Roll No. .....

Printed Pages : 3

962

GSM / D–16

ADVANCED CALCULUS

Paper–BM-231

Time allowed : 3 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) What is the difference between continuity and uniform continuity ? 2

(b) State Euler's theorem on homogeneous functions. 2

(c) Define Implicit function. 2

(d) Prove that $\vec{r}' . \vec{r}'''' = k(k'' - k^3 - k\tau^2)$. 2

Unit–I

2. (a) If $f(x) = \begin{cases} \dfrac{|x-2|}{2-x}, & x \neq 2 \\ -1, & x = 2 \end{cases}$, find whether f is continuous at $x = 2$. 4

(b) Prove that the function defined by $f(x) = \sin \dfrac{1}{x}$, $x \in R^+$ is continuous but not uniformly continuous on R^+. 4

3. (a) State and Prove Rolle's theorem. 4

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

Unit–II

4. (a) 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

(b) If $w = f(x, y)$, $x = r\cos\theta$, $y = r\sin\theta$; show that

$$\left(\frac{\partial w}{dr}\right)^2 + \frac{1}{r^2}\left(\frac{\partial w}{\partial \theta}\right) = \left(\frac{\partial f}{\partial x}\right)^2 + \left(\frac{\partial f}{\partial y}\right)^2. \quad 4$$

5. (a) If U is a homogenous function of x, y, z of order n, prove that

$$x\frac{\partial U}{\partial x} + y\frac{\partial U}{\partial y} + z\frac{\partial U}{\partial z} = nU. \quad 4$$

(b) Expand $e^x \cos y$ at $\left(1, \frac{\pi}{4}\right)$ by Taylor's theorem. 4

Unit–III

6. (a) Show by an example that second order partial derivative of a function may exist at a point but the function is not continuous there at. 4

(b) If f_x, f_y, f_{yx} all exist in the neighbourhood of the point (a,b) and f_{yx} is continuous at the point (a,b), then f_{xy} (a,b) also exists at (a, b) and f_{xy} (a,b) = f_{yx} (a,b). 4

7. (a) A rectangular box without top is to have volume 32 cubic feet. Find the dimensions of the box requiring least material for its construction. 4

(b) Find the extreme values of the function $x^2 + y^2 + z^2$ subject to the condition $xy + yz + zx = 3a^2$. 4

Unit–IV

8. (a) Show that the tangent at any point of the curve whose equation referred to rectangular axes are $x = 3t$, $y = 3t^2$, $z = 2t^3$ makes a constant angle with the line $y = z - x = 0$. 4

(b) Find the curvature and torsion of the curves $x = a\cos t$, $y = a\sin t$, $z = at\cot\alpha$. 4

9. (a) For a spherical curve, prove that $\rho + \frac{d^2\rho}{d\psi^2} = 0$, where ψ is such that $d\psi = \tau\, ds$. 4

(b) Find the unit normal vector to the surface $2xz^2 - 3xy - 4x = 7$, at the point (1, –1, 2). 4

(b) Solve the equation :

$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the boundary conditions :

$u(0, y) = u(a, y) = 0$ for $0 \le y \le b$

$u(x, 0) = 0$ for $0 \le x \le a$

and $u(x, b) = f(x)$ for $0 \le x \le a$ 4

Roll No. .....

Printed Pages : 4

GSM / D–16
MATHEMATICS
Paper–BM–232
Partial Differential Equations

Time allowed : 3 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) Form the partial differential equation by eliminating h and k from the equation $(x-h)^2 + (y-k)^2 + z^2 = \lambda^2$. $1\frac{1}{2}$

(b) Find the complete integral of $p - 3x^2 = q^2 - y$. $1\frac{1}{2}$

(c) Classify the differential equation :

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial x \partial y} = 0$$ $1\frac{1}{2}$

(d) Show that the partial differential equations $p = 6x + 3y$ and $q = 3x - 4y$ are compatible. $1\frac{1}{2}$

(e) Find the complementary function of the partial differential equation

$$\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 2 \sin(3x + 2y)$$ 2

Section–I

2. (a) Obtain the partial differential equation by eliminating the arbitrary function from the following :

$z = f(x^2 - y) + g(x^2 + y)$ 4

inclination of the string and the plane base of the hemisphere to the vertical, such that

$$\tan\phi = \frac{3}{8} + \tan\ \theta$$ 4

(b) To show that every given system of forces acting on a rigid body can be reduced to a wrench. 4

7. (a) Two equal uniform rods AB and AC, each of length 2 b are freely joined at A and rest on a smooth vertical circle of radius a. Show that if 2θ be the angle between them, then $b\sin^3\theta = a\cos\theta$. 4

(b) Equal forces act along the co-ordinate axes and the straight line

$$\frac{x-\alpha}{\ell} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}.$$

Find the equation of the central axes of the system. 4

Unit–IV

8. Find the resultant Wrench of two given wrenches. 8

9. (a) Find the equation of the conjugate line of the given line

$$\frac{x-f}{\ell} = \frac{y-g}{m} = \frac{z-h}{n}.$$ 4

(b) A heavy uniform cube balances on the highest point of a sphere whose radius is r. If the sphere is rough enough to prevent sliding and if one of the side of cube be $\frac{\pi r}{2}$, show that the cube can rock through a right angle without falling. 4

Roll No. .....

Printed Pages : 4

GSM / D–16
MATHEMATICS
Paper–BM–233
Statics

Time allowed : 3 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) The three coplanar forces acting on a particle are in equilibrium. The angle between the first and the second is 60° and that between the second and the third is 150°. Find the ratio of the magnitude of the forces. 2

(b) If the three like parallel forces acting on a rigid body are in equilibrium, then show that each is proportional to the distance between the other two. 2

(c) Define Laws of Limiting Friction. 1

(d) At what point of a tree must one end of a rope of given length *l* be attached so that a man pulling at the other end with a force may have the greatest tendency to pull it over. 1

(e) Show that the tangent of the angle of friction is equal to the coefficient of friction. 1

(f) Show that the virtual works done by the thrust in a virtual extension of a light rod from length *l* to $l + \delta l$ *is* $T.\delta l$, where T is the thrust in the rod. 1

Unit–I

2. (a) Forces P, Q, R acting along OA, OB, OC in the plane of the Δ ABC are in equilibrium. Prove that if O is the circum-centre of Δ ABC, then

$$\frac{P}{\sin 2A} = \frac{Q}{\sin 2B} = \frac{R}{\sin 2C}$$ 4

(b) Three like parallel forces P, Q, R act at the corner of a triangle ABC. Prove that their resultant will pass through the incentre of the triangle if

$$\frac{P}{a} = \frac{Q}{b} = \frac{R}{c}$$ 4

3. (a) The moment of a force F acting through the origin and a couple acting in the plane of rectangular axes, about three points (1, 0), (0, 1), (1, 2) are 0, 1, 1 units respectively. Find the force in magnitude and direction and also the moment of the couple. 4

(b) Show that a system of coplanar forces acting in one plane at different points of a rigid body can be reduced to a single force acting at any arbitrary point of the body together with the couple. 4

Unit–II

4. (a) A solid cone of height h and semi vertical angle α is placed with its base against a smooth vertical wall and is supported by a string attached to its vertex and to a

point in the wall. Show that the greatest possible length of the string is

$$h\sqrt{\left(1+\frac{16}{9}\tan^2\alpha\right)}.$$ 4

(b) A heavy body is placed on a rough inclined plane of inclination α greater than the angle of friction λ, being acted upon by a force parallel to the plane and along a line of greatest slope. To find the limits between which the force must lie. 4

5. (a) Two equal uniform rods AB and AC are freely joined at A. The ends B and C are connected by a fine string. The rods are suspended from B by a string. If in the position of equilibrium the angle between the rods is 2α, then show that the tension in the string is

$$\frac{3W \sin\alpha}{\sqrt{(1+3\sin^2\alpha)}},$$

where 2 W is the weight of either rod. 4

(b) Find the centre of gravity of the arc of the cardioid $r = a(1+\cos\theta)$ lying above the initial line. 4

Unit–III

6. (a) A solid hemisphere is supported by a string fixed to a point on its rim and to a point on a smooth vertical wall with the curved surface is in contact. If θ and ϕ are the

Roll No. .....

Printed Pages : 3

967

GSM / D–16
PHYSICS
Paper–V
Computer Programming and Thermodynamics

Time allowed : 3 hours] *[Maximum marks : 40*

*Note : Attempt **five** questions in all, selecting at least **one** question from each unit. **Question No. 1 is compulsory.** Scientific calculator (non-programmable) is allowed. Log tables may be asked for.*

Compulsory Question

1. (a) Convert binary number $(1110100.1001)_2$ into decimal number. 2

(b) Define built in function in Fortran. 2

(c) Discuss briefly the various methods to produce low temperatures. 2

(d) Discuss why the melting point of some solids is decreased with the increase of pressure, while those of others is increased ? 2

Unit–I

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

3. (a) Define flow chart. What are various symbols available in drawing the flow chart and what is the function of each ? 4

(b) Define an array. Explain one dimensional and two-dimensional array by giving examples. 4

Unit–II

4. Write an algorithm, draw flow chart and program to evaluate finite integral by Simpson's one-third rule. 8

5. Write an algorithm, flowchart and program to use least square curve fitting method to fit a straight line to a given set of data. 8

Unit–III

6. (a) Describe the absolute scale of temperature. Why it is adopted as a standard scale ? 5

(b) Calculate the change in entropy, when 100 g of water at 100°C is converted into steam at the same temperature. 3

7. (a) State and explain adiabatic demagnetisation. 4

(b) State Joule-Thomson effect, obtain analytical treatment of it for real gases. 4

Unit–IV

8. (a) Using Maxwell's thermodynamical relations, prove that for van der Waal's gas

$$C_p - C_v = R\left[1 + \frac{2a}{RTV}\right]$$

where symbols have their usual meaning. 5

(b) Calculate the specific heat of saturated steam from second Latent heat equation. Given

$L = 22.7 \times 10^5\ J\ kg^{-1}$, $T = 373\ K$

$\frac{dL}{dT} = -2688\ J\ kg^{-1}\ K^{-1}$ $C_l = 4242\ J\ kg^{-1}\ K^{-1}$.

Explain the meaning of result. 3

9. (a) Define phase diagram. Draw it for water and explain the various phases. Hence define triple point and prove it is unique. 4

(b) Define the four thermodynamical functions. 4

Roll No. .....

Printed Pages : 3

968

GSM / D–16
PHYSICS
Paper–VI
Waves and Optics–I

Time allowed : 3 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) How can we locate the central fringe in Fresnel Biprism experiment ? 1½

(b) What will happen if air is replaced by some transparent liquid in Newton's Rings experiment ? 1½

(c) In what respect a Zone Plate is different from a Convex Lens ? 1½

(d) Radiowaves can diffract to a large extent around buildings but light waves do not. Why ? 1½

(e) What is difference between the spectra obtained from a prism and a grating ? 2

or

(f) What do you mean by dispersive power of a grating ? 2

Unit–I

2. (a) Define interference. What are conditions of maxima and minima in double slit experiment ? Derive an expression for fringe width. 6

(b) A Biprism of angle 1° and refractive index 1.5 is placed at 40 cm from the slit. Find the slit width at 60 cm from it for sodium light of wave length 5893A°. 2

3. (a) Explain the formation of two coherent sources in case of a Fresnel Biprism and a Lloyd mirror. 4

(b) Describe the application of a Fresnel Biprism to find the thickness of a thin transparent sheet. 4

Unit–II

4. (a) Explain the formation of rings due to transmitted light in a Newton's Rings experiment. What will be the nature of rings if white light is used ? 5

(b) The diameter of n^{th} dark ring in Newton's Rings experiment is 3.0×10^{-3} m. when a liquid is introduced between lens and plate, the diameter of the same ring becomes 2.5×10^{-3} m. Calculate velocity of light in liquid if velocity of light in air is 3×10^{8} m/s. 3

5. (a) Explain the design and working of a Michelson Interferometer. How will you determine wavelength of light using it ? 6

(b) In a Michelson Interferometer experiment, a shift of 10 fringes is observed when a thin plastic film of refractive index 1.5 is introduced in one of its arm. Find thickness of the film if $\lambda = 5890$ A°. 2

Unit–III

6. (a) What is a Zone Plate ? Describe its principle and working as a convex lens. 6

(b) The radius of first ring of a zone plate is 0.55 mm. If the light of wavelength 6000 A° falls normally on it, where should the screen be placed to get bright spot ? 2

7. (a) Discuss the diffraction pattern produced by a rectangular slit. 6

(b) Calculate the position of first minimum and maximum in case of diffraction at a straight edge, on a screen placed at 2 m from the edge with a source very far away on the otherside if the wavelength is 5800 A°. 2

Unit–IV

8. Discuss Fraunhoffer diffraction at a single slit analytically to find the positions and relative intensities of minima and secondary maxima. 8

9. (a) What do you mean by resolving power ? Derive an expression for resolving power of a grating. 5

(b) A plane transmission grating gives angle of diffraction of 30° for second order maxima with light of wavelength 5000 A°. Calculate number of lines per cm in the grating. 3

Roll No. .....

969

Printed Pages : 3

GSM / D–16
INORGANIC CHEMISTRY
Paper–VIII–CH–201

Time allowed : 3 hours] *[Maximum marks : 32*

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

1. (i) Give an example of chelating agent with structure.

(ii) Sodium metal solution in liq. NH_3 is _____ in colour, paramagnetic and highly reducing in nature.

(iii) No. of unpaired electrons in NI^{+2} are _____.

(iv) Give maximum oxidation state of Cr.

(v) Draw the structure of Ni $(CO)_4$.

(vi) Write IUPAC name of Na_2 [Fe $(CN)_5$ NO].

(vii) Cr $(en)_2$ Cl_2 (ONO) and Cr $(en)_2$ Cl_2 (NO_2) are _____ isomers.

(viii) Give the formula to calculate spin only magnetic moment. 1×8

Section–A

2. (a) I. E. of '3d' elements do not vary much with increasing atomic number. Explain. 2

(b) Assign reasons for the following :

(i) Transition elements form large number of complexes.

(ii) Transition elements show variable oxidation

3. (a) Calculate on Bohr magneton the magnetic moment of $[Cr(H_2O)_6]^{+3}$. 1½

(b) Identify the following as Platinum metals, Coinage metals, Ferrous metals with reason :

(i) Co (ii) Ru (iii) Cu 3

(c) Why Fe^{+3} ion is coloured ? 1½

4. Explain the following :

(a) Z_n forms Z_n^{+2} ions and not Z_n^{+3} ions.

(b) Fe is a transition element but K is a representative one.

(c) Most of the transition metal compounds are coloured but those of Zn, Cd, Hg are colourless. 2×3

5. (a) What makes the chemistry of Zr and Hf so similar ? 2

(b) Explain different types of magnetic behaviour shown by paramagnetic ions. 3

(c) Write the electronic configuration of Cu^{+2}. 1

Section–B

6. (a) Write IUPAC names of the following :

(i) $[Co(NH_3)_3(NO_2)\,C\ell_2]$

(ii) $H_2\,Cr_2\,O_7$

(iii) $K_2[PtC\ell_6]$ 3

(b) What is Effective Atomic Number ? What is EAN rule ? Which of the following compounds follow this rule

(i) $[Cr(NH_3)_6]^{+3}$

(ii) $PtC\ell_6^{-2}$

(iii) $[Ni(NH_3)_6]^{+2}$ 3

7. (a) Define the following giving example :

(i) Ionisation isomerism

(ii) Hydrate isomerism 3

(b) In the complex ion $[Co(NH_3)(H_2O)_2\,Cl]^+$, give

(i) IUPAC name of the ion

(ii) Coordination number of central metal ion.

Also draw the structure of ion. 3

8. (a) Give advantages of liq. NH_3 as a solvent. 2

(b) Define the terms with example :

(i) Protonic solvent

(ii) Amphiprotic solvent. 2

(c) Explain that SO_2 acts both as Lewis acid and Lewis base. 2

9. (a) The electrical conductivity of liq. NH_3 increases on addition of $NH_4\,Cl$. Explain. 2

(b) Explain with example :

(i) acid-base reactions in liq. NH_3 2

(ii) precipitation reactions in liq. SO_2. 2

Roll No. .....

Printed Pages : 3

970

GSM / D–16
CHEMISTRY
Paper–IX (CH–202)
Physical Chemistry

Time allowed : 3 hours] *[Maximum marks : 32*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each section. **Question No. 1 is compulsory**. Use of Log-table and Non-programming calculator is allowed.*

Compulsory Question

1. (a) Differentiate between :

(i) Isothermal and Adiabatic Process

(ii) Open, Closed and Isolated Systems. 3

(b) What is the change in enthalpy when ideal gas expands reversibly and Isothermally ? 1

(c) Why zinc is used in Parke's process for desilverisation of lead ? 1½

(d) Write integrated form of Van't Hoff equation. Explain the various symbols involved. 1½

(e) What do you understand by 'Chemical Potential' ? 1

Section–A

2. (a) What is Joule-Thomson effect ? Justify that during this process, enthalpy of the system remains constant. 3

(b) Prove that for reversible and adiabatic expansion of ideal gas,

$TP^{(1-r)/r}$ = constant 3

3. (a) State and explain First Law of thermodynamics. 2½

(b) Calculate the amount of work done when 1 mole of an ideal gas contained in a bulb of 10 litres capacity at 1 atm is allowed to enter into an evacuated bulb of 100 litres capacity. 1½

(c) What do you mean by State Functions and Path Functions? Explain with examples. 2

4. (a) Derive the required expression to show that heat absorbed in an isothermal and reversible expansion of ideal gas is used completely in doing the work of expansion. 3

(b) Show that work done during reversible expansion is the maximum work for a given increase of volume and minimum to compress the gas for a given decrease of volume. 3

5. (a) What are extensive and intensive properties ? Explain with examples. 2

(b) Explainwhy C_p is always greater than C_v ? Also prove that $C_p - C_v = R$. 2

(c) Calculate maximum work done in joules when the volume of 16.0 g of O_2 at 300 K changes isothermally and reversibly from 5 litres to 50 litres. 2

Section–B

6. (a) How Distribution Law can be applied to determine the equilibrium constant of chemical equilibrium leading to the formation of complex KI_3 from KI and I_2 ? 4

(b) Derive the relationship between equilibrium constants K_p and K_c. 2

7. (a) Define Nernst Distribution Law. Derive it thermodynamically. 3

(b) Derive the following equation :

$\Delta G^\circ = -RT \ln K_p$

where the symbols have their usual meanings. 3

8. (a) Explain the use of Distribution Law in determining the degree of hydrolysis of aniline hydrochloride. 3

(b) Water boils at 373K at one atmospheric pressure. At what temperature will it boil when atmospheric pressure becomes 528 mm of Hg at some space station ? Latent heat of vaporisation of $H_2O = 2.28 kJg^{-1}$. 3

9. (a) Derive the required expression to show that 'Multi-step extraction is more economical than single step extraction'. 3

(b) Starting from Clapeyron equation, how Clausius-Clapeyron equation is obtained ? Express it in the integrated form. 3

Roll No. .....

Printed Pages : 3

971

GSM / D–16

CHEMISTRY

Paper–X–(CH–203)

Organic Chemistry (Theory)

Time allowed : 3 hours] *[Maximum marks : 32*

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

1. (a) Explain the principle of UV spectroscopy.

(b) What is nucleophilic acyl substitution ? Give its mechanism.

(c) What happens when ethylene Glycol is heated with Anhy. $ZnCl_2$.

(d) Give the mechanism of Fries rearrangement. 2 each

Section–A

2. (a) Discuss the mechanism of following reactions :

(i) Schotten-Bauman Rx

(ii) Reimer Tiemann Rx. 4

(b) Phenols have smaller dipole moment than methanol. Explain. 2

3. (a) Give the mechanism of base Catalysed ring opening of epoxides. 2

(b) Arrange the following in order of increasing acidity :

Phenol; Cyclohexanol, p-Bromophenol,

p-methoxy phenol. 2

(c) How will you prepare Phenol from : 2

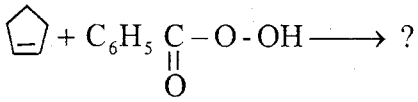
(i) Aromatic Sulphonic Acid

(ii) Diazonium Salt.

4. (a) What happens when :

(i) Isopropyl alcohols treated with reduced copper at 575 K.

(ii) $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH_2}} \xrightarrow{HIO_4} ?$

(iii)  $+ C_6H_5\,\underset{O}{\underset{\|}{C}}-O-OH \longrightarrow ?$

(iv) $CH_3-\underset{\diagdown\ \diagup}{\overset{CH_3}{\overset{|}{C}}}-CH_2 + HC\ell \longrightarrow ?$ 4

(b) How will you distinguish between 1°, 2°, 3° alcohols by Lucas reagent. 2

5. (a) Explain the acidic character of 1°, 2° and 3° alcohols. 2

(b) What is pinacol-pinacolone rearrangement ? Give its mechanism. 2

(c) Compare the acidic character of Alcohols and Phenols. 2

Section–B

6. (a) Give the mechanism of decarboxylation of Carboxylic acids. 2

(b) Discuss the relative stability of acid derivatives towards nucleophilic acyl substitution reaction. 4

7. (a) Complete the following reactions : 4

(i) $CH_3CH_2COOH \xrightarrow{Br_2/P} ?$

(ii) $CH_3COOH \xrightarrow[\Delta]{P_4O_{10}} ?$

(iii) $CH_3CH_2COOAg \xrightarrow{Br_2/CC\ell_4} ?$

(iv) $CH_3CH_2COOH \xrightarrow{HI/Red\ P} ?$

(b) m-hydroxy Benzoic acid is stronger acid than p-hydroxy Benzoic acid. Explain. 2

8. (a) Define and explain the followings :

(i) Auxochrome

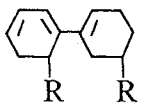
(ii) Bathochromic shift. 2 +2

(b) How will you distinguish between cis and trans isomers of stilbene with the help of UV Spectroscopy. 2

9. (a) Discuss briefly $\pi \rightarrow \pi^x$ and $n \rightarrow \pi^x$ electronic transitions which occur in UV region. 2

(b) A saturated carbonyl compound shows absorption at 190 nm and 300 nm. What type of transition is associated with each absorption ? 1

(c) Using Woodward-Fieser rule calculate λ_{max} of the given compound.



3

Roll No. .....

Printed Pages : 2

974

GSM / D–16

BOTANY

Paper–I

Biology and Diversity of Seed Plants–I

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. Draw relevant diagrams wherever necessary.*

1. Do as directed :

(a) Mention two important differences in the endosperms of Gymnosperms and Angiosperms.

(b) Why Cycads are designated as living fossils ?

(c) Name the three groups of Gymnosperms according to Pilger and Melchior's classification.

(d) Which period of Geological time scale is known as "Age of Cycads" ?

(e) What is cleavage polyembryony ?

(f) Name petrified and impression fossils of roots of *Lyginopteris.*

(g) What is a girdle trace ?

(h) The roasted seeds of which *Pinus* species are edible ? 8×1=8

P.T.O.

Unit–I

2. Give affinities of Gymnosperms with Angiosperms. 8

3. Discuss :

(i) Dominant flora of Paleozoic and Mesozoic era 4

(ii) Evolution of seed habit in Gymnosperms. 4

4. (a) What are fossils ? Describe the process of fossilization. Also describe factors affecting fossilization. 5

(b) Describe some important techniques to study fossils. 3

5. Describe the structure of following :

(i) *Williamsonia* 4

(ii) *Lyginopteris.* 4

Unit–II

6. Write upon :

(i) Mature ovule of *Cycas* 4

(ii) Anatomy of leaflet of *Cycas.* 4

7. (a) Describe external morphology of stem of *Pinus.* 4

(b) Describe female cone of *Pinus.* 4

8. Describe the process of reproduction in *Ephedra.* 8

9. (a) Enumerate characteristic features of Angiosperms. 4

(b) Discuss primitive characters shown by order Ranales. 4

Roll No. .....

975

Printed Pages : 2

GSM / D–16
BOTANY
Paper–II
Plant Anatomy

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each unit. **Question No. 1 is compulsory.** Support your answer with relevant diagrams wherever [illegible]. All questions carry equal marks.*

(Compulsory Question)

1. Answer briefly :
   - a) What are biennial plants ? Give an example.
   - b) What is the function of sclereids ?
   - c) What do you understand by conjoint, collateral and open vascular bundle ?
   - d) What are nerve plates ?
   - e) What is [illegible] ?
   - f) What type of vascular bundles are present in monocot root ?
   - g) What are storage roots ? Give an example.
   - (h) Differentiate between a dorsiventral leaf and an isobilateral leaf. $8 \times 1 = 8$

Unit–I

2. What do you understand by complex permanent tissue ? Explain a complex permanent tissue in detail giving well labelled diagrams. 8

3. Write short notes on :
   - (a) Structure and functions of cambium
   - (b) Difference between sapwood and heartwood
   - (c) Dendrochronology. 3+3+2

4. Write short notes on :
   - (a) Histogen theory for organization of shoot apex.
   - (b) Anatomy of a monocot stem. 4+4

5. With suitable diagrams explain the anomalous growth in *Achyranthes*. 8

Unit–II

6. Write short notes on :
   - (a) Epidermal appendages
   - (b) Types of compound leaves
   - (c) Phyllotaxy. 3+2+3

7. Write short notes on :
   - (a) Anatomy of a monocot leaf
   - (b) Leaf Abscission. 4+4

8. Write short notes on :
   - (a) Types of stomata in Dicot Leaves
   - (b) Quiescent centre. 5+3

9. Write short notes on :
   - (a) Secondary growth in dicot root
   - (b) Structural modification in respiratory roots. 4+4

Roll No. .....

Printed Pages : 2

975

GSM / D–16
BOTANY
Paper–II
Plant Anatomy

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each unit. **Question No. 1 is compulsory.** Support your answer with relevant diagrams wherever necessary. All questions carry equal marks.*

(Compulsory Question)

1. Answer briefly :

(a) What are biennial plants ? Give an example.

(b) What is the function of sclereids ?

(c) What do you understand by conjoint, collateral and open vascular bundle ?

(d) What are sieve plates ?

(e) What is abscission ?

(f) What type of vascular bundles are present in monocot root ?

(g) What are storage roots ? Give an example.

(h) Differentiate between a dorsiventral leaf and an isobilateral leaf. 8×1=8

Unit–I

2. What do you understand by complex permanent tissue ? Explain a complex permanent tissue in detail giving well labelled diagrams. 8

3. Write short notes on :

(a) Structure and functions of cambium

(b) Difference between sapwood and heartwood

(c) Dendrochronology. 3+3+2

4. Write short notes on :

(a) Histogen theory for organization of shoot apex.

(b) Anatomy of a monocot stem. 4+4

5. With suitable diagrams explain the anomalous growth in *Achyranthes*. 8

Unit–II

6. Write short notes on :

(a) Epidermal appendages

(b) Types of compound leaves

(c) Phyllotaxy. 3+2+3

7. Write short notes on :

(a) Anatomy of a monocot leaf

(b) Leaf Abscission. 4+4

8. Write short notes on :

(a) Types of stomata in Dicot Leaves

(b) Quiescent centre. 5+3

9. Write short notes on :

(a) Secondary growth in dicot root

(b) Structural modification in respiratory roots. 4+4

Roll No. .....
Printed Pages : 2

976

GSM / D-16
ZOOLOGY
Paper–I
Life and Diversity of Chordates-I

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all selecting **two** questions each from **Section–A** and **B**. **Question No. 1 is compulsory.** Support your answer with neat and well labelled diagrams wherever required.*

Compulsory Question

1. Answer the following in about 20 words each :

(a) Urochordates
(b) Dorsal lamina
(c) Kolliker's pit
(d) Wheel organ
(e) Catadromous migration
(f) Branchial basket
(g) Swim bladder
(h) Buccal funnel
(i) Intestinal bulb
(j) Heterocercal fin. 10×1=10

Section–A

2. Describe the digestive system of *Herdmania*. 7½

3. Give an account of circulatory system of *Amphioxus*. 7½

4. (a) Enlist the general characters of Chordates. 4
(b) Affinities of urochordates with vertebrates. 3½

5. Write short note on the following :

(a) Neural complex of *Herdmania* 3½
(b) Pharynx of *Branchiostoma*. 4

Section–B

6. Describe the structure, metamorphosis and evolutionary significance of Ammocoetes larva of *Petromyzon*. 7½

7. Describe the urinogenital system of Labeo. 7½

8. Write brief notes of the following :

(a) Parental care in fishes. 4
(b) Buccal funnel of *Petromyzon*. 3½

9. (a) Give a brief account of affinities of cyclostomes. 4
(b) Describe lateral line system of *Labeo*. 3½

Roll No. .....
Printed Pages : 2

977

GSM / D-16
ZOOLOGY
Paper–II
Mammalian Physiology–I

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each Section. **Q. No. 1 is compulsory.** Draw well labelled diagrams wherever necessary.*

1. Explain the following :

(a) Polysaccharides
(b) Hormone
(c) Osmosis
(d) Absorption
(e) Cardiac muscles
(f) Exocytosis
(g) Kwashiorkor
(h) Rheumatoid arthritis
(i) Muscle fatigue
(j) Rickets. 1×10=20

Section–A

2. (a) Describe peptide bonds and its characteristics. 3
(b) Discuss role of side chain X-R in secondary and tertiary structure of proteins. 4½

3. (a) Give an account of active transport. 3
(b) Discuss lock and key theory of enzyme action. 4½

4. (a) Describe Michaelis-Menton Hypothesis. 5
(b) Discuss sodium - potassium pump. 2½

5. (a) Explain competitive inhibition. 5
(b) Give an account of phagocytosis. 2½

Section–B

6. (a) Explain digestion of proteins. 5
(b) Discuss role of minerals. 2½

7. (a) Give an account of emulsification of fats. 4½
(b) Discuss Cori's Cycle. 3

8. (a) Describe ultra structure of skeletal muscles. 4½
(b) Discuss deficiency disease caused by Vitamin-B and C. 3

9. (a) Give an account of various bone disorders. 4
(b) Describe in detail bone growth and reabsorption. 3½

Roll No. .....
Printed Pages : 2

980

GSM / D-16
ELECTRONICS
Paper–I
OPAMP AND LINEAR INTEGRATED CIRCUITS-I

Time allowed : 3 hours] *[Maximum marks : 40*

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

Compulsory Question

1. (a) Explain what is meant by parasitic capacitance in an IC.

(b) Define sheet resistance R_S. What is the order of magnitude of R_S for the base region and also for the emitter region.

(c) Write the characteristics of an Ideal OPAMP.

(d) What is the effect of –ve feed back on the output resistance of an non Inverting OPAMP amplifier. 2×4

Unit–I

2. Write notes on the following processes used in I.C. fabrication.

(a) Diffusion

(b) Surface passivation. 4+4

3. Discuss in detail. pn junction isolation and dielectric isolation used to obtain isolation between components in an integrated circuit. Write their advantages and disadvantages also. 8

Unit–II

4. Discuss the fabrication of Junction and MOS capacitor in Integrated circuits. Also sketch their equivalent circuits. 8

[Turn over

5. (a) Describe a lateral pnp transistor. Why is its current gain low. 4

(b) Sketch the crosssection of a diode pair using collector-base regions if (i) the cathode is common (ii) the anode is common. 4

Unit–III

6. Discuss the operation of OPAMP as

(i) Inverting Amplifier

(ii) Non-Inverting Amplifier

(iii) Buffer. 3+3+2

7. (a) Define the terms differential gain, common mode gain and common mode regulation ratio. Why CMRR is called the figure of merit of differential Amplifier ? 4

(b) The differential mode gain of an amplifier is 2000 and CMRR is 1000. Calculate the output voltage if inputs in two terminals are 2mV and 1.9 mV. Calculate the percentage error if operational amplifier is ideal. 4

Unit–IV

8. (a) What is Schmitt Trigger ? Explain the operation of OPAMP as Schmitt Trigger. 5

(b) Explain the operation of OPAMP as differentiating circuit. 3

9. (a) Explain a 1st order low pass active filter using OPAMP. 4

(b) Explain the operation of OPAMP to multiply/divide the two analog voltages. 4

Roll No. .....
Printed Pages : 2

981

GSM / D-16
DIGITAL ELECTRONICS-I
Paper–II

Time allowed : 3 hours] *[Maximum marks : 40*

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

(Compulsory Question)

1. (a) What is magnitude comparator ? 1½

(b) What is the function of a multiplexer select inputs ? 1½

(c) What is the difference between truth table and excitation table ? 1½

(d) Draw the output waveform of JK flip-flop when the serial inputs applied are J = 1010 and K = 1100 (Given Q = 0 initially). 1½

(e) What do you understand by critical and uncritical race in sequential circuit ? Explain. 2

Unit–I

2. (a) How can you realize a full subtractor using NAND gates only ? 4

(b) Design a 4-bit Adder/Subtractor circuit with ADD/SUB control line. 4

3. (a) Draw and explain half-subtractor. Find out its difference and borrow bit outputs and design the circuit using NAND gates only. 4

(b) Design a comparator, which compares the magnitude of two numbers X and Y, each consisting of two bits. 4

Unit–II

4. (a) Implement the following Boolean function using 8:1 MUX

$F(A,B,C,D) = \Sigma m (0, 1, 3, 4, 8, 9, 15)$ 4

(b) Discuss a parity generator and checker circuit. Where such circuit find applications ? 4

5. (a) What is de-multiplexer ? Design Full adder using 1:8 DEMUX. 4

(b) What is code converter ? Design binary to Excess-3 code converter. 4

Unit–III

6. (a) What is a flip-flop ? Show the logic implementation of an R-S flip-flop having active HIGH R and S inputs. Draw its truth table. 4

(b) What is meant by the race problem in flip-flops ? How does a master-slave configuration help in solving this problem ? 4

7. (a) Draw and explain the logic diagram of master-slave D flip-flop using NAND gates. 4

(b) What is the difference between asynchronous and synchronous flip-flops ? Draw and explain clocked RS-flip-flop with NOR latch. 4

Unit–IV

8. (a) Draw and explain the circuit of MOD-16 asynchronous binary counter. Also draw the wave shapes at different output stages. 6

(b) What factors determine whether a counter operates a count up or count down counter ? 2

9. Design a synchronous MOD-12 up counter using J-K flip-flops. 8

Roll No. .....
Printed Pages : 2

982

GSM / D-16
COMPUTER SCIENCE
Paper–I
Data Structure

Time allowed : 3 hours] *[Maximum marks : BA -25*
B.Sc. - 40

Note : *Attempt any **five** questions select **one** from each unit.* ***Question No. 1 is compulsory.***

1. (a) Name any three string operations. 1 (2)

(b) Write four properties of array. 1 (2)

(c) Define Height Balanced tree. 1 (1)

(d) Write formula for searching an element in Column-Major 2-D Array. 1 (2)

(e) Write two applications of stack. 1 (1)

Unit–I

2. (a) Define Data structure and its categories. 3 (4)

(b) Discuss Time and Space Complexity. 2 (4)

3. (a) Explain string operations. 3 (4)

(b) Discuss any two pattern matching algorithms. 2 (4)

Unit–II

4. (a) Discuss searching an element in 2-D array. 3 (4)

(b) Write note on Parallel and sparse array. 2 (4)

5. Define SLL, DLL and CLL. Write Algorithm for Insertion at start in a SLL. 5 (8)

Unit–III

6. (a) Define stack and write Algorithm for PUSH operation. 3 (4)

(b) Discuss applications of stack with emphasis on recursion. 2 (4)

7. (a) Define FIFO. Write Algorithm to insert in a simple queue. 3 (4)

(b) Define circular queue, Priority Queue and representation of queue as array. 2 (4)

Unit–IV

8. Define Tree, its representation using Array and LIST. Write an Algorithm of Pre-order traversal in tree. 5 (8)

9. Write note on :

(a) Graph and its types

(b) Representation of Graphs. 5 (8)

Roll No. .....
Printed Pages : 2

983

GSM / D-16
SOFTWARE ENGINEERING
Paper–II

Time allowed : 3 hours] *[Maximum marks : B.A. : 25*
B.Sc. : 40

Note : *Attempt **five** questions in all selecting **one** question from each unit. **Question number 1 is compulsory.** All questions carry equal marks.*

1. (i) What is the most effort consuming phase in software development ?

(ii) Write a brief note on risk avoidance.

(iii) What is the best form of cohesion ?

(iv) Discuss the equation to compute the efforts in basic COCOMO.

(v) What is the need of beta testing ?

Unit–I

2. (a) What do you understand by software metrics ? Discuss the merits and demerits of LOC.

(b) What do you understand by prototyping ? Differentiate between evolutionary and throw-away prototyping.

3. (a) What are the limitations of waterfall model ?

(b) Define software engineering. Discuss the need of engineering approach to software development.

Unit–II

4. (a) What is the difference between functional and non-functional requirement ? In a Library management System specify any two functional and any two non-functional requirements.

(b) What is temporal cohesion ? Give a suitable example.

[Turn over

5. (a) What is coupling ? Differentiate between control coupling and data coupling ? Which one is better and why ? Discuss.

(b) What are the desirable characteristics of SRS ? Discuss.

Unit–III

6. (a) What is the difference between flow chart and data flow diagram ? Draw the data flow diagram for a payroll system. Make the necessary assumptions and specify them.

(b) What are the main factors affecting the cost of software? Discuss.

7. (a) According to Bohm, personnel short fall is the biggest risk in software development. What are the different solutions to this problem.

(b) What do you understand by weak entity ? In an Employees information system, identify the weak entity and draw the ERD.

Unit–IV

8. What is the need of cyclomatic complexity ? For the following algorithm, draw the control flow graph and compute the cyclomatic complexity.

```
int large (int a, int b, int c){
mx=a;
if(b>mx) then mx=b;
if(c>mx) then mx=c;
return mx}
```

9. Define maintenance. Software is not prone to wear and tear, then what is the need of maintenance ? What are the different types of maintenance ? Which one consumes maximum efforts and why ? Discuss.

9. Describe the meaning and use of following tags and attributes in context of tables in HTML : 1×8=8

(i) Border (ii) Cellspacing

(iii) Cellpadding (iv) Align

(v) Bgcolor (vi) TR

(vii) TD (viii) Width

HTML में टेबल से सम्बन्धित निम्नलिखित Tags एवं Attributes का वर्णन कीजिए : 1×8=8

(i) Border (ii) Cellspacing

(iii) Cellpadding (iv) Align

(v) Bgcolor (vi) TR

(vii) TD (viii) Width

Roll No. .....
Printed Pages : 4

984

GSM / D–16
COMPUTER APPLICATION
Paper–I
Web Designing Fundamentals-I

Time allowed : 3 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.*

नोट : *प्रत्येक इकाई से कम से कम **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. (a) What is a mailbox ?

मेल बॉक्स क्या है ?

(b) Define internet.

इंटरनेट को परिभाषित कीजिए।

(c) Name any three web-browsers.

किन्हीं तीन वेब ब्राउजर्स के नाम लिखिए।

(d) Give examples of container tag.

कंटेनर टैग के उदाहरण दीजिए।

(e) Define a webpage.

एक वेब पेज को परिभाषित कीजिए।

(f) Write the attributes to put margins on images.

इमेज पर हाशिया देने के लिए attributes लिखिए।

(g) Name the three primary types of lists in HTML.

HTML में लिस्ट के तीन मौलिक प्रकारों के नाम लिखिए।

(h) Define HTML. 1×8=8

HTML को परिभाषित कीजिए। 1×8=8

Unit–I (इकाई–I)

2. Describe following services of Internet : 2×4=8

(i) E-Mail (ii) WWW

(iii) TELNET (iv) FTP

इंटरनेट की निम्नलिखित सेवाओं की व्याख्या कीजिए : 2×4=8

(i) ई-मेल (ii) WWW

(iii) टेलनेट (iv) FTP

3. What are the ways to find needed information on the internet ? How can you find information, when you know or don't know its location URL ? 8

इंटरनेट पर वांछित सूचना ढूंढने के तरीके क्या हैं ? आप कैसे सूचना ढूंढ (खोज) सकते हैं, जबकि आप उसका URL जानते हैं अथवा नहीं जानते हैं ? 8

Unit–II (इकाई–II)

4. What are the important guidelines for creating a website ? 8

एक वेब साइट बनाने की प्रक्रिया में महत्वपूर्ण दिशा-निर्देशों का वर्णन कीजिए। 8

5. Explain the following : 2×4=8

(i) Web Hosting (ii) Internet Service Provider

(iii) DHTML (iv) Domain Name

निम्नलिखित की व्याख्या कीजिए : 2×4=8

(i) वेब होस्टिंग (ii) इंटरनेट सर्विस प्रोवाइडर

(iii) DHTML (iv) डोमेन नेम

Unit–III (इकाई–III)

6. (a) Write the steps to create an HTML document for a web page.

एक वेब पेज के लिए HTML document बनाने के चरण लिखिए।

(b) Explain the basic structure of an HTML document with an example HTML document. 4×2=8

एक HTML document की आधारभूत संरचना की व्याख्या एक उदाहरण HTML document के साथ कीजिए। 4×2=8

7. What is a Hyperlink ? Describe External and Internal Linking. Write the tag used for linking in HTML. Give a suitable example. 8

एक हाइपरलिंक क्या है ? बाहरी एवं आंतरिक लिंकिंग की व्याख्या कीजिए। HTML में लिंकिंग के लिए प्रयुक्त होने वाले Tag लिखिए। एक उपयुक्त उदाहरण दीजिए। 8

Unit–IV (इकाई–IV)

8. Describe the following form input tags : 2×4=8

(i) Text Box

(ii) Action Buttons

(iii) Check Box

(iv) Radio Buttons

निम्नलिखित फॉर्म इनपुट टैग्स का वर्णन कीजिए : 2×4=8

(i) टेक्स्ट बॉक्स

(ii) एक्शन बटन

(iii) चेक बॉक्स

(iv) रेडियो बटन

Roll No. .....

Printed Pages : 2

985

GSM / D–16

COMPUTER APPLICATIONS

Paper–II

Data Base Management System

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *(i) All questions carry equal marks.*

*(ii) Attempt **5** questions by selecting **one** question from each unit.*

*(iii) **Question number 1 is compulsory.***

Compulsory Question

1. Define the terms

(i) Database System 2

(ii) Schema 2

(iii) Derived Attribute 2

(iv) Super Key 2

Unit–I

2. (a) Describe the characteristics of database approach. 4

(b) Explain various roles in database environment. 4

3. Differentiate between the traditional file systems and database systems. 8

Unit–II

4. (a) Define Schema. How schema differs from instance in database system. 4

(b) Explain the levels of database management system architecture. 4

5. (a) What do you mean by data independence ? Differentiatate between logical and physical data independence. 4

(b) Classify different types of DBMS(s). 4

Unit–III

6. Draw E-R diagram of Inventory System. 8

7. Write short note on following :

(a) Physical data model 4

(b) Conceptual data model 4

Unit–IV

8. Define the terms and give suitable examples for each term

Primary key 2

Alternate key 2

Candidate key 2

Foreign key 2

9. (a) Explain the basic terminology of relational database management system. 4

(b) Explain the difference of base tables and views using suitable examples. 4

Roll No. .....
Printed Pages : 2

988

GSM / D-16
BIOTECHNOLOGY
Paper–VI
Immunology

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *The candidates are required to attempt **Question No. 1** and **four** others, selecting **one** question from each unit.*

1. Explain the following in brief : 8×1=8

(a) Null cells

(b) Avidity of antibody

(c) Epitopes

(d) ELISA

(e) Lymphokines

(f) Immunological tolerance

(g) Antigen presenting cells

(h) Hypersensitivity

Unit–1

2. (a) Discuss different types of immunity. 4

(b) Describe different cells of the immune system. 4

3. (a) Explain the functioning of secondary lymphoid organs in immune system with the help of well-illustrated diagram. 4

(b) Draw the structure of antibody and explain the functions of different classes of antibody. 4

4. (a) Write short notes on the following : 2×2=4

(i) Types of antigens

(ii) RIA assay.

(b) Differentiate between the following : 2×2=4

(i) Precipitation and agglutination reactions

(ii) Antigenicity and immunogenicity.

Unit–2

5. Discuss in detail about the cell mediated immunity giving an account of cells involved and write down its functions. 8

6. (a) What are the different factors responsible for autoimmunity? 4

(b) Write briefly about generation of humoral response. 4

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

(a) Structure of class II MHC molecules

(b) Difference between inactivated and attenuated vaccines.

(c) Flowchart of alternative pathway of complement system.

(d) Recombinant vaccines.

Roll No. .....
Printed Pages : 2

989

GSM / D-16
BIOTECHNOLOGY
Paper–VII
Molecular Biology

Time allowed : 3 hours] *[Maximum marks : 40*

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

Compulsory Question

1. State whether the following statements are True (T) or False (F)

(i) All prokaryotic m RNA have ATP or GTP residue at 5' end.

(ii) Centromeres are trancriptionally active regions of chromosomes.

(iii) DNA fragments can be separated by Northern blotting technique.

(iv) Introns are non-coding sequences in eukaryotic mRNA.

(v) AUG is the initiation codon.

(vi) Polysomes are present in eukaryotes only.

(vii) Rifamycin is an inhibitor of transcription.

(viii) RNA polymerase binds at operator and repressor binds at promotor site in DNA. 1×8

Unit–I

2. (a) How did transformation experiment show that DNA is a genetic material ? 4

(b) Explain the organization of chromatin in eukaryotic cell. 4

3. (a) Describe the features of viral genomes. 4

(b) Classify various types of restriction endonucleases based on their mode of action. 4

4. (a) Discuss the role of different DNA polymerases in replication of DNA. 4

(b) Give names and mode of action of two inhibitors of replication in prokaryotes. 4

Unit–II

5. (a) How was the triplet characteristic of genetic code elucidated ? 4

(b) Explain the regulation of expression of genes by attenuation of transcription. 4

6. (a) How is correct translation of mRNA ensured ? 4

(b) Explain the importance of post-translational changes in the structure of proteins. 4

7. Describe the mode of regulation of expression of lac operon

(a) When lactose is the sole source of energy in the growth medium.

(b) When both glucose and lactose are present in growth medium. 2×4

Roll No. .....
Printed Pages : 3

1002

GSM / D–16

HINDI (Compulsory)

Time allowed : 3 hours] *[Maximum marks : 40*

नोट : सभी प्रश्न अनिवार्य हैं।

1. निम्नलिखित पद्यांशों में से किन्हीं **दो** की सप्रसंग व्याख्या करें - 6+6=12

(क) देता है मिट्टी का घट ही
मुझको ठंडा पानी।
पर सोने का पात्र चाहती
तू दरिद्र की रानी ?
सोना पाकर भी क्या सुख से
तू सोने पावेगी ?
बढ़ती हुई लालसा तुझको
कहाँ न ले जावेगी ?

(ख) धूल लगी है पग काँटों से बिंधा हुआ है, दुख अपार।
किसी तरह से भूला भटका आ पहुँचा हूँ, तेरे द्वार।।
डरो न इतना, धूल-धूसरित होगा नहीं तुम्हारा द्वार।
धो डाले हैं इनको प्रियवर, इन आँखों से आसू द्वार।।

(ग) क्या कभी पोंधे किसी के अश्रु जल ?
या किया करते रहे सबको विकल ?
ओस कण सा पल्लवों से झर गया
जो अश्रु भारत का उसी से सर गया।

(घ) बैठा शुक उस घनी डाल पर
जो खोंते पर छाया देती
पंख फुला नीचे खोंते में
शुकी बैठ अंडे है सेती।
गाता शुक जब किरण बसंती
छूती अंग पर्ण से छन कर
किंतु, शुकी के गीत उमड़कर
रह जाते स्नेह में सनकर
गूंज रहा शुक का स्वर वन में
फूला मग्न शुकी का पर है
गीत, अगीत कौन सुन्दर है।

2. जयशंकर प्रसाद तथा रामधारी सिंह दिनकर में से किसी **एक** का साहित्यिक परिचय लिखें। 6

3. निम्नलिखित विषय में से किसी **एक** विषय पर सारगर्भित निबन्ध लिखें- 8

(क) दूरदर्शन
(ख) वैज्ञानिक प्रगति में भारत का योगदान
(ग) मानवाधिकार
(घ) नैतिक शिक्षा
(ङ) विज्ञान और औद्योगीकरण।

4. राजकीय महाविद्यालय कैथल के प्राचार्य की ओर से कु. वि. कुरुक्षेत्र के परीक्षा-नियंत्रक को एक पत्र लिखिए, जिसमें बी.एस.सी.तृतीय सेमेस्टर के विद्यार्थियों के परीक्षा अनुक्रमांक शीघ्र भेजने का अनुरोध हो।

या

सचिव मानव संसाधन विकास मंत्रालय, भारत सरकार की ओर से सचिव वाणिज्य मंत्रालय भारत सरकार को एक फाइल के बारे में अर्ध सरकारी पत्र लिखें। 8

5. निम्नलिखित अंग्रेजी शब्दों के हिन्दी तकनीकी अर्थ लिखें- 5

(i) Aeronautics,
(ii) Biconvex Lens
(iii) Central axis
(iv) Deflection,
(v) Fission
(vi) Graft
(vii) Homologous,
(viii) Convection
(ix) Freezing
(x) Elasticity.

Roll No. .....

Printed Pages : 2

1003

GSM / D–16

PUNJABI (Compulsory)

Time allowed : 3 hours] *[Maximum marks : 40*

ਨੋਟ : ਹਰੇਕ ਪ੍ਰਸ਼ਨ ਜ਼ਰੂਰੀ ਹੈ ।

1. ਹੇਠ ਲਿਖੇ ਕਾਵਿ-ਟੋਟਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਦੋ ਦੀ ਸਪ੍ਰਸੰਗ ਵਿਆਖਿਆ ਕਰੋ :

(ੳ) ਵਿੱਚ ਗਫਲਤ ਜੋ ਤੈ ਦਿਨ ਜਾਲੇ,
ਕੱਤ ਕੇ ਕੁਝ ਨਾ ਲਿਉ ਸੰਭਾਲੇ,
ਬਾਝੋਂ ਗੁਣ ਸ਼ਹੁ ਆਪਣੇ ਨਾਲੇ
ਤੇਰੀ ਕਿਉਂ ਕਰ ਹੋਸੀ ਗੱਤ ਕੁੜੇ ।

(ਅ) ਹੀਰ ਆਖਦੀ ਬਖਸ਼ ਗੁਨਾਹ ਮੇਰਾ,
ਸੇਵੇ ਸੁੱਤੜਾ ਆਣ ਜਗਾਇਆ ਏ ।
ਘੋਲ ਘੱਤੀਆਂ ਮੈ ਉਸ ਰਾਹ ਉੱਤੇ,
ਜਿਸ ਰਾਹ ਤੂੰ ਚਲਕੇ ਆਇਆ ਏ,
ਬਾਪ ਦਾਦਿਓ ਜਾਤ ਦਾ ਕੌਣ ਹੈ ਤੂੰ,
ਕਿਸ ਮਾਂ ਸੁਪੱਤੜੀ ਜਾਇਆ ਏ ।

(ੲ) ਉੜਕ ਖੌਫ ਉਤਾਰ ਨਜ਼ੂਮੀ, ਬਾਤ ਕਹੀ ਮਨ ਭਾਣੀ ।
ਆਸ਼ਿਕ ਹੋਰਾ ਕਮਾਲ ਸੱਸੀ ਜਦੁ ਹੋਗੁ ਜਵਾਨ ਸਿਆਣੀ ।
ਮਸਤ ਬਿਹੋਸ਼ ਥਲਾਂ ਵਿੱਚ ਮਰਸੀ, ਦਰਦ ਫਿਰਾਕ ਰੰਞਾਣੀ ।
ਹਾਸ਼ਮ ਦਾਗ ਲਗਾਉਸ ਕੁਲ ਨੂੰ, ਹੋਗੁ ਜਹਾਨ ਕਹਾਣੀ,

(ਸ) ਦੋਹੀਂ ਦਲੀਂ ਮੁਕਾਬਲੇ ਰਣ ਸੂਰੇ ਗੜਕਣ ।
ਚੜ੍ਹ ਤੋਫਾਂ ਗੱਡੀ ਢੁੱਕੀਆਂ ਲੱਖ ਸੰਗਲ ਖੜਕਣ ।
ਉਹ ਦਾਰੂ ਖਾਂਦੀਆਂ ਕੋਹਲੀਆਂ ਮਣ ਗੋਲੇ ਰੜਕਣ ।
ਜਿਉਂ ਦਾਗ ਪਲੀਤੇ ਛੱਡੀਆਂ ਵਾਂਗ ਬੱਦਲ ਕੜਕਣ । 5+5=10

2. ਹੇਠ ਲਿਖੀਆਂ ਕਹਾਣੀਆਂ ਵਿੱਚੋਂ ਕਿਸੇ **ਇੱਕ** ਦਾ ਵਿਸ਼ਾ-ਵਸਤੂ ਲਿਖੋ :

(ੳ) ਆਰਜੀ

(ਅ) ਜੀਨਤ ਆਪਾ

(ੲ) ਦੋ ਆਨੇ ਦਾ ਘਾਹ । 10

3. ਤੁਹਾਡਾ ਕੁੱਤਾ ਚੋਰੀ ਹੋ ਗਿਆ ਹੈ ਉਸਨੂੰ ਲੱਭਣ ਲਈ ਅਖਬਾਰ ਵਿੱਚ ਇਸ਼ਤਿਹਾਰ ਦਿਉ ।

ਜਾਂ

ਵਿਆਹ ਲਈ ਯੋਗ ਵਰ ਦੀ ਭਾਲ ਲਈ ਅਖਬਾਰ ਵਿੱਰ ਇਸ਼ਤਿਹਾਰ ਦਿਉ । 5

4. ਹੇਠ ਲਿਖੇ ਵਿਸ਼ਿਆਂ ਵਿੱਚੋਂ ਕਿਸੇ **ਇੱਕ** ਵਿਸ਼ੇ ਉੱਤੇ ਚਰਚਾ ਭਰਪੂਰ ਪੈਰਾ ਲਿਖੋ :

(ੳ) ਪ੍ਰਦੂਸ਼ਣ ਦੀ ਸੱਮਸਿਆ

(ਅ) ਸਮਾਜ ਕਲਿਆਣ ਵਿੱਚ ਨੌਜਵਾਨਾ ਦਾ ਹਿੱਸਾ

(ੲ) ਮਾਂ ਬੋਲੀ ਦਾ ਮਹੱਤਵ । 5

5. ਹੇਠ ਲਿਖੇ ਅਸ਼ੁੱਧ ਸ਼ਬਦਾਂ ਨੂੰ ਸ਼ੁੱਧ ਲਿਖੋ :

(i) ਪੀਂਰਾ (ii) ਸੇਹਤ (iii) ਬੌਹਤ
(iv) ਬਿਆਹ (v) ਪ੍ਰਮਆਤਮਾ (vi) ਬੁਧੀ
(vii) ਪਸੂ (viii) ਕਡਾਈ (ix) ਪਾਨੀ
(x) ਭਾਭੀ । 5

6. ਹੇਠ ਲਿਖੇ ਅੰਗਰੇਜੀ ਸ਼ਬਦਾਂ ਦਾ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਲਿਖੋ :

(i) Audio (ii) Pen Drive (iii) Input
(iv) Search Bar (v) Memory Card (vi) Folder
(vii) Computer (viii) Word Processor (ix) E-mail
(x) Down load 5

Roll No. .....

1014

Printed Pages : 2

OGSM / D–16
CHEMISTRY
Paper–IX–202
Physical Chemistry

Time allowed : 3 hours] *[Maximum marks : 26*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each section.*

Section–I

1. (a) How can reversible isothermal expansion of an ideal gas be brought about ? Derive an expression for work of expansion for such a process. 3

(b) Calculate the work done in Joules when 16 g of oxygen at 300 K expands isothermally from 5 litres to 25 litres ($R = 8.314\ Jk^{-1}\ mol^{-1}$) 3

2. (a) Derive the relation

$$PV^{\gamma} = \text{Constant}$$ $2\frac{1}{2}$

(b) How can you show that the work done in a reversible isothermal expansion of an ideal gas is maximum. $2\frac{1}{2}$

3. (a) State first law of thermodynamics in three different ways. Derive a mathematical expression for it. 3

(b) State and explain the following terms with suitable examples.

(i) Thermodynamic reversible and irreversible process.

(ii) State and path function. 3

(iii) राज्यं यदि हि रामस्य भरतस्यापि तत्तथा।
मन्यते हि यथात्मानं तथा भ्रातृंस्तु राघवः।।

(iv) तृणमन्तरतः कृत्वा प्रत्युवाच शुचिस्मिता।
निवर्तय मनो मत्तः स्वजने क्रियतां मनः।।

3. संस्कृत-चयनिका के गद्य-भाग में से निम्नतः किन्हीं **दो** गद्यांशों का सप्रसंग सरलार्थ कीजिए। 4×2=8

(i) सत्यं वद । धर्मं चर । स्वाध्यायान्मा प्रमदः। आचार्याय प्रियं धनमाहृत्य प्रजातन्तुं मा वयवच्छेत्सीः। मातृदेवो भव। पितृ देवो भव। आचार्यदेवो भव। अतिथिदेवो भव।

(ii) गुरु-वृद्ध-सिद्धाचार्यान् अर्चयेत्। द्वौ कालौ उपस्पृशेत्। मलायनेषु अभीक्ष्णं पादयोश्च वैमल्यम् आदध्यात्। मूर्ध-श्रोत्र-घ्राण-पाद-तैलनित्यः।

(iii) कदाचिद् वर्षासु अपि वृष्टेरभावात् तृषार्त्तो गजयूथो यूथपतिमाह- 'नाथ, कोऽभ्युपायोऽस्माकं जीवनाय। नाऽस्ति क्षुद्रजन्तूनामपि निमज्जनस्थानम्।

4. संस्कृतव्याकरण के आधार पर 'राम' अथवा 'अस्मद्' के पूर्ण शब्द रूप लिखिए। 8

5. संस्कृत व्याकरण के आधार पर निम्नतः अच् सन्धि के अन्तर्गत **चार** में सन्धि कीजिए। 2×4=8

(i) सुर + इन्द्रः (ii) विद्या + ओघः

(iii) सुधी + उपास्यः (iv) हरे + ए

(v) मधु + अरिः (vi) विष्णो + ए

Roll No. .....
Printed Pages : 2

1004

GSM / D–16
SANSKRIT
Paper–(Compulsory)

Time allowed : 3 hours] *[Maximum marks : 40*

नोट : सभी प्रश्नों के उत्तर क्रमानुसार दीजिए ।

1. पाठ्यक्रम में निर्धारित लघु उत्तर वाले निम्न **चार** प्रश्नों के उत्तर दीजिए। 2×4=8

(i) 'विभीषणस्य विलापः' पाठ किस मूल ग्रन्थ से लिया गया है ? मूल ग्रन्थ का नाम लिखिए।

(ii) 'बुद्धिर्यस्य बलं तस्य' पाठ किस मूल ग्रन्थ से लिया गया है ? मूल ग्रन्थ का नाम लिखिए।

(iii) 'सर्वाः आशाः मम ..... भवन्तु'।। रिक्त स्थान भरें।

(iv) 'स एव मृत्युमाप्नोति यथा राजा ..... ।।' रिक्त स्थान भरें।

2. 'संस्कृत-चयनिका' के पद्य भाग में से निम्नतः किन्हीं **दो** श्लोकों का सप्रसंग व्याख्यान कीजिए। 4×2=8

(i) नित्योऽनित्यानां चेतनोऽचेतनानाम्
एको बहूनां यो विदधाति कामान्।
तमात्मस्थं येऽनुपश्यन्ति धीराः
तेषां शान्तिः शाश्वती नेतरेषाम्।।

(ii) त्वमेकं शरण्यं त्वमेकं वरेण्यं,
त्वमेकं जगत्पालकं स्व प्रकाशम्।
त्वमेकं जगत्कर्तृ पातृ प्रहर्तृ,
त्वमेकं परं निश्चलं निर्विकल्पम्।।

(iii) राज्यं यदि हि रामस्य भरतस्यापि तत्तथा।
मन्यते हि यथात्मानं तथा भ्रातृंस्तु राघवः।।

(iv) तृणमन्तरतः कृत्वा प्रत्युवाच शुचिस्मिता।
निवर्तय मनो मत्तः स्वजने क्रियतां मनः।।

3. संस्कृत-चयनिका के गद्य-भाग में से निम्नतः किन्हीं **दो** गद्यांशों का सप्रसंग सरलार्थ कीजिए। 4×2=8

(i) सत्यं वद । धर्मं चर । स्वाध्यायान्मा प्रमदः। आचार्याय प्रियं धनमाहृत्य प्रजातन्तुं मा वयवच्छेत्सीः। मातृदेवो भव। पितृ देवो भव। आचार्यदेवो भव। अतिथिदेवो भव।

(ii) गुरु-वृद्ध-सिद्धाचार्यान् अर्चयेत्। द्वौ कालौ उपस्पृशेत्। मलायनेषु अभीक्ष्णं पादयोश्च वैमल्यम् आदध्यात्। मूर्ध-श्रोत्र-घ्राण-पाद-तैलनित्यः।

(iii) कदाचिद् वर्षासु अपि वृष्टेरभावात् तृषार्त्तो गजयूथो यूथपतिमाह- 'नाथ, कोऽभ्युपायोऽस्माकं जीवनाय। नाऽस्ति क्षुद्रजन्तूनामपि निमज्जनस्थानम्।

4. संस्कृतव्याकरण के आधार पर 'राम' अथवा 'अस्मद्' के पूर्ण शब्द रूप लिखिए। 8

5. संस्कृत व्याकरण के आधार पर निम्नतः अच् सन्धि के अन्तर्गत **चार** में सन्धि कीजिए। 2×4=8

(i) सुर + इन्द्रः (ii) विद्या + ओघः

(iii) सुधी + उपास्यः (iv) हरे + ए

(v) मधु + अरिः (vi) विष्णो + ए

Roll No. .....

Printed Pages : 2

1014

OGSM / D–16
CHEMISTRY
Paper–IX–202
Physical Chemistry

Time allowed : 3 hours] *[Maximum marks : 26*

Note : *Attempt **five** questions in all, selecting at least two questions from each section.*

Section–I

1. (a) How can reversible isothermal expansion of an ideal gas be brought about ? Derive an expression for work of expansion for such a process. 3

(b) Calculate the work done in Joules when 16 g of oxygen at 300 K expands isothermally from 5 litres to 25 litres ($R = 8.314\ Jk^{-1}\,mol^{-1}$) 3

2. (a) Derive the relation

$$PV^{\gamma} = \text{Constant}$$ $2\frac{1}{2}$

(b) How can you show that the work done in a reversible isothermal expansion of an ideal gas is maximum. $2\frac{1}{2}$

3. (a) State first law of thermodynamics in three different ways. Derive a mathematical expression for it. 3

(b) State and explain the following terms with suitable examples.

(i) Thermodynamic reversible and irreversible process.

(ii) State and path function. 3

4. (a) Derive Kirchoff's equation giving the variation of heat of reaction with temperature. 3

(b) Define 'Cp' and 'Cv' in terms of enthalpy change and internal energy change. Hence show that $Cp - Cv = R$. 2

Section–II

5. (a) State Nernst distribution law. Under what conditions it is applicable. $2\frac{1}{2}$

(b) Discuss the application of distribution law in the formation of complex ions. $2\frac{1}{2}$

6. (a) How is degree of hydrolysis of aniline hydrochloride determined ? Using distribution law ? $2\frac{1}{2}$

(b) Discuss the statement that "Multistep extraction is more economical than single step extraction". $2\frac{1}{2}$

7. (a) State law of chemical equilibrium. How can you derive it thermodynamically. 3

(b) Write expressions for the equilibrium constant for the following reaction

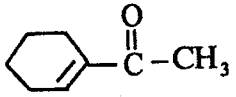
(i) $CaCO_3(s) \rightleftharpoons CaO(s) + O_2(g)$

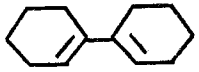
(ii) $4\,Fe(s) + 4\,H_2O(g) \rightleftharpoons Fe_3O_4(s) + 4\,H_2O$ 3

8. (a) Derive Clausius Clapeyron equation in the integrated form. 4

(b) State Le Chatelier's principle. 1

7. (a) Calculate λ_{max} for

(i) 

(ii) 

(b) Define the terms

(i) Chromophore

(ii) Bathochromic shift

(c) Distinguish cis and trans stilbene on basis of UV spectroscopy. 2,2,1½

8. (a) What is the effect of halogens on the strength of aromatic acids,

(b) Write about different types of electronic transitions and their relative energies

(c) Comment upon amphoteric nature of acid amides 2,2,1½

Roll No. .....

Printed Pages : 4

OGSM / D–16

CHEMISTRY

Paper–X–CH–203

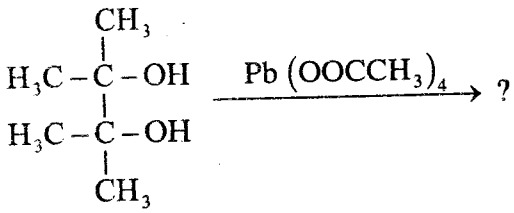
Organic Chemistry (Theory)

Time allowed : 3 hours] *[Maximum marks : 27*

Note : *Attempt **five** questions in all, selecting at least **two** questions from each section.*

Section–A

1. (a) Write the mechanism of reaction



(b) What happens when :

(i) Glycol is heated with H_2SO_4

(ii) 3° Butyl alcohol is passed over Cu at 573 K

(c) Give the mechanism of Pinacol-Pinacolone rearrangement. 2,2,1

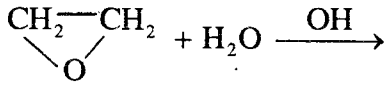
2. (a) Write the mechanism of Fries rearrangement

(b) Write the name of reaction and products formed when Phenol is heated with chloroform and alkali

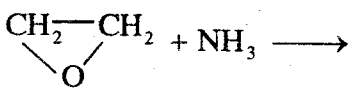
(c) Write the mechanism of preparation of Phenol from cumene 2,2,1½

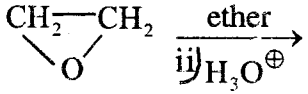
[P.T.O.

3. (a) Complete and give mechanism of



(b) Complete the equations :

(i) 

(ii) $C_2H_5MgBr +$ 

(c) Write the product and give mechanism of 2,2,1½

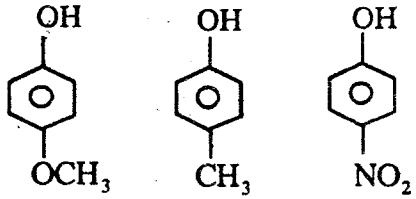
2 – Butane + Peroxy benzoic acid ⟶

4. (a) What happens when

(i) Ethyl alcohol and

(ii) Isopropyl alcohol is oxidised

(b) Arrange the following in increasing order of acidic nature, Justify



(c) Write IUPAC names of 2,2,1½

(i) Allyl alcohol

(ii) sec-butyl alcohol

(iii) 

Section–B

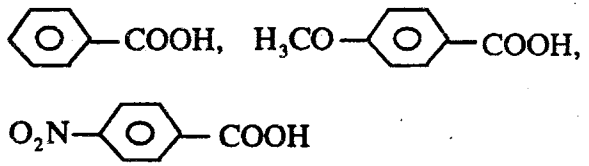
5. (a) Write the mechanism of decarboxylation in Kolbe's electrolytic reaction

(b) What happens when

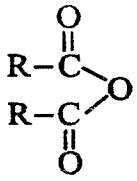
(i) Silver acetate is heated with Br_2 in $CC\ell_4$

(ii) $C_6H_5COOH + HNO_3 \xrightarrow{H_2SO_4}$

(c) Arrange the following in increasing order of acidic character 2,2,1½

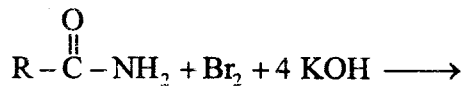


6. (a) Arrange the following in decreasing order of reactivity, with reasons

R–COOR, $RCOC\ell$, $RCONH_2$, 

(b) Write the mechanism of acidic hydrolysis of ester

(c) Complete the equation and write the name of reaction 2,2, 1½



Roll No. .....
Printed Pages : 3

1032

GSM / D–16
NUTRITION IN LIFE CYCLE
Paper–201

Time allowed : 3 hours] *[Maximum marks : 40*

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

नोट : *प्रत्येक इकाई से कम से कम **एक** प्रश्न चुनते हुए कुल **पाँच** प्रश्न कीजिए। **प्रश्न संख्या 1 अनिवार्य है।** सभी प्रश्नों के अंक समान हैं।*

Compulsory Question (अनिवार्य प्रश्न)

1. Answer the following in 2-3 lines :

निम्नलिखित का 2-3 पंक्तियों में उत्तर दीजिए :

(a) Define a reference adult woman.

Reference Adult स्त्री की परिभाषा दें।

(b) What is the RDA of iron for a pregnant woman.

गर्भवती महिला के लिए लोहे की दैनिक प्रस्तावित मात्रा (RDA) बतायें।

(c) Write the daily additional calorie requirements of a lactating woman.

स्तनपान कराने वाली माता की अतिरिक्त (additional) ऊर्जा की दैनिक आवश्यकता बतायें।

(d) Name two dietary problems faced by a pregnant woman.

गर्भवस्था के दौरान स्त्री की आहार सम्बन्धी दो समस्याओं के नाम बताइए।

(e) Why do old aged people prefer to eat well cooked semi-solid food ?

वृद्ध व्यक्ति नर्म तथा अच्छी तरह पका हुआ भोजन खाना क्यों पसन्द करते हैं ?

(f) Give two advantages of breast feeding.
स्तनपान करवाने के दो लाभ बतायें।

(g) Define meal planning.
आहार आयोजन किसे कहते हैं ?

(h) Daily energy requirement of a male adult heavy worker.
भारी कार्य करने वाले वयस्क पुरुष की ऊर्जा की दैनिक ज़रूरत।

Unit–I (इकाई–I)

2. Why do we need to plan meals ? Explain the principles of meal planning in detail.
हमारे लिए आहार आयोजन क्यों जरूरी है ? आहार आयोजन के सिद्धान्तों का विस्तृत वर्णन करें।

3. Breast feeding is best for the child. Discuss in detail.
'माँ का दूध शिशु के लिए सर्वोत्तम है।' विस्तृत व्याख्या कीजिए।

4. Discuss the nutritional and food requirements of school children.
स्कूल जाने वाले बच्चों की पोषक तत्वों तथा आहार की आवश्यकताओं का वर्णन करें।

5. Write notes on any *three* of the following :
(a) Packed school lunch for school going children.
(b) Weaning
(c) Economy in time and money in meal planning.
(d) Dietary considerations for adolescents.
निम्नलिखित में से किन्हीं **तीन** पर लघु टिप्पणियां लिखें :
(क) स्कूल जाने वाले बच्चों के Packed lunch के बारे में लिखें।
(ख) स्तनमोचन।
(ग) आहार आयोजन में समय तथा धन की बचत।
(घ) किशोरों के आहार सम्बन्धित अनुचिन्तन।

Unit–II (इकाई–II)

6. Describe the nutritional requirements of a pregnant woman.
गर्भवती माता की पौष्टिक आवश्यकताओं का वर्णन कीजिए।

7. Explain the increased nutritional requirements during lactation.
दूध पिलाने वाली माता की बढ़ी हुई पौष्टिक आवश्यकताओं का वर्णन कीजिए।

8. Give recommended dietary allowances for a male school teacher. Write dietary guidelines for planning a diet for him.
एक स्कूल अध्यापक (पुरुष) के लिए प्रस्तावित दैनिक पौष्टिक आवश्यकताओं का वर्णन कीजिए। उसके आहार आयोजन करते हुए किन-किन बातों को ध्यान में रखेंगे ?

9. Describe various nutritional problems and dietary guidelines during old age.
वृद्धावस्था की विभिन्न पोषण सम्बन्धी समस्याओं तथा आहारी दिशा-निर्देशों के विषय में वर्णन कीजिए।

Roll No. .....
Printed Pages : 2

1033

GSM / D–16
INTRODUCTION TO CLOTHING CONSTRUCTION
Paper–Course-202

Time allowed : 3 hours] *[Maximum marks : 40*

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

नोट : *प्रत्येक इकाई से कम से कम **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

निम्नलिखित को संक्षेप में लिखें : 4×2=8

(a) Yarn

धागा

(b) Tension regulator

तनाव नियन्त्रक

(c) Use of True Bias

अरेबी कपड़े का प्रयोग

(d) Machine working heavily.

मशीन का भारी चलना।

Unit–I (इकाई–I)

2. Explain the functioning of various parts of sewing machine. 8

सिलाई मशीन के विभिन्न भागों की कार्यप्रणाली की व्याख्या करें। 8

3. Smooth and speedy functioning of sewing machine needs special care. Explain. 8

सिलाई मशीन को समतल और तेज रफ्तार से चलाने के लिए विशेष सम्भाल की आवश्यकता होती है। वर्णन करें। 8

4. Write in detail about the marking, cutting and finishing equipments used in clothing construction. 8

परिधान बनाने में कपड़े पर निशान लगाना, कपड़ा काटना और परिसज्जा के लिए किन-किन उपकरणों को आवश्यकता पड़ती है ? विस्तृत व्याख्या करें। 8

5. Write the defects in sewing and suggest their remedies. 8

सिलाई करते समय उत्पन्न हुए दोष तथा उनके निवारण के उपाय बताएं। 8

Unit–II (इकाई–II)

6. Write the importance of clothing. 8

कपड़ों के महत्व की व्याख्या करें। 8

7. Explain the general principles of clothing construction. 8

परिधान निर्माण के सामान्य सिद्धान्तों का वर्णन करें। 8

8. Define paper pattern. Discuss its advantages and disadvantages. 8

पेपर पैटर्न को परिभाषित करें। इसके लाभ तथा हानियों का वर्णन करें। 8

9. Calculate the amount of material required for Lady's Suit, Blouse and Petticoat. 8

पेटीकोट, ब्लाउज और लेडीज़ सूट के लिए अनुमानित कपड़ा बताएं। 8

Roll No. .....
Printed Pages : 3

1034

GSM / D–16
FAMILY DYNAMICS
Paper–Course-203

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt any **five** questions, selecting at least **two** questions from each unit. **Question No. 1 is compulsory.***

नोट : *प्रत्येक इकाई से कम से कम **दो** प्रश्न चुनते हुए, कोई **पाँच** प्रश्नों के उत्तर दीजिए। **प्रश्न संख्या 1 अनिवार्य है।***

Compulsory Question (अनिवार्य प्रश्न)

1. Answer the following in short : 1×8=8

संक्षेप में उत्तर दें : 1×8=8

(a) Types of family

परिवार के प्रकार

(b) Marriage

विवाह

(c) Single Parenting

माता/पिता द्वारा पालन

(d) Economic Liberalization

आर्थिक उदारीकरण

(e) Women Employment

महिलाओं के रोज़गार

(f) Urbanisation

शहरीकरण

(g) Infant Mortality

नवजात मृत्युदर

(h) Media Boom

मीडिया में संभावनाओं का उछाल। (जनसंचार)

Unit–I (इकाई–I)

2. Define family and explain the role of family in community development. 8

परिवार की परिभाषा दीजिए तथा परिवार की सामुदायिक विकास में भूमिका बताएं। 8

3. What are the functions of marriage and criteria for mate selection. 8

विवाह के क्या कार्य हैं तथा जीवन-साथी के चुनाव के आधार एवं मापदण्ड दीजिए। 8

4. What type of community help is essential for helping lower income groups ? Explain. 8

निम्न आय वर्ग के उत्थान एवं सहायता हेतु किस प्रकार की सामुदायिक सहायता की आवश्यकता होती है ? वर्णन करें। 8

Unit–II (इकाई–II)

5. What is the meaning of family planning and explain the factors affecting it. 8

परिवार नियोजन का क्या अर्थ है तथा इसे प्रभावित करने वाले कारकों को वर्णित करें। 8

6. Give in detail the relation between women employment and socio-economic status of a family. 8

स्त्रियों का रोजगार में होने का परिवार के सामाजिक आर्थिक स्तर पर प्रभाव का सम्बन्ध विस्तार से दें। 8

7. Explain the role of national agencies in educating the masses about population education. 8

राष्ट्रीय समितियों की जनसमूहों में जनसंख्या शिक्षा प्रदान करने में क्या भूमिका है ? 8

8. Give a detailed account of child health programmes being run in India. 8

भारत में चल रहे बाल स्वास्थ्य सम्बन्धी कार्यक्रमों का विस्तृत ब्यौरा दीजिए। 8

Roll No. .....
Printed Pages : 3

1035

GSM / D–16

HOUSEHOLD EQUIPMENT AND CONSUMER PROTECTION

Paper–Course No. 204

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *Attempt **five** questions in all, by selecting at least **one** question from each unit. **Question number one is compulsory.** All questions carry equal marks.*

नोट : *प्रत्येक इकाई में से कम से कम **एक** प्रश्न का चयन करते हुए कुल **पाँच** प्रश्नों के उत्तर दीजिए। **प्रश्न संख्या एक अनिवार्य है।** सभी प्रश्नों के अंक समान हैं।*

Compulsory Question (अनिवार्य प्रश्न)

1. Answer the following in 3-5 sentenses :

निम्नलिखित का 3-5 वाक्यों में उत्तर दीजिए :

(i) Service facility

सेवा सुविधा

(ii) Write names of equipment used for personal care.

निजी रख-रखाव में प्रयोग होने वाले उपकरणों के नाम लिखो।

(iii) Precautions to be taken while using electric equipment.

बिजली द्वारा चालित उपकरणों का प्रयोग करते हुए क्या-क्या सावधानियाँ बरतेंगे ?

(iv) BIS

बी.आई.एस.

(v) Describe the problems with improper burning of gas.

गैस का ठीक से न जलना किस-किस समस्या की वजह से हो सकता है ?

(vi) Name various types of knives with their use.

विभिन्न प्रकार के चाकुओं के नाम उनके उपयोग सहित बताओ।

(vii) Warrantee

वारन्टी

(viii) Benefits of purchasing during sale. 1×8=8

सेल के दौरान खरीदारी के लाभ। 1×8=8

Unit–I (इकाई–I)

2. Write down the difference between tool and Equipment. Explain about any four tools used for cleaning. 8

औजार एवं उपकरण में क्या विभिन्नता है, लिखो। सफाई के लिए प्रयुक्त होने वाले किन्हीं चार औजारों का वर्णन कीजिए। 8

3. Describe the size, design, types, care, cleaning and tips for washing clothes in your washing machine. 8

कपड़े धाने वाली मशीन का आकार, बनावट, प्रकार, रख-रखाव सफाई के विषय में बताओ। इसमें कपड़े धोने के लिए आप किन-किन बातों को ध्यान में रखेंगे ? 8

4. Explain the use, care and storage of equipment which is used for personal care. 8

व्यक्तिगत रख-रखाव के लिए प्रयोग किए जाने वाले उपकरणों का प्रयोग, रख-रखाव एवं संग्रहण के विषय में लिखो। 8

5. Explain working of various electrical equipment which are used in kitchen. 8

रसोई घर में प्रयोग होने वाले बिजली द्वारा चालित उपकरणों की क्रिया-प्रणाली लिखो। 8

Unit–II (इकाई–II)

6. Write a note on following :

(i) Guarantee

(ii) Modes of payment for goods and services. 4×2=8

निम्नलिखित पर टिप्पणी लिखिए :

(i) गारन्टी

(ii) वस्तुओं एवं सेवाओं के भुगतान के तरीके। 4×2=8

7. What is instalment sales contract ? Describe its benefits, drawbacks and factors affecting it. 8

'किश्त बिक्री अनुबन्ध' किसे कहते हैं ? इसके लाभ, हानियां व इसे प्रभावित करने वाले कारकों का वर्णन कीजिए। 8

8. Who is a consumer ? Describe various problems faced by a consumer. 8

उपभोक्ता किसे कहते हैं ? उपभोक्ता को किन-किन समस्याओं का सामना करना पड़ता है ? 8

9. Write about various Agencies who are working for consumer protection. 8

विभिन्न एजेन्सीज़ के विषय में लिखो जो उपभोक्ता सुरक्षा हेतु कार्य कर रही हैं। 8

Roll No. .....

1036

Printed Pages : 3

GSM/ D–16

COMMUNITY DEVELOPMENT AND EXTENSION EDUCATION–I

Paper–Course-205

Time allowed : 3 hours] *[Maximum marks : 40*

Note : *(i) Attempt **five** questions in all, selecting at least **two** questions from each unit. **Question No. 1 is compulosry**.*

(ii) All questions carry equal marks.

नोट : *(i) प्रत्येक इकाई से कम से कम **दो** प्रश्नों का चयन करते हुए कुल **पाँच** प्रश्नों के उत्तर दीजिए। **प्रश्न संख्या 1 अनिवार्य है।***

(ii) सभी प्रश्नों के अंक समान हैं।

1. ***Objective type questions (Compulsory questions)***

वस्तुनिष्ठ प्रश्न (अनिवार्य प्रश्न)

(a) Write down two types of communications.

संचार के दो प्रकार लिखें।

(b) What is full form of NREGA ?

'NREGA' का पूरा नाम लिखें।

(c) When 'Mid Day Meal' programme was introduced in India ?

भारत में मिड-डे भोजन कार्यक्रम कब शुरू किया गया ?

(d) What is smallest unit of society ?

समाज की सबसे छोटी इकाई क्या है ?

(e) Write two effects of Problem of Poverty in India ?

भारत में गरीबी की समस्या से पड़ने वाले दो प्रभाव बताएं।

(f) Give two types of family on basis of marriage.

विवाह के आधार पर परिवारों के दो प्रकार बताएं।

(g) Name of programme which is closely related with development of women and children in India.

महिलाओं और बच्चों के विकास से घनिष्ठ रूप से सम्बन्धित कार्यक्रम का नाम बताएं।

(h) Who said ?"Communication is blood stream of organisation ?"

संचार संगठन में रक्तधारा के समान है। यह किसने कहा है ?

Unit–I (इकाई–I)

2. What are the problems in way of Communication Process ? Give suggestions for improvement of the process ? 8

संचार प्रक्रिया में आने वाली समस्यायें कौन-कौन सी हैं ? उन्हें दूर करने के सुझाव बताएं।

3. What is meaning of family ? What are main characteristics of family. 8

परिवार से क्या अभिप्राय है ? परिवार की मुख्य विशेषतओं को बताइये।

4. Define Society. What are main types of society ? 8

समाज को परिभाषित करें। समाज के प्रमुख प्रकारों का वर्णन कीजिए।

5. What is organization ? Give main elements of organisation. 8

संगठन क्या है ? संगठन के प्रमुख तत्व बताइये।

Unit–II (इकाई–II)

6. Write an essay on Mid Day Meal programme. 8

'मध्यान्न भोजन कार्यक्रम' पर निबन्ध लिखें।

7. What is problem of poverty ? What are main causes of poverty? 8

गरीबी की समस्या क्या है ? गरीबी उत्पन्न करने वाले मुख्य कारण बताइये ?

8. What are objectives of TRYSEM-Training for Rural Youth for self employment in India ? 8

भारत में ग्रामीण युवाओं के लिए आत्म प्रशिक्षण (TRYSEM) नामक योजना के उद्देश्य बताइये।

9. Write down features of 'NREGA' plan.

नरेगा योजना की विशेषतायें बताइये।

Roll No. .....

Printed Pages : 3

1052

BCA / D–16

OBJECT ORIENTED PROGRAMMING USING C++

Paper–BCA–231

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *Student will be required to attempt **five** questions in all. **Question No. 1 is compulsory.** In addition to compulsory question, student will have to attempt allotted **four** more questions selecting **one** question from each unit. All questions carry equal marks.*

(Compulsory Question)

1. (a) Explain the concept of data hiding and encapsulation in C++. 4×4=16

(b) Discuss the concept of copy constructor in C++ with suitable example.

(c) Write short note on friend function in C++. Give suitable example.

(d) Define operator. Explain various types of operators along with their hierarchy.

Unit–I

2. (a) Explain various features of object oriented programming. 8

(b) What is the significance of scope resolution operator in C++ ? Give suitable examples. 8

3. (a) Explain the concept of structure and class in C++ along with suitable example. How do they differ from each other ? 8

(b) Write short note on static Data Members and Static Member Function. 8

Unit–II

4. What is the significance of constructor and destructor in C++ ? How do we declare them ? Write a program to compute area of various geometrical figures using constructor and destructor. 16

5. Explain the following in C++ with suitable examples : 16

- Unformatted and Formatted Input / Output Operations
- Constructor Overloading.

Unit–III

6. Explain the concept of string handling and dynamic memory management in C++ with suitable examples. 16

7. Explain the following along with their significance and suitable examples : 16

- Manipulators
- this pointer
- Array of objects

Unit–IV

8. (a) Explain the concept of function overloading in C++. Write a program in C++ to compute area of various geometrical figures using function overloading. 8

(b) Explain the concept of operator overloading in C++. Write a program to overload prefix increment operator using operator overloading in C++. 8

9. Explain the following concepts and give their significance with examples : 16

- Binary operator overloading
- Inline functions.

Roll No. .....

1053

Printed Pages : 3

BCA / D–16

DATA STRUCTURE

Paper–BCA–232

Time allowed : 3 hours] *[Maximum marks : 80*

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

(Compulsory Question)

1. (a) How a two dimensional array is represented in memory ? 2

(b) Convert the infix expression (A – B) * (D | E) into prefix expression and postfix expression. 3

(c) Why a queue structure is called a First Come and First Serve (FCFS) structure ? 3

(d) Define space and time complexity of an algorithm ? 3

(e) Linked list structures are called dynamic memory allocating structures. How ? 3

(f) Differentiate a strictly binary tree and a binary tree ? 2

Section–A

2. (a) Define an array of strings. How is it stored in memory ?

(b) Explain BiG O Notation for computing time and space complexity of an algorithm ? 8,8

3. Write notes on the following operations on a data structure :
   (a) Traversing a structure
   (b) Sorting
   (c) Indexing
   (d) Updating. 4×4

Section–B

4. (a) 'Arrays are static memory allocating data structures'. How ?
   (b) Write an algorithm to calculate average of a one dimensional array A [15] Containing numeric values. 8,8

5. (a) Differentiate a single linked list and a double linked list ?
   (b) Write an algorithm to insert a node in a single linked list. 8,8

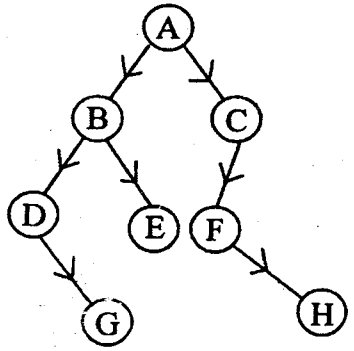
Section–C

6. (a) When a stack is called full and empty ? Write basic operations performed on a stack.
   (b) Discuss two application areas of a stack data structure. 8,8

7. (a) Differentiate a queue from a dequeue with representation in memory.
   (b) Develop algorithms to insert and delete a data element in a queue. 8,8

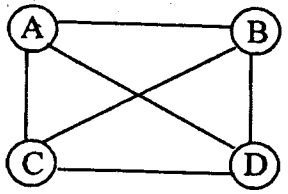
Section–D

8. Give a binary tree, define the following :



   (a) Terminal nodes 2
   (b) Non-terminal nodes 2
   (c) Level and height of each node 2
   (d) Sequential representation in memory 5
   (e) Linked representation in memory. 5

9. Consider the graph (G) with four vertices :
   Given below :



   Explain the following of the above graph :
   (a) Degree of each vertex
   (b) A path matrix
   (c) An Adjacency matrix representation
   (d) An Adjacency list representations. 3,3,5,5

Roll No. .....

1054

Printed Pages : 2

BCA / D–16
COMPUTER ARCHITECTURE
Paper–BCA–233

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *A candidate will be required to answer **five** questions in all, selecting **one** question from each unit in addition to **compulsory question No. 1.** All questions carry equal marks.*

(Compulsory Question)

1. (i) What is Control Memory ?

(ii) What do you mean by Accumulator ?

(iii) What is Logic operation ?

(iv) What is MAR

(v) What is CISC ?

(vi) What is Software Interrupt ?

(vii) What do you mean by Synchronous Mode of Data Transfer ?

(viii) What is Cache Memory ? 8×2=16

Unit–I

2. Explain the design of Accumulator Logic. 16

3. Explain various types of Computer Instructions. 16

Unit–II

4. Design Address Sequencer and explain its working ? 16

5. Define Micro operation. What are the four main categories of micro operations. Give four example of each categories using RTL ? 16

Unit–III

6. What do you mean by Program Interrupt ? Explain its types. 16

7. Explain Instruction Format ? What are the various types of Instruction Format ? Discuss. 16

Unit–IV

8. What is I/O Interface ? Explain the Component and function of I/O Interface ? 16

9. Write short note on the following :

(a) Associate Mapping

(b) Direct Mapping

(c) Set-Associative Mapping

(d) Locality of Reference. 4×4=16

Roll No. .....
Printed Pages : 2

1055

BCA / D-16
SOFTWARE ENGINEERING
Paper–BCA-234

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *Attempt **five** questions in all. **Question No. 1 is compulsory.** In addition to this attempt **four** more questions selecting **one** question from each unit. All questions carry carry equal marks.*

Compulsory Question

1. Answer the following questions in brief : 4×4

(a) What is function point ? How it is used for project estimation?

(b) What are the various characteristics of SRS ?

(c) Differentiate between cohesion and coupling.

(d) Differentiate between black box and white box testing.

Unit–I

2. (a) Explain different programming paradigm. 8

(b) Explain the following terms : 4×2

(i) Product Metrics

(ii) Process Metrics

(iii) Rapid application development

(iv) Computer Aided software engineering.

3. What do you mean by Software development life cycle (SDLC)? Draw a diagram of pure waterfall life cycle. Explain different phases involved in waterfall life cycle. 16

Unit–II

4. What do you know about feasibility study ? Explain its various types in detail. 16

5. (a) Explain project Monitoring. Explain its various tools and techniques in detail. 8

(b) What do you mean by SCM (software configuration management) ? Explain the process of SCM. 8

Unit–III

6. Explain the following terms : 4×4

(a) WBS (work breakdown structure)

(b) Gantt charts

(c) PERT (project evaluation and Review Technique)

(d) CPM (critical path method)

7. (a) Explain ER Diagram (Entity-Relationship). Mention types of attributes in ER diagram. 8

(b) Why software maintenance is necessary ? Discuss problems that are faced during maintenance of software. 8

Unit–IV

8. (a) Define Risk Management. Explain its process with help of diagram. 8

(b) Explain the following term : (4×2)

(i) Unit testing

(ii) System testing

(iii) Mutation testing

(iv) Regression testing

9. Discuss COCOMO model. Explain static single variable cost estimation and multi variable cost estimation model in detail. 16

Roll No. .....
Printed Pages : 2

1056

BCA / D-16

FUNDAMENTALS OF DATABASE SYSTEM

Paper–BCA-235

Time allowed : 3 hours] *[Maximum marks : 80*

Note : ***Question No. 1 is compulsory.*** *In addition attempt* ***four*** *more questions, selecting* ***one*** *question from each unit. All questions carry equal marks.*

Compulsory Question

1. Attempt **all** the following : 2×8

(a) Entity

(b) Attribute

(c) Secondary key

(d) Database Designer

(e) Inconsistency

(f) Data and Information

(g) Domain

(h) Binary Relationship.

Unit–I

2. (a) What do you mean by Database System ? What are advantages and disadvantages of Database System ? 8

(b) What are the disadvantages of File System ? 8

3. (a) What are the Components of Database ? 8

(b) What are the duties of DBA ? 8

Unit–II

4. (a) What do you mean by data independence ? Explain various types of data independence. 8

(b) Describe the Architecture of a Database System. 8

5. (a) Explain Classification of database system. 8

(b) Differentiate between Schema and subschema. 8

Unit–III

6. What do you mean by data model ? Explain various types of data models. 16

7. (a) What is E-R diagram ? Draw E-R Diagram for a company database. 8

(b) What is an entity ? Explain the term weak and strong entity. 8

Unit–IV

8. (a) What is relationship between tables and views ? Explain with example. 8

(b) Differentiate between. Hierarchical and Network Data Model. 8

9. Explain Domain constraint, Key constraint, Entity integrity and Referential integrity. 16

Unit–IV

8. (a) Given that :

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find $\frac{d^2y}{dx^2}$ at $x = 1.6$ 8

(b) Using divided difference, find the value $f'(8)$, given that $f(6) = 1.556$, $f(7) = 1.690$, $f(9) = 1.908$, $f(12) = 2.158$. 8

9. (a) Derive Simpson's $\frac{3}{8}$ rule. 8

(b) Use Gauss's quadrature formula to evaluate $I = \int_0^1 x\,dx$ with $n = 4$, upto 5 decimal places. 8

Roll No. .....

Printed Pages : 4

BCA / D–16

COMPUTER ORIENTED NUMERICAL METHODS

Paper–BCA–236

Time allowed : 3 hours] *[Maximum marks : 80*

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) Find the difference of the following floating point numbers 4

(i) 0.39×10^3 from 0.4925×10^3

(ii) 0.45×10^3 from 0.3925×10^5

(b) Explain Runge-Kutta method of fourth order. 4

(c) Construct Newton's forward interpolation polynomial for the following data : 4

x	4	6	8	10
f(x)	1	3	8	16

Hence evaluate $f(5)$

(d) Evaluate :

$\int_0^1 \frac{1}{1+x^2}\,dx$ using Simpson's $\frac{1}{3}$rd rule taking $h = \frac{1}{4}$ 4

[P.T.O.

Unit–I

2. (a) Find the value of $(1 + X)^2$ and $(X^2 + 2X) + 1$ when $X = 0.8990\ E(-2)$. Calculate the relative errors in two methods of calculating the expression. Which one is the preferred method ? 8

(b) If $a = 0.6554\ E1$, $b = 0.5646\ E(-1)$ and $c = 0.6534\ E1$, show that $(a + b) - c \neq (a - c) + b$. 8

3. (a) Find a real positive root of the equation $x^3 - x - 1 = 0$ using bisection method correct to three places of decimal. 8

(b) Show that order of convergence of Regula falsi method is 1.618. 8

Unit–II

4. (a) Solve the following equation by triangularisation Method :

$$2x + 4y + 3z = 9$$

$$3x + y - 2z = -1$$

$$x - y + z = 6$$ 8

(b) Solve the following equations by Gauss-Seidal Method :

$$2x + y + 6z = 9$$

$$8x + 3y + 2z = 13$$

$$x + 5y + z = 7.$$ 8

5. (a) Using modified Euler's Method, find an approximate value of y when $x = 0.3$, given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$ 8

(b) Using Runge-Kutta method, solve $\frac{dy}{dx} = y - x$ for $x = 0.1$. Initially $y(0) = 2$. Taking $h = 0.1$ 8

Unit–III

6. (a) Using Newton-Backward difference formula, estimate the number of persons earning between Rs. 90 to Rs. 100 : 8

Wages (in Rs.)	below 40	40 – 60	60 – 80	80 – 100	100 – 120
No. of persons (in thousands)	250	120	100	70	60

(b) Use Sterling formula to find y_{28}, given

$y_{20} = 49925$, $y_{25} = 48316$, $y_{30} = 47236$, $y_{35} = 45926$, $y_{40} = 44306$. 8

7. (a) Prove that Chebyshev polynomial $T_n(x)$ satisfy the differential equation

$$(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + n^2y = 0$$ 8

(b) Find the least square polynomial approximation of degree two to the following data :

x	0	1	2	3	4
f(x)	–4	–1	4	10	20

8

Roll No. .....

Printed Pages : 2

1058

OBCA / D–16
C-PROGRAMMING-II
Paper-BCA-231

Time allowed : 3 hours] *[Maximum marks : 80*

Note: *Attempt any **five** questions including **first question which is compulsory.** The remaining **four** questions required to be attempted from given four units selecting at least **one** question from each unit. All question carry equal marks.*

1. Write short notes on the following :

(a) User defined data types

(b) Call by reference and call by value

(c) Getc and putc functions

Unit-I

2. Write a program to read a text and count all occurrences of a particular word.

3. Distinguish between the following:

(a) Actual and formal arguments

(b) Global and local variables

(c) Structure and array

(d) Automatic and static variables

Unit-II

4. What is a pointer? Write a program in C to exchange the values stored in two locations in the memory using pointers.

5. Write a function that receives a sorted array of integers and a integer value, and inserts that value in its correct place using pointers.

Unit-III

6. Define a file in C. Explain various operations that can be performed on files.

7. Write a program in C to copy the contents of one file into another.

Unit-IV

8. What do you mean by macro? What are the advantages of using macro definitions in a program?

9. Differentiate between #ifdef and #if directive.

Roll No. .....

1059

Printed Pages : 2

OBCA / D–16

DATA STRUCTURE–I

Paper–BCA-232

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *Student will be required to attempt **five** questions in all. **Question number 1 is compulsory.** In addition to compulsory question, student will have to attempt **four** more questions selecting **one** question from each unit. All questions carry equal marks.*

Compulsory Question

1. (a) What is Big-O notation ? Discuss. 4

(b) What is abstract data type ? 2

(c) Write short note on linear array ? 2

(d) What is polish notation and reverse polish notation ? 4

(e) What do you mean by garbage-collection ? 4

Unit–I

2. What do you mean by pattern matching algorithm ? Discuss first pattern matching algorithm with the help of suitable example. 16

3. What is data structure ? Write different data structure operations and also write the applications of the data structure. 16

Unit–II

4. (a) What is array data structure ? Discuss different representation of array in main memory of computer. 8

(b) What do you mean by searching ? Write down algorithm for searching an element in a sorted linked list. 8

5. (a) Discuss the following :

–Header linked list

–Multidimensional array. 8

(b) Insertion and deletion in array is more complex than linked list. Justify your answer with suitable example. 8

Unit–III

6. What do you mean by stack ? Write quick sort algorithm with the help of suitable example. 16

7. What is queue data structure ? Discuss array and linked representation of queue with algorithm. 16

Unit–IV

8. What is tree data structure ? Discuss different tree traversal algorithm in detail. 16

9. What is graph data structure ? Explain depth first search and breadth first search algorithms with suitable examples. 16

Roll No. .....
Printed Pages : 2

1060

OBCA / D-16

COMPUTER ARCHITECTURE-I

Paper–BCA-233

Time allowed : 3 hours] *[Maximum marks : 80*

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

1. Answer the following questions in brief : 4×4=16

(a) Differentiate synchronous and asynchronous mode of information exchange.

(b) What is shift counter ? Explain its use in ALU.

(c) What are the benefits of organizing memories into hierarchy?

(d) Distinguish between horizontal and vertical microprogramming.

Unit–I

2. (a) Discuss Daisy chain and Polling method of connecting devices to a bus. 8

(b) Explain the concept of cycle stealing in DMA. 8

3. (a) Explain the concept of handshaking. How it is advantageous for data transfer. 8

(b) What are output devices ? Explain working of inkjet printer. 8

Unit–II

4. (a) Derive and explain an algorithm for adding and subtracting two floating point binary numbers. 8

(b) Explain the working of carry look-ahead adder with the help of block diagram. 8

5. Write short note on the following :

(a) Carry storage adder 8

(b) Boots Algorithm for Multiplication 8

Unit–III

6. (a) What is the speed mismatch between ALU and memory units ? Explain the concept memory interleaving. 8

(b) Discuss the problems of management of memory hierarchies. 8

7. (a) Explain the difference between word-associative and block-associative cache organization. 8

(b) Explain multilevel organization of caches. 8

Unit–IV

8. (a) What is indexing ? Explain the different uses of index register. 8

(b) Solve (A*B)-(C/D) using three, two, one and zero instruction format. 8

9. (a) Explain the following uses of stack : 8

(i) interrupt processing

(ii) storing local variables

(iii) storing parameters

(b) Explain the working of stack organized processor with the help of block diagram. 8

3

Roll No. .....
Printed Pages : 2

1061

OBCA / D-16

INTRODUCTION TO DATABASE SYSTEM

Paper–BCA-234

Time allowed : 3 hours] *[Maximum marks : 80*

Note : ***Question No. 1 is compulsory.*** *Attempt* ***four*** *more questions by selecting at least* ***one*** *question from each section. All questions carry equal marks.*

1. Compulsory Question.

(a) What is concept of domain ? How can attribute define domain ? 4

(b) Define data independence in detail. 4

(c) Define terms : entity, tuple, degree and cardinality. 4

(d) Define a key. Also explain super and foreign keys. 4

Section–I

2. Define database approach along with its major characteristics. 16

3. What are roles of DBA, Data manager, File Manager and Disk Manager ? 16

Section–II

4. (a) Explain object based data models and physical data models. 8

(b) Explain centralized and client server architecture in DBMS. 8

5. Explain advantages and disadvantages of record based data models. 16

Section–III

6. Discuss steps for designing ER diagram. Using these steps develop an ER diagram of your choice. 16

7. (a) Explain various types of relationships by giving suitable examples. 8

   (b) Distinguish between hierarchical and network data model. 8

Section–IV

8. What is relational model ? Explain with suitable example. Explain major properties of relational tables. 16

9. (a) What are database relations ? Explain various properties of relations. 8

   (b) What do you mean by constraints ? Define any three integrity rules with suitable example. 8

Roll No. .....
Printed Pages : 2

1062

OBCA / D-16

STRUCTURAL SYSTEM ANALYSIS AND DESIGN

Paper–BCA-235

Time allowed : 3 hours] *[Maximum marks : 80*

Note : *Attempt **five** questions in all. **Question No. 1 is compulsory.** In addition to this attempt four more questions selecting from each unit. All questions carry equal marks.*

Compulsory Question

1. Answer the following questions in brief : 4×4

(a) Differentiate between Deterministic and Probabilistic system.

(b) Explain Technical and Operational feasibility study.

(c) Distinguish between logical design and physical design.

(d) Differentiate between black box testing and white box testing.

Unit–I

2. Define system. Mention its various characteristics. Also discuss classification of computer based information system in detail. 8

3. Explain SDLC (software development life cycle) by giving its various phases in detail with help of a diagram. 8

Unit–II

4. What are the various fact finding process and techniques used by system Analyst ? 8

5. Explain the following : 2×4

(a) IPO and HIPO charts

(b) DFD and Data Dictionary.

Unit–III

6. (a) Explain the following terms : 8

(i) Database (ii) Tunability

(iii) Data migration (iv) Logical data independence

(b) Differentiate between coupling and cohesion. 8

7. Define file organisation. Discuss various methods of file organisation by giving its advantages and disadvantages. 16

Unit–IV

8. Explain the following types of testing : 16

(a) Unit testing

(b) System testing

(c) Alpha testing

(d) Beta testing

(e) Acceptance testing

(f) Mutation testing

(g) Regression testing

(h) Stress testing

9. (a) Why maintenance is necessary ? Discuss various types of maintenance. 8

(b) Discuss the concept of Quality Assurance. Also discuss its various levels. 8

Roll No. .....

1063

Printed Pages : 3

OBCA / D–16

MATHEMATICAL FOUNDATION–III

Paper–BCA–236

Time allowed : 3 hours] *[Maximum marks : 80*

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

1. (a) Differentiate $\frac{\tan x - \cot x}{\tan x + \cot x}$ with respect to x.

(b) If $y = \log(\cos x)$, find $\frac{d^3y}{dx^3}$.

(c) Write an equation of normal to the curve $y = x^3$ at (2,8)

(d) Show that the curve $y = x^4$ is concave upwards at the origin.

(e) Find the radius of curvature at the origin for the curve $2x^4 + 3y^4 + 4x^2y + xy - y^4 + 2x = 0$ by Newton's Method.

Unit–I

2. (a) If $y = \tan^{-1}\frac{4\sqrt{x}}{1-4x}$, Find $\frac{dy}{dx}$.

(b) Prove that :

$$\left(x^2 - 1\right)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - n^2 y = 0$$

where $y = \left[x + \sqrt{x^2 - 1}\right]^n$.

3. (a) If $x^p \cdot y^q = (x+y)^{p+q}$ then prove that $\frac{dy}{dx} = \frac{y}{x}$

(b) If $y = \sin^{-x}$ prove that

$$(1-x^2)\, y_{n+2} - (2n+1)\, x y_{n+1} - n^n y_n = 0$$

where $y_n = \frac{d^n y}{dx^n}$

Unit–II

4. (a) Find the point on the curve $y = 3x^2 - 2x - 4$ at which tangent is perpendicular to the line $x + 10y - 7 = 0$

(b) If $f(x) = x^3 - 2x + 5$, find the value of $f(2.001)$ with the help of Taylor's series for $f(x+h)$.

5. (a) Solve : $\lim_{x \to 0} \left(\frac{1}{x} - \cot x\right)$

(b) Show that the function $f : R^2 \to R$ defined by

$$f(x, y) = \begin{cases} xy \dfrac{(x^2 - y^2)}{(x^2 + y^2)}, & (x, y) \neq (0, 0) \\ 0, & \text{otherwise} \end{cases}$$

is continuous at (0, 0)

Unit–III

6. (a) Find all the asymptotes of the curve

$$3x^3 + 2x^2y - 7xy^2 + 2y^3 - 14xy + 7y^2 + 4x + 5y = 0$$

(b) Find the asymptotes of the polar curve $r \tan 3\theta = a$.

7. (a) Find the position and nature of double points on the curve $(y-x)^2 + x^6 = 0$.

(b) Show that the curve $y^2(2a - x) = x^3$ has a single cusp of the first species at the origin.

Unit–IV

8. (a) Find the radius of curvature of the curve

$$y = 4 \sin x - \sin 2x \text{ at } x = \frac{\pi}{2}$$

(b) Find the co-ordinates of the centre of curvature at any point (x, y) of the parabola $y^2 = 4ax$.

9. (a) Trace the curve $y^2 = (x-2)^2 (x-5)$

(b) Trace the curve $r = a \cos 3\theta$.

Unit IV

8. (a) Show that : 4

$$B(m,n) = \int_0^\infty \frac{x^{n-1}}{(1+x)^{m+n}} dx, \quad m > 0, \; n > 0.$$

(b) Evaluate the integral : 4

$$\int_0^1 \int_0^{x^2} e^{y/x} dy dx$$

9. (a) Evaluate the integral : 4

$$\int_1^3 \int_{1/x}^1 \int_0^{\sqrt{xy}} xyz \, dz \, dy \, dx$$

(b) Evaluate : 4

$$\lim_{x \to 0^+} \left(\frac{\cot x - \frac{1}{x}}{x} \right)$$

Roll No. ..... Total Pages : 04

BSIT/D-16 12605

MATHEMATICAL FOUNDATIONS OF INFORMATION TECHNOLOGY-III

BSIT-301

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) If G is a group w.r.t. multiplication, then prove that : 2

$(ab)^{-1} = b^{-1}.a^{-1}$, for all $a, b \in G$.

(b) Evaluate the integral $\int_0^\infty e^{-4x} . x^{3/2} dx$ in terms of Gamma function. 2

(c) If : 2

$$z = \tan^{-1}\left(\frac{x}{y}\right) \text{ and } \frac{\partial^2 z}{\partial x \partial y}$$

(d) In a single throw of two dice, find the probability that either a doublet or total of 9 will appear. 2

Unit I

2. (a) In a certain school, 20% of the students failed in English, 15% of the students failed in Maths and 10% of the students failed in English and Maths. A student is selected at random. If he failed in English, what is the probability that he also failed in Maths ? 4

(b) A fair coin and an unbiased die are tossed. Let A be the event "head appears on the coin and B be the event 3 on the die. Check whether A and B are indepedent events or not. 4

3. (a) A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six. 4

(b) A speaks truth in 60% of the cases and B in 90% of the cases. In what percentage of cases are they likely to contradict each other in stating the same fact ? 4

Unit II

4. (a) Prove that set of all even integers including zero is a group w.r.t. addition. 4

(b) If H_1 and H_2 are two subgroups of G, then prove that $H_1 \cap H_2$ is also a subgroup of G. 4

5. (a) Show that none of the following sets form an integral domain : 4

(i) Set of even integers

(ii) Set of 3×3 matrices.

(b) Prove that necessary and sufficient conditions for a nonempty subset S of the ring R to be subring of R are : 4

(i) $a, b \in S \Rightarrow a - b \in S$

(ii) $a, b \in S \Rightarrow a.b \in S$

Unit III

6. (a) If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, show that : 4

$$x\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = \tan u$$

(b) Expand $e^x \cos y$ at $\left(1, \frac{\pi}{4}\right)$ by using Taylor theorem. 4

7. (a) Examine for maximum and minimum values the function : 4

$$f(x, y) = \sin x + \sin y + \sin (x + y)$$

(b) Find the extreme values of the function $x^2 + y^2 + z^2$ subject to the condition $xy + yz + zx = 2a^2$, using Lagrange's method of multipliers. 4

Roll No. .....

Total Pages : 03

BSIT/D-16 **12606**

ELECTRONIC CIRCUITS AND NETWORK THEORY

BSIT-302

Time : Three Hours] [Maximum Marks : 40

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

Compulsory Question

1. (a) What are the advantages and usages of an emitter follower ? **2**

(b) Why are isolation bands required in IC fabrication ? **2**

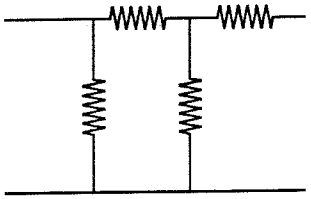
(c) Why are npn devices preferred over pnp in ICs ? **2**

(d) Justify the need of a DC coupled amplifier. **2**

Unit I

2. (a) Explain h-parameters of a two port network. **4**

(b) Determine Z parameters of the network shown below. All resistances are of 5 ohms. 4



3. Obtain the expressions for current gain, voltage gain, input impedance and output admittance of a transistor amplifier. Discuss, how source and load impedance affects these amplifier parameters. 8

Unit II

4. Discuss the step by step process for fabricating a monolithic integrated transistor. Draw cross-sectional view after each step. 8

5. (a) Explain masking and etching technique used in fabrication of a monolithic integrated circuit. 5

(b) Discuss beam lead isolation method used in IC fabrication. 3

Unit III

6. (a) Discuss different types of transistor structures used in ICs. 6

(b) What are buried layers in ICs ? 2

7. (a) Discuss how monolithic diodes are obtained in ICs ? Discuss their characteristics. 5

(b) List the main characteristics of integrated components. 3

Unit IV

8. (a) Discuss opamp as difference amplifier. 5

(b) List the characteristics of an ideal opamp. 3

9. (a) Discuss opamp in non-inverting configuration and obtain an expression for its gain. How this circuit can be converted into unity gain buffer and what are the advantages ? 5

(b) Define CMRR. Why is high value of CMRR preferred ? 3

Roll No. ..... Total Pages : 03

BSIT/D-16 **12607**

TELECOMMUNICATION-I

BSIT-303

Time : Three Hours] [Maximum Marks : 40

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

(Compulsory Question)

1. (a) Compare the error rate in computer-computer connection via a local cable and via a dial-up telephone line. **2×4**

(b) Discuss merits of switched network to connect devices to make one-to-one communication possible.

(c) Justify the statement that "Paging system is much simpler and less expensive".

(d) Why is ATM called as "highway" of the information super highway ?

Unit I

2. (a) Discuss the function of "End Office" in Telephone System. **3**

(b) Draw block diagram for computer to computer call and explain its working. 5

3. (a) Explain RS-449 standard in Telephone System in detail. How it minimizes the problems faced in RS-232 standard ? 4

(b) Discuss the WDM scheme in detail. 4

Unit II

4. (a) Discuss Time-Slot-Interchange in TDS using suitable diagram. 3

(b) Compare the functioning of space-division and time-division switches. 5

5. Draw architecture of ISDN system with a PBX and explain its working. 8

Unit III

6. (a) Discuss the various generations of cordless telephone systems. 4

(b) Explain the operation of Improved Mobile Telephone System. 4

7. Write a detailed note on Personal Communications Services. 8

Unit IV

8. (a) Discuss Achitecture of Frame Relay Network. 4

(b) Discuss drawbacks of virtual-circuit switching network. How is Frame Relay System superior than the Virtual Circuit Switching ? 4

9. Discuss various ATM layers in detail. 8

Roll No. .....

Total Pages : 03

BSIT/D-16 **12608**

MICROPROCESSOR ARCHITECTURE AND PROGRAMMING-I

BSIT-304

Time : Three Hours] [Maximum Marks : 40

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

(Compulsory Question)

1. (a) The positive clock edge occurs halfway through each state. Why ? **2×4**

(b) What do you mean by RRC instruction ?

(c) Explain DAA instruction.

(d) Explain EI and DI instruction.

Unit I

2. Draw SAP-I Architecture and explain each unit. **8**

3. (a) Explain Fetch and Execute cycle of LDA routine with timing diagram. **4**

(b) Write a subroutine that produces a time delay of approximately 500 micro sec if the clock frequency is 1MHZ and Hand assemble this program starting at address 3000H. 4

Unit II

4. (a) Write a program in SAP-III to find the sum of a series 1+2+3+4+.....+10 using : 6
   (i) INR instruction and no DCR
   (ii) DCR instruction and no INR.
   (b) Explain CALL and RET instruction with example. 2

5. (a) Discuss PUSH and POP instructions in detail. 4
   (b) Suppose that 256 bytes of data are stored in memory between address 5000H to 50FFH. Write a program that copies these bytes at address 9000H to 90FFH. 4

Unit III

6. Draw and discuss the architecture of 8085 microprocessor. 8

7. (a) What do you mean by fetch-execute overlap of 8085 ? 4

(b) Discuss the following instructions of 8085 : 4
XCHG, XTHL, SPHL and PCHL.

Unit IV

8. Write a note on DMA and its working. 8

9. Draw and explain the interrupt control circuit for 8085 microprocessor in detail. 8

Roll No. .....

Total Pages : 03

BSIT/D-16 **12609**

OPERATING SYSTEM-I

BSIT-305

Time : Three Hours] [Maximum Marks : 40

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

(Compulsory Question)

1. (a) Differentiate between Hard Real Time System and Soft Real Time System.

(b) Explain Process Control Block.

(c) Define IPC. How do processes communicate using direct and indirect communication ?

(d) What do you mean by Starvation in Deadlock ? **8**

Unit I

2. (a) What do you mean by Operating System ? Explain the functions of Operating System. **4**

(b) Differentiate between Network and Distributed Operating System. 4

3. (a) Define System Call and explain various types of System Calls provided by Operating System. 4

(b) Explain Booting Process. 4

Unit II

4. Differentiate between the following :

(a) Preemptive and Non-preemtive Scheduling 4

(b) Response Time and Waiting Time. 4

5. What do you mean by Schedulers ? Differentiate between Job Scheduler and CPU Schedulers.

Unit III

6. Write short notes on the following :

(a) Message Passing System 4

(b) Cooperative Processes. 4

7. Explain producer consumer synchronization problem with example and its solutions 8

Unit IV

8. Define Deadlock Prevention and Deadlock Avoidance. Explain four criteria for deadlock prevention. 8

9. (a) Explain, how deadlock can be eliminated by Resource Preemption. 4

(b) Explain Deadlock recovery mechanism. 4

Roll No. ..... Total Pages : 02

BSIT/D-16 12610

COMPUTER PROGRAMMING WITH C-I

BSIT-306

Time : Three Hours] [Maximum Marks : 40

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

1. (a) Define variable and write rules to define a variable.
   (b) Define size of operator with example.
   (c) Name *two* character functions used in C.
   (d) What are escape sequences ? 8

Unit I

2. (a) Define features of C language.
   (b) Write data types used in C. 8

3. (a) Write structure of C program.
   (b) Discuss and console input/output and comments in C. 8

Unit II

4. Explain operators used in C with their procedence. 8

5. (a) Write a program to find even-odd out of any *ten* numbers using IF statement.
   (b) Discuss library functions in C. 8

Unit III

6. (a) Write a program to find multiplication table for 2 to 7.
   (b) Differentiate do-while and while loop with example. 8

7. (a) Define switch statement. Write a program to show use of switch statement.
   (b) Differentiate 'break' and 'continue' with example. 8

Unit IV

8. How is 2-D array represented in C ? Write a program to multiply two matrices. 8

9. (a) Write a note on character functions used in C with example.
   (b) Write a program to perform selection SORT on A[N]. 8