

Roll No.

Total Pages : 2

26714

NBSIT/D-25

COMPUTER PROGRAMMING WITH C

Paper : B23-HIT-302

Time : Three Hours]

[Maximum Marks : 50

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. Write short notes on the following :
 - (a) Pseudo code.
 - (b) Break statement.
 - (c) Static storage class.
 - (d) Storage of 1-D and 2-D array in memory.

UNIT-I

2. What do you mean by a Variable in C? Explain the data types and modifiers in C language using suitable examples.
3. What is an expression in C language? Explain the operator precedence and associativity with suitable examples.

26714/150/KD/445

42^A [P.T.O.
19/12

UNIT-II

4. Explain the following with suitable examples :
switch statement, while loop.
5. (a) Write a Program to find the sum of its digits
of a number.
(b) Write a Program to find the largest of three
integers in C language.

UNIT-III

6. How to define a function in C language? Explain
the meaning of call by value and call by reference
in functions using suitable examples.
7. (a) Write a Program to find the factorial of a
number using a recursive function.
(b) Explain the scope rules for variables.

UNIT-IV

8. (a) What do you mean by 1-dimensional arrays
in C?
(b) Explain the concept of pointers in C using
suitable examples.
9. How is the union different from structures in the C
language? Explain using suitable examples.

9. (a) Write a program to find the largest number in a given set of 3 numbers using 8085 assembly language. (5)
- (b) Discuss the techniques of counting and indexing in assembly language programming. Provide examples for each technique. (5)

Roll No.

Total Pages : 4

26716

NBSIT/D-25

INFORMATION TECHNOLOGY

(Microprocessor 8085 Architecture and Programming)

Paper-B23-HIT-501

Time : Three Hours]

[Maximum Marks : 50

Note : There are nine questions in this paper. All questions carry equal marks. Attempt *five* questions in all. Question No. 1 is compulsory. Attempt remaining *four* questions by selecting only *one* question from each unit.

Compulsory Question

1. (a) What is a single-chip microcomputer? Write its advantages over traditional micro-computers. (2.5)
- (b) Explain the instructions of 8085 :
(i) ANA D (ii) SHLD address. (2.5)
- (c) Show that the instruction DAD H shifts left the data in H-L register pair by one bit. (2.5)
- (d) What is the specialty of A register over the other general purpose registers? (2.5)

UNIT-I

2. Describe the basic components of a microprocessor: registers, ALU, CPU, I/O devices, and memory. (10)

26716/150/KD/1009

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26716/150/KD/1009

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3. (a) Explain the functions of the following buses in a microprocessor :
 - (i) Address bus. (6)
 - (ii) Data bus. (6)
 - (iii) Control bus. (6)
- (b) What is tri-state logic? Explain how it is used in microprocessor systems, especially in bus systems. (4)

UNIT-II

4. Draw and explain the architecture of the 8085 microprocessor. Describe the function of all major units. (10)
5. (a) Write various flags provided in 8085 microprocessor and discuss their roles. (4)
- (b) Discuss the role of address buffer and address data buffer in the architecture of 8085 microprocessor. (3)
- (c) Discuss the functions of the following signals of 8085 microprocessor : ALE, S0 and S1. (3)

UNIT-III

6. (a) If carry flag is zero, then show that RAR instruction produces a division of Accumulator contents by a factor of 2. (3)

- (b) What is difference between CMP reg and SUB reg instructions? Explain with suitable example. (4)
 - (c) Explain PUSH and POP instructions. (3)
7. (a) What will be contents of accumulator and flags (CY, S, P and Z), after the execution of SUB D instruction; if A = D7 H and D = 62 H. (4)
 - (b) Explain the following instructions of 8085 microprocessor. Also discuss which flags get affected with the execution of these instructions. ADD C, CMP B and MOV A, M. (3)
 - (c) Write a program in assembly language using 8085 instructions to get 2's Complement of a number stored in memory location 2201 H. Store the answer at 2202 H. (3)

UNIT-IV

8. (a) Write an 8085 assembly language program to add two 8-bit numbers stored in memory locations 4050H and 4051H and store the result in memory location 4052H. (5)
- (b) Write an 8085 assembly language program to multiply two 8-bit numbers and store the result in a memory location. (5)

26717

NBSIT/D-25

INFORMATION TECHNOLOGY

(Operating Systems)

Paper : B23-HIT-502

Time : Three Hours]

[Maximum Marks : 50

Note : Attempt any *five* question, select *one* question from each unit. Question No. 1 is compulsory.

Compulsory Question

1. (a) Differentiate single user and Multi user OS.
(b) Write note on PCB.
(c) Discuss Logical and physical address space.
(d) What is thrashing?
(e) Name a few File operations. (2×5=10)

UNIT-I

2. (a) Define operating system and its major functions.
(b) Discuss system calls and virtual machine.
3. Explain Processes Scheduling, its criterion and algorithms. (10)

26717/50/KD/1240

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UNIT-II

4. (a) Define critical section and explain producer-consumer problem to explain it.
(b) Define semaphores and discuss barber shop problem.
5. Explain concept of Deadlock, its detection and recovery. (10)

UNIT-III

6. What is memory management, explain Contiguous Memory Management.
7. Explain Virtual Memory : Demand Paging and any two Page Replacement policies. (10)

UNIT-IV

8. Define File, field, record and Keys. Explain Directory Structure.
 9. Explain File allocation methods. (10)
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26719

NBSIT/D-25

INFORMATION TECHNOLOGY

(Web Development Using PHP)

Paper : B23-HIT-504

Time : Three Hours]

[Maximum Marks : 50

Note: Attempt *five* questions in all by selecting *one* question from each unit. Question number 1 is compulsory. All questions carry equal marks.

Compulsory Question

1. Write short note on the following :
 - (a) MySQL and PHP.
 - (b) Global variables.
 - (c) Associative arrays.
 - (d) Browsing a table with PHP.

UNIT-I

2. What is a PHP script? Explain why and how it is written using suitable examples?
3. Write a detailed note on control flow and form processing in PHP with example forms of HTML.

26719/150/KD/1377

136 [P.T.O.
29/12

UNIT-II

4. What are variables in PHP? How are they used in scripts? Write a simple PHP program to show the use of expressions and operators.
5. What do you mean by numeric functions in PHP? How are they used? Explain with examples.

UNIT-III

6. How string variables are declared and used in PHP? Write a PHP program to count the number of words in string without using string functions.
7. What are arrays in PHP? Write a PHP program for creating and manipulating an indexed array.

UNIT-IV

8. Explain the following :
 - (a) Connection of PHP with MySQL database
 - (b) Develop a simple application to enter data into a hypothetical database.
9. Show the use of PHP to perform CRUD operations on databases.