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

1444

GSE /M-16
MATHEMATICS
Paper–BM–121
Number Theory and Trigonometry

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

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

(Compulsory Question)

1. (a) Prove that, if n is an integer, the product n (n – 1) (2 n – 1) is divisible by 6. $1\frac{1}{2}$

(b) Find a such that $a \equiv 7 \pmod 5$ $1\frac{1}{2}$

(c) Find all possible values of n which satisfies $\phi(n)=23$ $1\frac{1}{2}$

(d) If n is any integer, show that

$$(1+i)^n+(1-i)^n = 2^{\frac{n}{2}+1}\cos\frac{n\pi}{4}$$ $1\frac{1}{2}$

(e) Prove that $\text{Log}_4 2 = \dfrac{\frac{1}{2}\log 2 + i\,n\pi}{\log 2 + i\,m\pi}$ 1

Section–I

2. (a) Show that a number is divisible by 9 iff the sum of its digits is divisible by 9. $2\frac{1}{2}$

(b) If a, m, n are non-zero integers, then (a, m n) = 1 if and only if (a, m) = 1 and (a, n) = 1. $2\frac{1}{2}$

3. (a) Find the general solution in positive integers of $13x - 17y = 5$ $2\frac{1}{2}$

(b) If p is prime. show that $2(p-3)!+1$ is a multiple of p. $2\frac{1}{2}$

Section–II

4. (a) Find the number of zeros at the right end of 11 ! $2\frac{1}{2}$

   (b) Find the smallest integer x for which d (x) = 6. $2\frac{1}{2}$

5. (a) Prove that -1 is a quadratic residue of prime numbers of the form $4k+1$ $2\frac{1}{2}$

   (b) If p and p + 2 are both prime then show that :

   $\phi(p+2)=\phi(p)+2$. $2\frac{1}{2}$

Section–III

6. (a) Express $\sin^6\theta\cos^2\theta$ in a series of cosines of multiples of θ. $2\frac{1}{2}$

   (b) Show that the roots of $(1+x)^5=i(1-x)^5$ are :

   $x=i\tan\frac{(4r+1)\pi}{12}$, where r = 0, 1, 2. $2\frac{1}{2}$

7. (a) Prove that :

   $$\tan\frac{u+iv}{2}=\frac{\sin u+i\sin hv}{\cos u+\cos hv}$$ $2\frac{1}{2}$

   (b) If $\frac{(1+i)^{x+iy}}{(1-i)^{x-iy}}=\alpha+i\beta$, Prove that one of the value of

   $\tan^{-1}\frac{\beta}{\alpha}$ is $\frac{1}{2}\pi x+y\log 2$. $2\frac{1}{2}$

Section–IV

8. (a) Solve the equation :

   $$\tan^{-1}\frac{x-1}{x-2}+\tan^{-1}\frac{x+1}{x+2}=\frac{\pi}{4}$$ $2\frac{1}{2}$

   (b) Prove that :

   $\log(1+ix)=\frac{1}{2}(1+x^2)+i\tan^{-1}x$;

   hence deduce the expression of $\tan^{-1}x$ in ascending powers of x . $2\frac{1}{2}$

9. (a) Prove that :

   $$\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{5}{13}+\sin^{-1}\frac{16}{65}=\frac{\pi}{2}$$ $2\frac{1}{2}$

   (b) Find the sum to infinity of the series :

   $1-\frac{1}{2}\cos\theta+\frac{1\cdot3}{2\cdot4}\cos2\theta-\frac{1\cdot3\cdot5}{2\cdot4\cdot6}\cos3\theta+\cdots;\ -\pi<\theta<\pi$.

   $2\frac{1}{2}$

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

1445

GSE /M-16

MATHEMATICS

Paper–BM–122

Ordinary Differential Equation

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

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

(Compulsory Question)

1. (a) Write solution of exact differential equation $Mdx + Ndy = 0$ 1

(b) Solve : $(D^4 + 5D^2 + 6)y = 0$ 2

(c) Show that the differential equation

$$(yz + 2x)\,dx + (zx - 2z)\,dy + (xy - 2y)\,dz = 0$$

is said to be exact 2

(d) Differentiate between orthogonal trajectory and oblique trajectory. 1

Section–I

2. (a) Solve :

$$(y^4 + 2y)\,dx + (xy^3 + 2y^4 - 4x)\,dy = 0 \qquad 2\tfrac{1}{2}$$

(b) Define exact differential equation. State and prove the necessary and sufficient condition for differential equation

$Mdx + Ndy = 0$ to be exact. $2\tfrac{1}{2}$

[Turn over

3. (a) Solve : $x = y + p^2$ 2

(b) Obtain the complete primitive and the singular solution of

$$x\left(\frac{dy}{dx}\right)^2 - 2y\frac{dy}{dx} + 4x = 0$$ 3

Section–II

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

$$\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1 \text{ is self-orthogonal.}$$ $2\frac{1}{2}$

(b) $\frac{d^2y}{dx^2} + y = \sin x \sin 2x$, solve. $2\frac{1}{2}$

5. (a) Solve :

$$\frac{d^3y}{dx^3} - 3\frac{dy}{dx} + 2y = x^2.e^x$$ $2\frac{1}{2}$

(b) Solve :

$$(2x-1)^3\frac{d^3y}{dx^3} + (2x-1)\frac{dy}{dx} - 2y = 0.$$ $2\frac{1}{2}$

Section–III

6. (a) Solve :

$$\frac{d^2y}{dx^2} - \cot x\frac{dy}{dx} - (1-\cot x)\,y = e^x \sin x.$$ $2\frac{1}{2}$

(b) Solve :

$$\cos x\frac{d^2y}{dx^2} + \sin x\frac{dy}{dx} - 2y\cos^3 x = 2\cos^5 x.$$ $2\frac{1}{2}$

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

$$(1-x)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = (1-x)^2$$ 3

(b) Solve :

$$\frac{d^2y}{dx^2} - 2\tan x\frac{dy}{dx} + 5y = 0$$

by removing the first derivative. 2

Section–IV

8. (a) Solve the simultaneous equations

$$\frac{dx}{dt} + 5x + y = e^t \text{ and}$$

$$\frac{dy}{dx} - x - 3y = e^{2t}$$ $2\frac{1}{2}$

(b) Solve the simultaneous equations

$$\frac{dx}{xy} = \frac{dy}{y^2} = \frac{dz}{z\left(xy - 2x^2\right)}$$ $2\frac{1}{2}$

9. (a) Solve the differential equation :

$$\left(2x^2 + 2xy - 2xz^2 + 1\right)dx + dy + 2z\,dz = 0$$ $2\frac{1}{2}$

(b) Solve :

$(x - 3y - z)\,dx - (2y - 3x)\,dy - (z - x)\,dz = 0.$ $2\frac{1}{2}$

Roll No. .....

Printed Pages : 3

1452

GSE / M–16
MATHEMATICS
Paper–BM–121
Number Theory and Trigonometry

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

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

1. (a) If 'p' is a prime number and 'a' is any number, then either p divides a or p is co-prime to a. 2

(b) Find $\phi(n)$ for $n = 68$. 2

(c) Split $e^{(5+3i)^2}$ into real and imaginary parts, where $i = \sqrt{-1}$. 1

(d) Prove that $\cosh^2 x - \sin h^2 x = 1$. 1

(e) Show that :

$\log(1 + \cos 2\theta + i \sin 2\theta) = \log(2 \cos \theta) + i\theta$. 2

Section–I

2. (a) Find the g.c.d. of 858 and 325, and express it in the form $m.858 + n.325$. 4

(b) Solve the congruence $15x \equiv 22 \pmod{21}$. 4

3. (a) State and prove Fermat's Theorem. 4

(b) If $(p-1)! + 1 \equiv 0 \pmod{p}$, then prove that p is a prime number. 4

Section–II

4. Find the least positive integer x such that

$x \equiv 5 \pmod 7$; $x \equiv 7 \pmod{11}$; $x \equiv 3 \pmod{13}$. 8

5. (a) If x is any real number, then $\left[\frac{[x]}{n}\right] = \left[\frac{x}{n}\right]$, where n is a positive integer and [x] is Greatest Integer function. 4

(b) Show that 3 is a quadratic non-residue of 31. 4

Section–III

6. (a) If α, β be the roots of $x^2 - 2x + 4 = 0$, prove that

$$\alpha^n + \beta^n = 2^{n+1} \cos \frac{n\pi}{3}.$$ 4

(b) Prove that : 4

$$\cos^5\theta \sin^3\theta = -\frac{1}{2^7}[\sin 8\theta + 2\sin 6\theta - 2\sin 4\theta - 6\sin 2\theta].$$

7. (a) If $z = x + iy$, where x and y are real, find the real and imaginary parts of $\frac{\cos z}{z+1}$. 4

(b) If $x + iy = \cos h(4 + iv)$, show that

$$\frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1$$ 4

Section–IV

8. (a) Express Log [Log $(\cos\theta + i\sin\theta)$] in the form A + iB. 4

(b) Show that the real part of the principal value of $i^{\log(1+i)}$ is $e^{-\pi^2/8} \cdot \cos\left(\frac{\pi}{4}\log 2\right)$. 4

9. (a) Solve the equation

$\tan^{-1}(e^{ix}) - \tan^{-1}(e^{-ix}) = \tan^{-1}(i)$. 4

(b) Sum the series : 4

$$\cosh\alpha - \frac{1}{2}\cosh 2\alpha + \frac{1}{3}\cosh 3\alpha - \ldots\ldots \infty.$$

Roll No. .....

1453

Printed Pages : 3

GSE / M–16
MATHEMATICS
Paper–BM–122
Ordinary Differential Equation

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

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

Compulsory Question

1. (a) Define exact differential equation. 1

(b) Solve $p = \tan(px - y)$ 1

(c) Find the complementary function of the differential equation

$$\frac{d^4 y}{dx^4} - m^4 y = \sin mx.$$ 2

(d) Show that $y = e^{2x}$ is a part of C.F. for the D.E.

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

(e) Show that the D.E.

$(yz + 2x)\,dx + (zx - 2z)\,dy + (xy - 2y)\,dz = 0$ is exact. 2

Section–I

2. (a) To find the necessary and sufficient conditions that the equation $Mdx + Ndy = 0$ may be exact. 4

(b) Solve :

$(2x^2 y - 3y^4)\,dx + (3x^2 + 2x y^3)\,dy = 0.$ 4

3. (a) Solve the D.E.

$$p = \tan\left(x - \frac{p}{1+p^2}\right).$$ 4

(b) Obtain the complete primitive and the singular solution of

$$x\left(\frac{dy}{dx}\right)^2 - 2y\frac{dy}{dx} + 4x = 0.$$ 4

Section–II

4. (a) Find the orthogonal trajectory for the family of curves $r = a(1 + \sin\theta)$. 4

(b) Solve the D.E.

$$\frac{d^3y}{dx^3} - 5\frac{d^2y}{dx^2} + 7\frac{dy}{dx} - 3y = e^{2x}\cosh x.$$ 4

5. (a) Solve the D.E.

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x.$$ 4

(b) Solve the D.E.

$$(1+x)^2\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} + y = 4\cos\log(1+x).$$ 4

Section–III

6. (a) Solve the D.E.

$$x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - 9y = 0.$$

given that $y = x^3$ is a part of solution. 4

(b) Solve the D.E. by removing the first derivative :

$$\frac{d^2y}{dx^2} - 2\tan x\frac{dy}{dx} + (a^2+1)y = \sec x.e^x.$$ 4

7. (a) Solve the D.E.

$$\frac{d^2y}{dx^2} - \cot x\frac{dy}{dx} - y\sin^2 x = 0.$$

by changing the independent variable. 4

(b) Solve the D.C. by the method of variation of parameters :

$$\frac{d^2y}{dx^2} + 9y = \sec 3x.$$ 4

Section–IV

8. (a) Solve the simultaneous equations

$$\frac{dx}{dt} + 5x + y = e^t$$

$$\frac{dy}{dt} - x + 3y = e^{2t}$$ 4

(b) Solve the simultaneous equations :

$$\frac{dy}{x^2 - y^2 - z^2} = \frac{dy}{2xy} = \frac{dz}{2xz}$$ 4

9. (a) Solve the total D.E.

$$2yz\,dx + zx\,dy - xy(1+z)\,dz = 0.$$ 4

(b) Solve the D.E. by using the method for homogeneous equation.

$$z(z-y)\,dx + (z+x)\,zdy + x(x+y)\,dz = 0.$$ 4

Roll No. .....

Printed Pages : 3

1454

GSE / M–16
MATHEMATICS
Paper–BM–123
Vector Calculus

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

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

1. (a) Prove that $[\vec{a}\,\vec{b}\,\vec{c}+\vec{d}]=[\vec{a}\,\vec{b}\,\vec{c}]+[\vec{a}\,\vec{b}\,\vec{d}]$. 1

(b) Find the unit tangent vector at $t=2$ on the curve $x=t^2-1$, $y=4t-3$, $z=2t^2-6t$. 2

(c) If $\vec{w}$ is a constant vector and $\vec{v}=\vec{w}\times\vec{r}$, prove that div $\vec{v}=0$. 1

(d) Find the square of element of arc length in cylindrical co-ordinates. 2

(e) Show that $\oint_C \phi\nabla\psi.d\vec{r}=-\oint_C \psi\nabla\phi.d\vec{r}$. 2

Section–I

2. (a) If $\vec{a},\vec{b},\vec{c}$ are three vectors such that $\vec{a}\times\vec{b}=\vec{c}$ and $\vec{b}\times\vec{c}=\vec{a}$, show that three vectors $\vec{a},\vec{b},\vec{c}$ are orthogonal in pairs and $|\vec{b}|=1, |\vec{c}|=|\vec{a}|$. 4

(b) Show that $\vec{a}\times(\vec{b}\times\vec{c})$, $\vec{b}\times(\vec{c}\times\vec{a})$, $\vec{c}\times(\vec{a}\times\vec{b})$ are coplanar. 4

3. (a) The necessary and sufficient condition for a vector function $\vec{f}$ of a scalar variable 't' to have constant direction is $\vec{f} \times \frac{d\vec{f}}{dt} = 0$. 4

(b) If $\vec{a}$ and $\vec{b}$ are constant vectors, w is constant and $\vec{r}$ is a vector function of scalar t given by $\vec{r} = \cos w t\, \vec{a} + \sin w t\, \vec{b}$, show that $\vec{r} \times \frac{d\vec{r}}{dt} = w(\vec{a} \times \vec{b})$ 4

Section–II

4. (a) If $\vec{a}$ is a constant vector and $\vec{f} = \vec{a} \times \vec{r}$, prove that div $\vec{f} = 0$ 4

(b) Find the greatest value of the directional derivative of $\phi = x^2yz$ at the point (1, 4, 1). 4

5. (a) Prove that :

$\text{Curl}(\vec{f} \times \vec{g}) = \vec{g} \cdot \nabla \vec{f} - \vec{f} \cdot \nabla \vec{g} + \vec{f}\ \text{div}\ \vec{g} - \vec{g}\ \text{div}\ \vec{f}$. 4

(b) Prove that : $\nabla^2 f(r) = \frac{2}{r} f'(r) + f''(r)$. 4

Section–III

6. (a) Express the vector field $2y\,\hat{i} - z\,\hat{j} + 3\,\hat{k}$ in spherical polar co-ordinates. 4

(b) Let u, v, w be orthogonal co-ordinates, Prove that :

(i) $|\nabla u| = \frac{1}{h_1}, |\nabla v| = \frac{1}{h_2}, |\nabla w| = \frac{1}{h_3}$

(ii) $\hat{e}_1 = \hat{E}_1,\ \hat{e}_2 = \hat{E}_2,\ \hat{e}_3 = \hat{E}_3$ 4

7. (a) Transform the following function from spherical to Cartesian system :

$\vec{f} = 3a\, r^2 \sin\theta \cos\phi\ \hat{e}_r + 2a^2 r \cos\theta \sin\phi\ \hat{e}_\theta + r^3 \hat{e}_\phi$ 4

(b) Prove that in an orthogonal curvilinear co-ordinate system: Curl (grad ϕ) = 0. 4

Section–IV

8. (a) Find the work done in moving a particle once round a circle C in the xy – plane, if the circle has centre at the origin and radius 2 and if the force field is given as :

$\vec{f} = (2x - y - 2z)\,\hat{i} + (x + y - z)\,\hat{j} + (3x - 2y - 5z)\,\hat{k}$ 4

(b) Evaluate $\iint_S \vec{f} \cdot \hat{n}\, dS$, where

$\vec{f} = 18z\,\hat{i} - 12\,\hat{j} + 3y\,\hat{k}$ and S is the part of the plane $2x + 3y + 6z = 12$, which lies in the first quadrant. 4

9. (a) Prove that $\iiint_V \frac{1}{r_2}\, dV = \iint_S \frac{\vec{r} \cdot \hat{n}}{r^2}\, dS$

where $\vec{r} = x\,\hat{i} + y\,\hat{j} + z\,\hat{k}$ and $|\vec{r}| = r$. 4

(b) Verify Green's Theorem in plane for

$\int_C (x^2 - xy^3)\, dx + (y^2 - 2xy)\, dy$, where C is a square with vertices (0, 0), (2, 0), (2, 2), (0, 2). 4

Roll No. .....

Printed Pages : 3

1457

GSE / M–16
PHYSICS
Paper–I
Properties of Matter and Kinetic Theory of Gases

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

Note : ***Question No. 1 is compulsory. Four*** *more questions are to be attempted, selecting* ***one*** *question from each unit. Use of scientific (Non-programmable) calculator is allowed. Log tables may be asked for.*

Compulsory Question

1. Answer the following :

(a) Compare the velocities when a solid cylinder reaches the bottom of an inclined plane by

(i) Rolling

(ii) Sliding 2

(b) A cantilever of uniform cross-section is more likely to break near its fixed end. Why ? 2

(c) Determine van-der-Waal's constants in terms of critical constants of a gas. 2

(d) Why is the thermal conductivity of hydrogen gas large as to any other gas at a given temperature ? 2

Unit–I

2. (a) State and prove theorem of parallel axes. 3

(b) Obtain an expression for moment of inertia of a solid cylinder about an axis passing through its centre and perpendicular to its length. 5

3. (a) Derive expressions for moment of inertia of a sphere about its diameter and about a tangent. 6

(b) A sphere has a radius of 0.15m. Calculate its moment of inertia about any diameter. Density of material is 7.8×10^3 kg m^{-3}. 2

Unit–II

4. Define Young's modulus (Y), modulus of rigidity (η), bulk modulus (K) and Poisson's ratio (σ). Derive relations between

(i) Y, K and σ

(ii) Y, η and σ 8

5. (a) Find the couple necessary to twist a rod of circular cross-section through an angle ϕ. Hence calculate the couple per unit twist for a solid and hollow cylinder. 6

(b) What couple must be applied to a wire 1m long and 2mm in diameter to twist one of its ends through 45°. The modulus of rigidity is 5×10^{10} N m^{-2}. 2

Unit–III

6. State the basic postulates of the kinetic theory of gases and derive the expression for pressure exerted by a perfect gas. 8

7. (a) Define principal specific heats of a gas. Find their ratio using law of equipartition of energy. 5

(b) Find the specific heats C_v and C_p of a gas if the mass of one kilomole of this gas is 30 kg and the ratio $\frac{C_p}{C_v}$ is 1.4. 3

Unit–IV

8. (a) Define most probable speed, average speed and root mean square speed. Derive relations for them. 6

(b) Calculate the temperature at which the r.m.s. speed of a hydrogen molecule will be equal to 8 km per second. 2

9. (a) What gives rise to the phenomenon of viscosity ? Derive expressions for coefficient of viscosity of a gas on the basis of kinetic theory. Show that it is independent of pressure. 6

(b) Find the mean free path of He molecules at a temperature of 0°C and a pressure of 760 mm Hg. Coefficient of viscosity is 1.3×10^{-5} Nm^{-2} S. Density of Helium is 0.1786 kg m^{-3}. 2

Roll No. .....

Printed Pages : 3

1458

GSE / M–16
PHYSICS
Paper–II
Semiconductor Devices

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

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

1. (a) In general, LED is not fabricated using Si, Why ?

   (b) Why emitter follower amplifier has high input impedance ?

   (c) Why we deliberatly use negative feed back loops in amplifiers though it reduces gain considerably ?

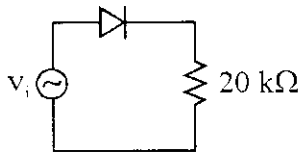
   (d) How compound semiconductors are much better than elemental semiconductors ? 4×2=8

Unit–I

2. (a) Find the concentration of holes and electrons in a n-type semiconductor at room temperature, if the conductivity is 300 S/cm. Given, $n_i = 1.5 \times 10^{10}$ /cm^3, $\mu_n = 1300$ cm^2/V–S. 3

   (b) Sketch the V–I characteristics of a pn-Junction and discuss qualitatively the shape of these. How these characteristics change with temperature ? 5

3. (a) Sketch the wave forms of the voltage across the 20 kΩ resistance and the current in the circuit given below for $v_i = 20 \sin wt$.

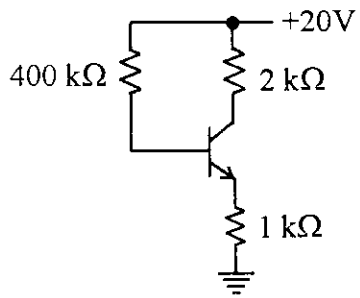


Take the diode as practical and mode of Si. 4

(b) Describe the operation of solar cell. How a solar cell is different from a photo detector ? 4

Unit–II

4. (a) Determine dc bias voltages and currents in the following circuit. Take $V_{BE} = 0$ & $\beta = 100$. 4



(b) Draw a collector feedback bias circuit and find stability factor of the circuit. 4

5. (a) Discuss the input, output and transfer characteristics of a CB –transistor amplifier. 5

(b) A Germanium transistor having $\beta = 100$ and $V_{BE} = 0.2V$ is used in fixed bias amplifier circuit with $V_{CC} = 16$ V, $R_C = 5k\Omega$ and $R_B = 790$ kΩ. Determine its operating point. 3

Unit–III

6. Draw the circuit diagram of a two stage RC-coupled amplifier and highlight the importance of various components connected. Explain the reasons behind the limited band width of such a circuit. 8

7. (a) List the advantages and disadvantage of negative feedback. Is it possible to reduce distortion level using negative feedback ? If it is so, then how ? 5

(b) A voltage amplifier has voltage gain with feedback of 100. If gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the open loop gain A of amplifier and feedback fraction β. 3

Unit–IV

8. Describe the operation of a Hartley Oscillator. Also determine its frequency of oscillation and condition for starting of oscillations. 8

9. Describe in detail, the principle and working of a CRO. 8

Roll No. .....

Printed Pages : 3

1459

GSE / M–16
CHEMISTRY
Paper–IV CH–104
Inorganic Chemistry (Theory)

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

*Note : Attempt **five** questions in all, selecting **two** questions each from **Section-A** and **Section-B. Question No. 1 is compulsory.***

1. (i) NH_3 has higher Boiling point than PH_3. 1

(ii) Why sodium metal is kept under kerosene. 1

(iii) Write the formulae of Plaster of Paris and Gypsum. 1

(iv) Write the reaction by which first noble gas compound was discovered. 1

(v) Define catenation. 1

(vi) What is inert pair effect ? Give example. 1

(vii) Why CCl_2F_2 is used in refrigerators ? 1

(viii) What is Corborundum ? Give its use. 1

Section–A

2. (a) What is intermolecular Hydrogen Bonding ? Explain with example. 2

(b) Describe briefly Dipole-Dipole forces. 2

(c) Explain Extrinsic and Intrinsic semiconductors. 2

3. (a) How does Band model Theory explain the metallic character of Beryllium ? 2

(b) Give Reason–

(i) Be and Mg do not impart colour to the flame.

(ii) NaOH is stronger base than $Ba(OH)_2$. 3

(c) Draw the structure of solid $BeCl_2$. 1

4. (a) How does Lithium differ from its congeners (Give any four points). 2

(b) Explain the following :

(i) Lithium forms oxide, sodium forms per oxide and potassium forms super oxide

(ii) The conductivity of L_1^+ ion in aqueous solution is less than that of CS^+ ion. 3

(c) Which has lowest I.E. and why Be or Mg ? 1

5. (a) Xenon forms the largest number of compounds as compared to any other noble gas. Comment. 2

(b) Draw the structure of

(i) XeF_4

(ii) XeO_2F_2 2

(c) Complete the following : 2

(i) $XeF_6 + H_2O \longrightarrow$

(ii) $XeF_4 + Hg \longrightarrow$

Section–B

6. (a) Discuss the structure of Borazine. 2

(b) Why BF_3 is a weaker Lewis acid than BCl_3 and BBr_3 ? 2

(c) What are Carbides ? How do Al_4C_3 and CaC_2 differ ? 2

7. (a) Explain cyclic silicates giving their structure. 2

(b) Draw the structures of

(i) P_4O_6

(ii) H_3PO_4 2

(c) NO is paramagnetic. Explain. 2

8. (a) Why Inter-halogen compounds are more reactive than halogen ? 2

(b) Arrange HClO, HBrO and HIO in order of increasing acid strength giving reason. 2

(c) I_3^- is known while F_3^- is not known. Explain. 2

9. (a) Name any four oxy acids of sulphur. 2

(b) How H_2O_2 acts as a bleaching agent ? 1

(c) Explain the structures of

(i) ClF_3

(ii) ICl_4^- 3

Roll No. .....

Printed Pages : 2

1460

GSE / M–16
CHEMISTRY
Paper–V, CH–105
Physical Chemistry

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

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

1. (a) Define rate of reaction ? 1×8=8

(b) What is the unit of First order reaction ?

(c) Give one example of pseudo unimolecular reaction ?

(d) What are Arrhenius equation ?

(e) Define cell constant ?

(f) What is the unit of equivalent conductance ?

(g) Specific conductivity of 0.12 N solution of an electrolyte is 0.024 siemen/cm. Calculate its equivalent conductivity ?

(h) Write Debye-Huckel Onsager equation for strong electrolyte ?

Section–A

2. (a) Derive integrated rate equation for second order reaction. 4

(b) Show that time taken for 99.9% of First order reaction to complete is ten times that of its half life time. 2

3. (a) Explain transition state theory ? Give advantage of this theory over the collision theory ? 3.5

(b) Why rate of reaction becomes double with every 10° rise in temperature. 2.5

4. (a) Explain the factors which affects rate of reaction ? 3

(b) Calculate the activation energy of reaction whose reaction rate at 300K get double for 10° rise in temperature ? 3

5. (a) Explain the collision theory for unimolecular reaction ? 3.5

(b) Write the characteristics of first order reaction ? 2.5

Section- B

6. (a) Define Kohlrausch law and explain its three application ? 4

(b) What do you understand by electrophoretic effect ? 2

7. (a) Derive Henderson Hazel equation acidic and basic buffer solution. 4

(b) The resistance of 0.01 M NaCl solution at 25° C is 200 ohm and cell constant of conductivity cell is unity. Calculate its molar conductivity. 2

8. (a) What are the main postulates of Arrhenius theory. 3.5

(b) Explain the variation of molar conductivity with concentration for strong and weak electrolyte. 2.5

9. What is the basic principle of conductometric titration ? Explain briefly the conductometric titration in case of 6

(i) Strong acid - strong base
(ii) Weak acid - strong base
(iii) Strong acid - weak base

(b) 2. 4. 6-Trinitrochloro benzene can be easily hydrolysed with aq-sodium carbonate. Explain. 2

(c) Why terminal alkynes are acidic in nature ? Explain with suitable examples. 2

8. (a) Write all the possible structures for the compounds having molecular formula C_5H_6 which upon treatment with ammonical $AgNO_3$ solution gives a white precipitate. 2

(b) Discuss the bimolecular displacement mechanism for nucleophilic aromatic substitution. 2

(c) Write short notes on :

(i) Ullmann reaction.

(ii) Sandmayer reaction. 2

9. (a) What is the reason for low reactivity of alkynes towards electrophilic addition reaction. 2

(b) What happens when

(i) Ethyne reacts with HBr

(ii) Ethyne undergoes oxidation with alkaline $KMnO_4$ solution at room temperature. 2

(c) Complete the following : 2

(i) $CH_3COOAg \xrightarrow{Br_2,\ \Delta}$?

(ii) $CH_3 - C(CH_3)_2 - Br \xrightarrow{\text{alc.KOH}}$?

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

1461

GSE / M–16
CHEMISTRY
Paper–VI-CH-106
Organic Chemistry

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

Note : *Attempt **five** questions in all, selecting at least **two** questions from each section (**Section–A** and **Section–B**). **Question No. 1 is compulsory.***

1. (a) Which of the two cis and trans But-2-ene is more stable and why ?

(b) Give the IUPAC names of the following compounds

(i) $CH_3-CH=CH-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

(ii) $H_2C = CH - CH - C \equiv CH$

(c) State whether the following statements are true or false

(i) [8] – Annulene is aromatic

(ii) [10]–Annulene is not aromatic

(d) What are dienophiles ?

(e) Which isomer of dichlorobenzene has the highest melting point and lower solubility ?

(f) Out of ethyne and ethene which is more reactive towards electrophilic addition reactions ?

(g) Pick out the substituents which are

(i) Ring activating (ii) Ring deactivating

–Br, $-NH_2$, $-CH_3$, $-NO_2$

(h) Arrange the following in order of decreasing reactivity towards nucleophilic substitution.

RF, RBr, RC*l*, RI. 1×8=8

Section–A

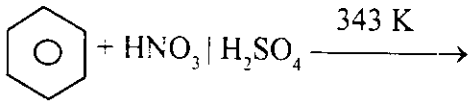
2. (a) State Markownikov's rule. How was it modified ? Explain with examples. 2

(b) How does Huckel's rule explain the aromatic nature of organic compounds. 2

(c) Halogens are electron withdrawing and yet they are ortho-para directing. Explain it. 2

3. (a) What is Hofmann elimination ? How does it differ from Saytzeff elimination ? Give reasons for your answer. 2

(b) Complete the following reaction and support your answer by giving mechanism 2



(c) In the organic synthesis, Friedal Craft's acylation is preferred over Friedal Craft alkylation. 2

4. (a) Nuclear halogenation of toluene takes place in the presence of Lewis acid whereas the side chain halogenation takes place in presence of sunlight. Justify. 2

(b) Discuss the mechanism of dehydration of alcohols to form alkenes. 2

(c) Complete the following reactions : 2

(i) $H_3C - CH = CH_2 + B_2H_6 \xrightarrow{H_2O_2|OH^-}$

(ii) $H_2C = CH_2 + O_3 \xrightarrow[Zn / H_2O]{CC\ell_4}$

5. (a) Arrange the following sets of alkenes in decreasing order of stability : 1-pentene, 2-methyl-2-butene, cis-2-pentene, trans--2-pentene. 2

(b) What are aromatic, anti-aromatic and non aromatic compounds ? Give one example of each. 2

(c) Predict the principle mononitration products of the following 2

(i) p-nitro toulene (ii) m-xylene

(iii) m-nitro anisole (iv) p-methylanisole

Section–B

6. (a) Explain why 1.3–butadiene undergoes both 1,2 and 1,4 –addition reactions. 2

(b) Give the elimination addition mechanism of conversion of Chlorobenzene into aniline. 2

(c) Complete the following reactions : 2

(i) $CH_3 - C \equiv CH \xrightarrow[dil\ H_2SO_4]{HgSO_4}$

(ii) $CH \equiv CH \xrightarrow[CH_3CH_2Br]{NaNH_2} A \xrightarrow[CH_3Br]{NaNH_2}$

7. (a) Explain the factors affecting the occurrence and rates of S_N1 reaction. 2

[Turn over

self-employment industries. If these steps are effectively encouraged and used, it will help to overcome the problem to a large extent.

(i) What is unemployment ?
(ii) What are the two types of unemployment ?
(iii) How can the problem of unemployment be solved in rural areas ?
(iv) What can be done to solve the problem of unemployment among educated classes ?
(v) Which word in the passage means : 'step' ?

. Make a precis of the following passage and give it a suitable title :-

We sometimes think that it would be very nice to have no work to do. How we envy rich people who have not to work for their living, but can do just what they please all the year round. Yet when we feel like this, we make a mistake. Sometimes rich people are not so happy because they are tired of having nothing to do. Most of us are happy when we have regular work to do for our living, especially if the work is what we like to do. The first thing the work does for us is to give us happiness. The work gives us self-respect. The idler, however, rich he is, lives on the work of others. He is like a beggar in the streets who takes the money of others, who have had to toil for it. Such people do not live Independently and ought to feel ashamed of themselves. But the honest worker who earns his living by useful toil, can hold up his head and respect himself. Lastly, regular work helps to build up character. It teaches us good habits as punctuality, carefulness, thoroughness and faithfulness in work. 7

. Write a letter to the Editor of a newspaper stressing the need for introducing moral education in schools.

or

Write a letter to the Deputy Commissioner requesting him to open a dispensary in your village. 8

Roll No. .....

1462

Printed Pages : 4

GSE / M–16
ENGLISH

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

Note : Attempt all questions.

1. Read the following passage and answer the questions given at the end :-

However, we Indians are good at misusing well-intentioned programmes. My intention was to encourage spontaneity in asking questions. Some school teachers began to dictate questions to their class which were to be sent to me by the students. Thus one week I would receive 50 post-cards with identically phrased questions preceded by identically phrased requests for my autographed answers. All from the same class of the same school.

(i) Name the essay and its author.
(ii) What are we Indians good at ?
(iii) What was the intention of the writer ?
(iv) What would he receive every week ?
(v) What word in the passage means 'same' ?

or

Walt Whitman, better known as a lyrical poet of self-celebration, wrote poems based on his first hand knowledge of battelfields and wartime hospitals, he served as a nurse for four years. His is a poetry of compassion, reminding readers of just how poignant is suffering and losses which war occasions. At the onset of the war, Whitman had been strongly in favour of the conflict, believing that preserving the American Union was worth dying and killing for.

(i) Name the essay and its author.
(ii) What type of poems did Walt Whitman write ?
(iii) What does his poetry remind the readers of ?

(iv) What did he believe in the beginning ?

(v) What would in the passage mean 'famous' ? 5

2. Explain with reference to the context :-

Now, whatever the dangers which threaten our civilization, and they are many, it seems likely to escape this one. Previous civilizations, as I have said before, were specialised and limited, they were like oasis in a surrounding desert of savagery. Sooner or later the desert closed in and the oasis was no more. But today it is oasis which is spreading over the desert. Modern civilization is a far flung thing.

or

What I would like to be reminded for is not for doing the first heart transplant in the world. I would like to be remembered for the children I have treated for a variety of abnormal heart diseases. That gives me the greatest satisfaction. Reconstruction of a congenitally abnormal heart, building that into a normal one through surgery – That's real cardiac surgery for me. 3

3. Answer any *four* questions in about 30 words each :-

(i) How have machines become our masters ?

(ii) Name the four 'Varnas' Manu talks of.

(iii) How has the pre-birth sex determination gone against the girls ?

(iv) What are the three barriers in the social behaviour of the Hindus ?

(v) What is rote learning ?

(vi) How is Walt-Whitman different from Melville as war-poet ? 1½×4=6

4. What are the major defects of our civilization, according to C.E.M. Joad ?

or

Summarise the main argument of the essay 'Inhumanisation of War'. 6

5. Translate the following passage into Hindi :

These days the rich are getting richer and poor are getting poorer. As a bigger fish swallows a smaller fish, the rich are suckling the blood of the poor. Every poor man wants bread, clothes and a house. But he is hungry, ill-clad and homeless. Daily everything is becoming dearer. Some items have disappeared from the market. The rich have hoarded them in stores for getting more profit. It is the government's duty to take stern steps for eradicating black-marketing. Unless every person in India had bread to eat, clothes to wear and house to live in, freedom would only be a mockery. 5

or

(For Non-Hindi speaking/Foreign students only)

Read the following passage and answer the questions that follow :-

Unemployment may be defined as a state of worklessness for a person who is fit and willing to work. To a large extent India is facing an acute problem of unemployment. India is an underdeveloped economy. The nature of unemployment in India, therefore, differs from the one that prevails in a developed economy. In India we have chronic underemployment in the rural sector and unemployment among the educated classes in the urban areas.

The problem of unemployment is becoming more and more serious every year. The measures to solve rural unemployment are effectively controlling the population, stepping up the growth rate and starting new industries and land reform. To solve the problem of unemployment among the educated classes there should be a reform of the educational system and setting up of

Roll No. .....

Printed Pages : 2

1465

GSE / M–16
BOTANY
Paper–I
Diversity of Archegoniates

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

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

Compulsory Question

1. (a) Bryophytes are amphibians of plant kingdom. Justify.

(b) Differentiate between *elaters* and *pseudo-elaters*.

(c) Define the term *Protonema*.

(d) What are *Syndetocheilic Stomata* ?

(e) What is *Circinate Vernation* ?

(f) What is *di-stelic* condition ?

(g) On the time scale, to which period does *Rhynia* belong to ?

(h) Point out the hydrophytic features of *Equisetum* stem.

1×8=8

Unit–I

2. Discuss Alternation of Generation with reference to the life cycle of *Marchantia*. 8

3. Write briefly about :

(a) Sporogonium of *Funaria*

(b) Gemma Cups in *Marchantia*. 4×2=8

4. Elaborate upon :

   (a) Economic Importance of Bryophytes

   (b) Protonema of *Funaria.* 4×2=8

5. *Anthoceros* presents a combination of primitive gametophyte and advanced sporophyte. Comment. 8

Unit–II

6. Write brief notes on :

   (a) *Rhynia*

   (b) Rhizophore of *Selaginella.* 4×2=8

7. Discuss Heterospory and seed Habit in *Selaginella.* 8

8. Give well labelled diagrams only (description not required) :

   (a) T.S. Stem of *Equisetum*

   (b) L.S. Cone of *Equisetum.* 4×2=8

9. Discuss briefly the lify cycle of a (FERN) studied by you with the help of suitable diagrams. 8

Roll No. .....

Printed Pages : 2

1466

GSE / M–16
BOTANY
Paper–II
Genetics

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

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

1. Write short answers of the following :

(a) Transduction

(b) DNA proof reading

(c) Universality of genetic code

(d) Repetitive DNA

(e) Dihybrid Cross

(f) Linkage groups

(g) Induced mutations

(h) Operon model 1×8=8

Unit–I

2. Explain process of DNA replication citing the roles of different enzymes involved in it. 8

3. Give an account of repetitive or satellite DNA. What is its significance ? 8

4. What do you mean by principle of segregation ? Explain it with the help of suitable cross. 8

5. What are supplementary genes ? How do they interact to modify the F2 ratio ? Explain with the help of suitable example. 8

Unit–II

6. Write short notes on the following :
   (a) DNA damage and repair
   (b) Chemical mutagens 4×2=8

7. What do you mean by regulation of gene action ? Explain the regulation of an inducible system with the help of suitable example. 8

8. Give brief account of the following :
   (a) 2-D structure of protein
   (b) Gene expression in eukaryotes 4×2=8

9. Write short note on the following :
   (a) Plasmids
   (b) Functions of plastid DNA 4×2=8

Roll No. .....

Printed Pages : 2

1471

GSE / M–16
ELECTRONIC DEVICES AND CIRCUITS–II
Paper–I

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

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

Compulsory Question

1. (a) What is the difference between base bias and emitten bias ? In what kind of circuits is each useful ? 2

(b) Why do you avoid R–C or transformer coupling for amplifying extremely low frequency signals ? 2

(c) What is the significance of operating point ? 2

(d) What is the major advantage of power FETs over bipolar transistors ? 2

Unit–I

2. (a) Is the operating point of a transistor amplifier fixed ? If not, what are the factors responsible for its shift ? 3

(b) List the three sources of instability of collector current. Define the three stability factor. 5

3. (a) What do you understand by transistor biasing ? Why it is needed ? 4

(b) Derive the expression to find the stability factor for the collector to base bias circuit. 4

Unit–II

4. (a) What is the drawback of an emitter feedback bias ? 3

(b) Draw the voltage divides biasing circuit for a n-p-n transistor. Then discuss the steps in calculating the collector-emitter voltage. 5

5. (a) Why does the voltage divider biasing circuit have a very stable Q point ? 3

(b) A multistage amplifier consists of three stages. The voltage gain of stages are 60, 100 and 160. Calculate the overall gain in db (decibel). 2

(c) Explain emitter bias circuit using n-p-n transistor. 3

Unit–III

6. (a) Explain the frequency response curve of R–C coupled amplifier for the law and mid frequency region. 4

(b) Explain the transformer coupling amplifiers. 4

7. (a) What do you mean by bandwidth of an amplifier ? Explain the factors which affect the bandwidth. 4

(b) Derive the expression for the lower cutoff frequency of the R–C coupled transistor amplifier due to emitter bye pass capacitance alone and assume other capacitances to have zero impedance. 4

Unit–IV

8. (a) Explain the construction and working of a JFET. 4

(b) Explain N-channel MOSFET in depletion mode. 4

9. (a) Draw and explain CS and CD low frequency model of MOSFET. 6

(b) How can a JFET act like a voltage controlled resistance ? 2

Roll No. .....

1472

Printed Pages : 3

GSE / M–16
ELECTRONICS
Paper–II (Theory)
Network Analysis

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

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

1. (a) Define and explain ideal current source. 2×4

   (b) Why super position Theorem Can't be applied to non-linear networks.

   (c) Explain what do you mean by reciprocity in two port network.

   (d) What do you mean by image impedance ?

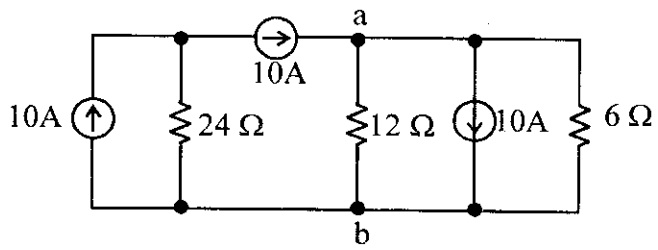
Unit–I

2. (a) Define and explain Kirchhoff's Current Law. 3

   (b) Obtain a star equivalent connection for a delta connection. 5

3. (a) State and explain Thevenin's Theorem. 4

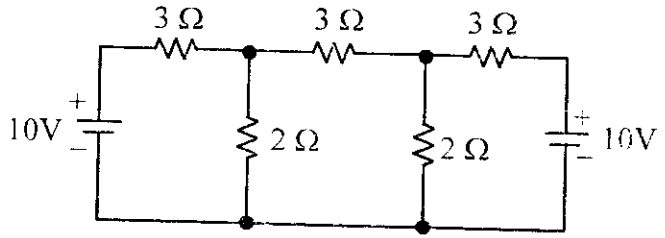
   (b) Obtain Thevenin's equivalent between nodes 'a' and 'b' for the given circuit : 4



Unit–II

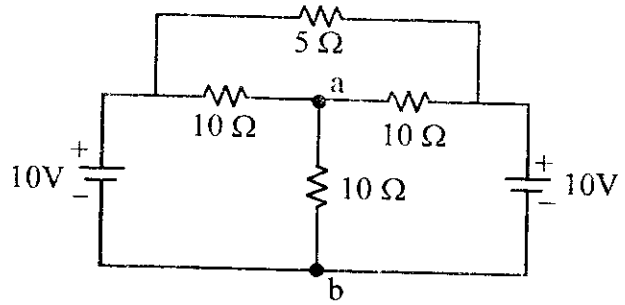
4. (a) State and explain reciprocity Theorem. 4

(b) Find out whether the following network is reciprocal or not : 4



5. (a) Define and explain Tellegen's Theorem. 4

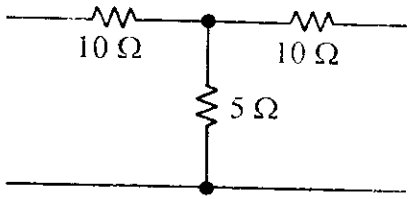
(b) Obtain Thevenin's equivalent for the given circuit between nodes 'a' and 'b' : 4



Unit–III

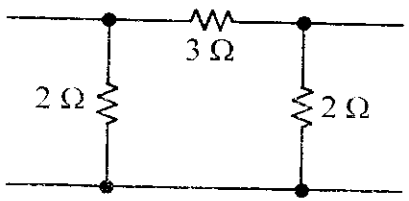
6. (a) Discuss admittance parameters. 4

(b) Find Y-parameters for the given network : 4



7. (a) Discuss inverse hybrid parameters. 4

(b) Find inverse-h parameters for the given circuit : 4



Unit–IV

8. (a) Discuss parallel connection of two port network. 4

(b) Discuss Lattice networks. 4

9. (a) Obtain elements of the T-network in terms of ABCD parameters. 4

(b) The port currents of a two port network are given by 4

$I_1 = -V_1 + 2V_2$

$I_2 = 2V_1 - 3V_2$

Find the equivalent π-network.

Roll No. .....

1474

Printed Pages : 3

GSE / M–16
COMPUTER SCIENCE
Paper–II
Logical Organization of Computers

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

BA: 25

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

1. (a) How 2421 can be said as self complimenting code 1,2

(b) Prove using T.T.

$\overline{a+b} = \bar{a}.\bar{b}$

$\overline{a.b} = \bar{a}+\bar{b}$ 2,2

(c) What is Duality Principle 1,2

(d) Differentiate combinational and sequential circuits. 1,2

Unit–I

2. (a) Do as follows :

(i) $(10.625)_{10} \rightarrow (\ )_2$

$(\ )_6$

(ii) $(70)_8 \rightarrow (\ )_{10}$

(iii) $(3A\ B\ 7) \rightarrow (\ )_2$

(iv) $(x)_{10} = (1234)_4$ 3,4

(b) Write note on Error-Detection and correction method using 7-bit notation. 2,4

3. (a) Use 2's compliment to solve

– 16	–10	+32
–24	+8	–24

2,3

(b) Explain floating point Notation using underflow and overflow situation. 3,5

Unit–II

4. (a) Define Boolean Algebra and Write postulates of Boolean Algebra. 3,4

(b) Solve using Boolean Algebra

(i) $XY + \overline{X}Z + YZ = XY + \overline{X}Z$

(ii) $(X + Y)(XZ + Z)(\overline{\overline{Y} + XZ}) = \overline{X}YZ$ 2,4

5. (a) Draw and Label 4 variable K-map solve for 4 cornors. 2,4

(b) Solve using K-Map

(i) $Z = \Sigma\, 0, 1, 2, 3, 8, 9, 10, 11$

(ii) $Z = \Sigma\, 0, 1, 10, 14, 15 + \underset{\phi}{\Sigma}\, 4, 5, 11, 12$ 3,4

Unit–III

6. (a) Solve using Canonical Expressions for Full-Adder. 3,4

(b) Make 4 : 1 Mux 2,4

7. (a) Make code convertor from 8421 to 2421 3,4

(b) Explain comparator. 2,4

Unit–IV

8. Explain clocked SRFF, its problem and solution. 5,8

9. (a) Make Register to store 1011 Using Shift Register. 2,3

(b) Design Mod-5 counter using JKFF. 3,5

Roll No. .....

Printed Pages : 3

1475

GSE / M–16
COMPUTER APPLICATIONS
Paper–I
Information Technology

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

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

नोट : *प्रत्येक इकाई से **एक** प्रश्न का चयन करते हुए, कुल **पाँच** प्रश्न करें और **प्रश्न नं० 1 अनिवार्य है**। सभी प्रश्नों के अंक समान हैं।*

1. Explain : 2×4

(a) Expansion Slot

(b) Modulation

(c) Digital Sound

(d) Web Browser and Search Engine

व्याख्या : 2×4

(क) एक्सपैनशन स्लॉट

(ख) माड्यूलेशन

(ग) डिजिटल ध्वनि

(घ) वेब ब्राउज़र और खोज इंजन

Unit–I इकाई–I

2. What is Motherboard and explain the different components of Motherboard ? 8

मदरबोर्ड क्या है और मदरबोर्ड के विभिन्न घटकों की व्याख्या करें। 8

3. (a) What do you mean by PC Evolution and explain the classifications of PC ?

(b) Differentiate between Serial Port and Paralliel Port. 4×2

(क) पीसी विकास से क्या मतलब है और पीसी के वर्गीकरण समझाओ ?

(ख) सीरियल पोर्ट और समानांतर पोर्ट के बीच अंतर बताएं। 4×2

Unit–II इकाई–II

4. Write short note on : 4×2

(a) On-Line Analytical processing.

(b) Geographical Information System.

नोट लिखें : 4×2

(क) ऑनलाइन विश्लेषणात्मक प्रक्रिया।

(ख) भौगोलिक सूचना प्रणाली।

5. What is Data warehousing and describe the characteristics of Data Warehousing ? 8

डेटा-भंडारण क्या है और डेटा भण्डारण की विशेषताओं का वर्णन करें ? 8

Unit–III इकाई–III

6. (a) What is E-Commerce and explain the structure of E-Commerce. 4×2

(b) Explain the concept of Mobile Communication.

(क) ई-कॉमर्स क्या है और ई-कॉमर्स की संरचना की व्याख्या करें।

(ख) मोबाइल संचार की अवधारणा को समझाओ।

7. Explain the concept of Multimedia and how multimedia is useful in field of Education and Business. 8

मल्टीमीडिया की अवधारणा और कैसे मल्टीमीडिया शिक्षा और व्यवसाय के क्षेत्र में उपयोगी है समझाओ। 8

Unit–IV इकाई–IV

8. What do you mean by Transmission medium and explain various data Transmission media ? 8

ट्रांसमिशन मीडियम से आपका क्या तात्पर्य है और विभिन्न डाटा प्रसारण मीडिया की व्याख्या करें ? 8

9. (a) What is Internet and write main uses of Internet in brief ?

(b) What is Multiplexing ? Describe two basic methods of multiplexing. 4×2

(क) इंटरनेट क्या है और संक्षिप्त में इंटरनेट का मुख्य उपयोग लिखें ?

(ख) बहुसंकेतन क्या है ? बहुसंकेतन के दो बुनियादी तरीकों का वर्णन करें। 4×2

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

1476

GSE / M–16
COMPUTER APPLICATIONS
Paper–II
Programming in C

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.***

नोट : *प्रत्येक इकाई से कम से कम एक प्रश्न चुनते हुए, कुल पाँच प्रश्न कीजिए। **प्रश्न सं. 1** अनिवार्य है।*

Unit–I (इकाई–I)

1. (a) Define constant and variable.
   स्थिरांक तथा परिवर्ती को परिभाषित कीजिए।
   (b) Define searching and merging.
   सर्चिंग तथा मर्जिंग को परिभाषित कीजिए।
   (c) What is the purpose of flowchart ?
   फ्लोचार्ट का उद्देश्य क्या है ?
   (d) Define identifier and keyword.
   आइडेन्टीफायर तथा कीवर्ड को परिभाषित कीजिए।
   (e) What is purpose of assignment statement ?
   असाइनमेंट स्टेटमेंट का क्या उद्देश्य है ?
   (f) What recursion ?
   रिकर्शन क्या है ?
   (g) What is the purpose of break statement ?
   ब्रेक स्टेटमेंट का क्या उद्देश्य है ?
   (h) Explain features of C language.
   सी-भाषा की विशेषताओं की व्याख्या कीजिए।

Unit–II (इकाई–II)

2. Write short note on : 8

(i) Types of errors in programming.

(ii) Decision Table.

निम्न पर संक्षिप्त टिप्पणी लिखिए : 8

(i) प्रोग्रामिंग में त्रुटियों के प्रकार

(ii) निर्णय सारणी।

3. What do you mean by algorithm and flowchart ? Write algorithm and draw flowchart to find largest number out of three given numbers. 8

अल्गोरिथ्म तथा फ्लोचार्ट से आपका क्या तात्पर्य है ? दी गई तीन संख्याओं में से सबसे बड़ी संख्या ज्ञात करने के लिए अल्गोरिथ्म लिखें और फ्लोचार्ट चित्रित कीजिए। 8

Unit–III (इकाई–III)

4. (a) What is an Operator ? Describe several different types of operator available in C ? 8

(b) What is the purpose of printf and scanf function ? How is it used within a C program ? 8

(क) प्रचालक क्या है ? सी में उपलब्ध प्रचालक के बहुत से भिन्न प्रकारों का वर्णन कीजिए। 8

(ख) प्रिंट एफ तथा स्कैन एफ फंक्शन का उद्देश्य क्या है ? किसी सी प्रोग्राम के अन्दर इसका किस प्रकार से उपयोग किया जाता है ? 8

5. (a) Explain the structure of C program. 8

(b) Describe various data types available in C.

(क) सी प्रोग्राम की संरचना की व्याख्या कीजिए। 8

(ख) सी में उपलब्ध विभिन्न आँकड़ा प्रकारों का वर्णन कीजिए।

Unit–IV (इकाई–IV)

6. What are the Control transfer statements of C ? 8

सी के नियंत्रण अंतरण कथन क्या हैं ? 8

7. Write an algorithm and a program in C to check whether a given number is prime or not. 8

दी गई संख्या अभाज्य है या नहीं, जाँच करने के लिए सी में एक अल्गोरिथ्म तथा एक प्रोग्राम लिखिए। 8

Unit–V (इकाई–V)

8. Explain various storage classes in C ? 8

सी में विभिन्न भण्डारण वर्गों की व्याख्या कीजिए। 8

9. What do you mean by an array ? How an array can be initialized and processed. 8

ऐरे से आपका क्या तात्पर्य है ? एक ऐरे को किस प्रकार से आरम्भ किया तथा संसाधित किया जा सकता है ? 8

Roll No. .....

Printed Pages : 3

1501

GSE / M–16
HUMAN PHYSIOLOGY
Paper–Course No. III

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

Note : *Attempt any **five** questions 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 कोई भी **पांच** प्रश्न करें। **प्रश्न सं० 1 अनिवार्य है।** सभी प्रश्नों के अंक समान हैं।*

Compulsory Question / अनिवार्य प्रश्न

1. Fill up the blanks : 1×8=8

रिक्त स्थान भरें : 1×8=8

(a) _____ is known as power house of a cell.

_____ को कोशिका का पावर हाउस कहते हैं।

(b) _____ ribs are attached to sternum.

_____ पसलियाँ स्टर्नम से जुड़ी होती हैं।

(c) Excess of glucose in blood is converted into _____ with the help of _____.

रक्त में ग्लूकोस की अधिक मात्रा _____ की मदद से _____ में परिवर्तित हो जाती है।

(d) _____ helps in blood clotting.

_____ रक्त का थक्का बनने में सहायता करता है।

(e) _____ is functional unit of kidney.

_____ गुर्दे की क्रियात्मक इकाई है।

(f) Process of penetration of sperms in to egg is known as _____.

शुक्राणुओं के अण्डे में भेदन की क्रिया _____ कहलाती है।

(g) Give the normal level of glucose in blood.

रक्त में ग्लूकोस की सामान्य मात्रा बताएं।

Unit–I (इकाई–I)

2. Explain a cell with the help of diagram name the organells of a cell and their functions. 8

कोशिका का चित्र बनाकर वर्णन करें व इसके अवयव व उनके कार्यों को भी बताएं। 8

3. Discuss the names and functioning of accessory glands of digestive system. 8

पाचन संस्थान की सहायक ग्रंथियों के नाम व उनके कार्यों का उल्लेख करें। 8

4. Give the names of bones of Axial Skeleton system. 8

अंग कंकाल (Axial Skeleton) तन्त्र की हड्डियों के नाम दें। 8

5. (a) Explain the composition of blood. 4

(b) Blood clotting (Coagulation) 4

(क) रक्त की संरचना पर प्रकाश डालें। 4

(ख) रक्त का थक्का जमना। 4

Unit–II (इकाई–II)

6. (a) Explain the excretory system. 4

(b) Explain the mechanism of urine formation. 4

(क) उत्सर्जन तन्त्र को बताएं। 4

(ख) मूत्र बनने की प्रक्रिया बताएं। 4

7. Short notes :

(a) Structure of Lungs. 4

(b) Explain the inspiration and expiration process of Lungs. 4

संक्षिप्त उत्तर दें।

(क) फेफड़ों की बनावट 4

(ख) फेफड़ों की अन्तः श्वसन (inspiration) तथा प्रश्वसन क्रिया (expiration) को समझाएं। 4

8. Discuss the reproductive system of a female. 8

स्त्री प्रजनन संस्थान का वर्णन करें। 8

9. Name the sense organs and explain any one. 8

शरीर की संवेदी अंगों के नाम दें व किसी भी एक को विस्तार से बताएं। 8

Roll No. .....

Printed Pages : 2

1502

GSE / M–16
PRENATAL, INFANT GROWTH AND CARE
Paper–Course–112

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

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

नोट : *प्रत्येक इकाई से **दो** प्रश्न चुनते हुए कुल **पांच** प्रश्न करें। **प्रश्न सं० 1 अनिवार्य है।***

Compulsory Question / अनिवार्य प्रश्न

1. Write short note on any *four* :

(a) Fertilization

(b) Hearing sense of neonate

(c) Normal birth

(d) Maternal Age

(e) Characteristics of Neonate. 4×2=8

किन्हीं **चार** पर संक्षेप में लिखो : 4×2=8

(क) गर्भधारण

(ख) नवजात शिशु की सुनने की क्षमता

(ग) सामान्य जन्म

(घ) माता की आयु

(ङ) नवजात शिशु की विशेषताएं

Unit–I (इकाई–I)

2. Discuss the discomforts and their prevention that mother experience during pregnancy. 8

गर्भावस्था की समस्याओं और उनके उपचार का वर्णन करो। 8

3. Discuss the signs of pregnancy. 8

गर्भावस्था के लक्षण का वर्णन करो। 8

4. Write the different types of deliveries. 8

भिन्न-भिन्न प्रकार की डिलीवरी (प्रसव) का वर्णन करो। 8

5. Discuss the different stages of prenatal development. 8

जन्म पूर्व विकास की अवस्थाओं का वर्णन करो। 8

Unit–II (इकाई–II)

6. Write about the physical development of neonate. 8

नवजात शिशु के शारीरिक विकास का वर्णन करो। 8

7. Discuss the leg and hand skills of 0-2 years babies. 8

0-2 वर्ष के शिशु के पैर और हाथ की क्रियाओं के बारे में लिखो। 8

8. Write about : 4×2=8

(a) Any digestive disturbance of children.

(b) Any respiratory disorder.

निम्न के बारे में लिखो : 4×2=8

(क) बच्चों के कोई भी पाचन सम्बन्धी विकार

(ख) कोई भी श्वास सम्बन्धी विकार

9. Why children are immunized ? Write the immunization schedule. 8

बच्चों को टीकाकरण क्यों किया जाता है ? टीकाकरण तालिका के विषय में लिखो। 8

Roll No. .....

1504

Printed Pages : 2

GSE / M–16
INTRODUCTORY HOME MANAGEMENT
Paper–Course-114

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

Note : - *Attempt **five** questions in all, selecting **two** questions from each unit.*

- ***Question No. 9 is compulsory.***
- *All questions carry equal marks.*

नोट : - *प्रत्येक इकाई में से **दो** प्रश्न चुनते हुए, कुल **पाँच** प्रश्न करने है।*

- ***प्रश्न नं० 9 अनिवार्य है।***
- *सभी प्रश्नों के अंक समान हैं।*

Unit–I (इकाई–I)

1. Write in detail the importance of Home-management by defining it.

गृह व्यवस्था को परिभाषित करते हुए इसके महत्व के बारे में लिखो।

2. Explain in detail the process of Home-management.

गृह व्यवस्था की प्रक्रिया का विस्तार से वर्णन करो।

3. Elaborate the stages of family life cycle in detail.

पारिवारिक जीवन-चक्र की अवस्थाओं की विस्तृत व्याख्या कीजिए।

4. "A good housewife is having various skills and abilities", explain.

"एक अच्छी गृहणी में विभिन्न गुण व योग्यताएं होती है" वर्णन करो।

Unit–II (इकाई–II)

5. (a) How many type of decisions are there ?

(b) Write down importance of decision making.

(क) निर्णय कितनी प्रकार के होते है।

(ख) निर्णय प्रक्रिया के महत्व के बारे में लिखो।

6. Classify goals and explain the factors affecting goal setting.

लक्ष्यों का वर्गीकरण करो तथा लक्ष्य निर्धारण को प्रभावित करने वाले घटकों के बारे में लिखो।

7. Explain human and non-human resources in detail.

मानवीय व अमानवीय साधनो का विस्तार से वर्णन करो।

8. Define the term standard write in detail about standards.

स्तर को परिभाषित कीजिए। स्तरों के बारे में विस्तार से लिखो।

Compulsory Question (अनिवार्य प्रश्न)

9. Classify the following :

(a) Resources

(b) Decisions

(c) Values

(d) Goals

निम्नलिखित का वर्गीकरण कीजिए :

(क) साधन

(ख) निर्णय

(ग) मूल्य

(घ) लक्ष्य

निम्नलिखित में से किन्हीं **चार** पर लघु टिप्पणियां लिखें -

(क) बेरी-बेरी

(ख) सोडियम की कमी

(ग) कैल्शियम की शरीर में भूमिका

(घ) घेघां रोग (Goitre)

(ङ) रतौंधी (Night blindness)

(च) फ्लोरीन के कार्य 4×2

Roll No. .....

Printed Pages : 4

1505

GSE / M–16
HOME SCIENCE
Paper–Course–115
Basic Nutrition

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.*

नोट : *प्रत्येक इकाई से **दो** प्रश्नों का चुनाव करते हुए, कुल **पाँच** प्रश्नों के उत्तर दें। **प्रश्न सं० 1 अनिवार्य है।** सभी प्रश्नों के अंक समान हैं।*

Compulsory Question / अनिवार्य प्रश्न

1. (i) Name one mineral and one vitamin necessary for clotting of blood.

रक्त का थक्का जमने के लिये आवश्यक एक खनिज तथा एक विटामिन के नाम बतायें।

(ii) In which deficiency the colour of the tongue becomes magenta?

जीभ का रंग जामनी किस पोषण हीनता में हो जाता है ?

(iii) Excess of which nutrient causes fluorosis?

किस पोषक तत्व की अधिकता से फ्लोरोसिस होता है ?

(iv) Name two minerals that are necessary for bone growth.

अस्थि की वृद्धि के लिये आवश्यक दो खनिजों के नाम बताएँ।

(v) Name the vitamin which is available only from animal foods.

उस विटामिन का नाम बतायें जो केवल प्राणिज भोज्य पदार्थों से मिलता है।

(vi) How many calories do we get from one gram of carbohydrate ?

एक ग्राम कार्बोहाईड्रेट से कितनी कैलोरी ऊर्जा मिलती है ?

(vii) Why are fats solid while oils are liquid at room temperature? Give one reason.

एक कारण बतायें कि सामान्य तापमान पर वसा ठोस तथा तेल तरल क्यों होते हैं ?

(viii) Moonface is the symptom of which disease ? Name it.

उस रोग का नाम लिखें जिसका लक्षण चेहरे का चन्द्रमा जैसा हो जाना है। 8×1

Unit–I (इकाई–I)

2. Discuss the functions, sources and R.D.A. of Protein. 8

प्रोटीन के कार्यों, भोज्य साधनों तथा दैनिक आवश्यक मात्रा (R.D.A.) का वर्णन करें। 8

3. (a) Describe the functions of carbohydrates.

(b) What are the effects of deficiency and excess of fat on body ? Discuss. 4+4

(क) कार्बोहाईड्रेट के कार्यों का वर्णन करें।

(ख) शरीर में वसा की कमी तथा अधिकता के प्रभाव समझायें। 4+4

4. Discuss any *two* of the following :

(a) Importance of fibre in diet

(b) Causes and symptoms of Kwashiorkor

(c) Functions of fat 4+4

निम्नलिखित में से **दो** का वर्णन करें :

(क) आहार में रेशे (fibre) का महत्व

(ख) क्वाशियरकर के कारण व लक्षण

(ग) वसा के कार्य 4+4

5. Discuss the role of water in body. What are the effects of deficiency of water ? 8

शरीर के लिये जल का महत्व समझायें। जल की कमी से शरीर पर क्या प्रभाव पड़ते हैं ? 8

Unit–II (इकाई–II)

6. Discuss the functions and effects of deficiency of vitamin C. 8

विटामिन सी के कार्यों तथा कमी के प्रभावों का वर्णन करें। 8

7. What are the functions and effects of deficiency of vitamin D ? Explain. 8

विटामिन डी के कार्यों तथा कमी के प्रभावों को समझायें। 8

8. Explain the functions, sources and effects of deficiency of iron. 8

लोहे के कार्य, भोज्य साधन तथा कमी से होने वाले प्रभावों का ब्यौरा दें। 8

9. Discuss briefly any *four* of the following :

(a) Beri-beri

(b) Sodium deficiency

(c) Role of calcium

(d) Goitre

(e) Night blindness

(f) Functions of fluorine 4×2

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

1506

GSE / M–16
NUTRITIONAL BIOCHEMISTRY
Paper–Course-116

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

Note : ***Question No. 1 is compulsory.*** *Attempt* ***four*** *more questions selecting* ***two*** *from each section.*

नोट : *प्रश्न सं. एक अनिवार्य है। प्रत्येक खण्ड से* ***दो*** *प्रश्न चुनते हुए* ***चार*** *प्रश्न और कीजिए।*

Compulsory Question (अनिवार्य प्रश्न)

1. (a) Explain the following terms :

(i) Anabolism (ii) Diastereomers

(iii) Saponification (iv) Coenzyme 1×4=4

(b) Draw structures of the following :

(i) Adenine (ii) Sucrose

(iii) Cholesterol (iv) Vitamin–C 1×4=4

(क) निम्नलिखित पदों की व्याख्या कीजिए :

(i) उपचय (ii) डायस्टीरियोमर्स

(iii) साबुनीकरण (iv) सह-एंजाइम। 1×4=4

(ख) निम्नलिखित की संरचनाएं चित्रित कीजिए :

(i) एडिनीन (ii) सुक्रोज़

(iii) कोलेस्ट्रॉल (iv) विटामिन सी 1×4=4

Section–A (खण्ड–क)

2. (a) Enlist various proteolytic enzymes of human digestive system and discuss their role in digestion. 4

(b) How are carbohydrates metabolised in body ? Give brief outlines only. 4

(क) मानव पाचन प्रणाली के विभिन्न प्रोटियोलाइटिक एन्जाइमों को सूचीकृत कीजिए तथा पाचन में उनकी भूमिका की विवेचना कीजिए। 4

(ख) शरीर में कार्बोहाइड्रेट्स किस प्रकार से उपपाचित होते हैं ? केवल संक्षिप्त रूपरेखा दीजिए। 4

3. (a) Discuss various levels of organization of proteins. 4

(b) Enlist major features of β-DNA structure of nucleic acids. 4

(क) प्रोटीनों के संगठन के विभिन्न स्तरों की विवेचना कीजिए। 4

(ख) न्यूक्लीय अम्लों की β-डी एन ए संरचना की प्रमुख विशिष्टताओं को सूचीकृत कीजिए। 4

4. (a) Define acid value and iodine number of fats. Discuss the importance of these estimations. 4

(b) How are lipids of food digested in humans ? 4

(क) वसाओं के अम्ल मान तथा आयोडीन संख्या को परिभाषित कीजिए। इन अनुमानों के महत्व की विवेचना कीजिए। 4

(ख) मानवों में आहार के वसाओं का पाचन किस प्रकार से होता है ? 4

5. (a) Differentiate between reducing and nonreducing sugars. Explain with examples. 4

(b) Discuss structure and functions of various types of RNA. 4

(क) अपचायक तथा गैर अपचायक शर्कराओं के बीच विभेद कीजिए। उदाहरणों सहित व्याख्या कीजिए। 4

(ख) आर एन ए के विभिन्न प्रकारों की संरचना तथा कार्यों की विवेचना कीजिए। 4

Section–B (खण्ड–ख)

6. Discuss structure, physiological functions and deficiency symptoms of Vitamin–D. 8

विटामिन डी की संरचना, कायकीय कार्यों तथा कमी के लक्षणों की चर्चा कीजिए। 8

7. (a) Enlist various physiological functions of magnesium and copper. 4

(b) Discuss the clinical situation related to deficiency of iron. 4

(क) मैग्नीशियम तथा कॉपर के विभिन्न कायकीय कार्यों को सूचीबद्ध कीजिए। 4

(ख) लोहे की कमी से सम्बन्धित निदानशालीय अवस्था की विवेचना कीजिए। 4

8. How is enzyme activity affected by pH and temperature ? 8

pH तथा तापमान से एन्ज़ाइम क्रिया किस प्रकार से प्रभावित होती है ? 8

9. (a) Discuss the importance of enzymes. 4

(b) Differentiate between class hydrolase and lyase of enzymes. 4

(क) एन्ज़ाइमों के महत्व की विवेचना कीजिए। 4

(ख) एन्ज़ाइमों के हाइड्रोलेज़ तथा लाइएज़ वर्ग के बीच विभेद कीजिए। 4

Roll No. .....

Printed Pages : 2

1533

BCA / M–16
ADVANCED PROGRAMMING–C
Paper–BCA–121

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

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

Compulsory Question

1. (a) Differentiate between structure and union. 3

(b) Briefly explain enumerated type data. 3

(c) How is pointer to pointer declared ? Give example. 3

(d) How members of structure are referenced using pointer ? 2

(e) What is difference between text file and binary file ? 3

(f) What are command line arguments ? 2

Unit–I

2. Explain the functions available for manipulating strings. Give examples. 16

3. (a) How is the structure declared ? How structure type variables are created and assignment is made to members of the structure ? 6

(b) Write a program in C to find total salary of employee using structure. Take structure members as Employee–no, name, Basicpay Total salary = Basicpay + DA + HRA

DA = 107% of Basic pay

HRA = 10% of Basic pay 10

Unit–II

4. (a) How is the pointer declared ? How address is stored in pointer variable and pointer is dereferenced ? 6

   (b) Write a program in C to interchange the value of two variables by passing address of variables to pointer variables in function. 10

5. (a) How is one dimensional array is referenced using pointers ? Give example. 8

   (b) Write a program to sum the elements of Linear array in which elements are referenced by pointers. 8

Unit–III

6. (a) How is the file pointer declared ? How file is opened and closed using file pointer ? 6

   (b) Explain the different modes of accessing the file. 10

7. (a) Explain the functions available for reading and writing character by character from the file. 8

   (b) Write a C program to count the number of words in a file. 8

Unit–IV

8. (a) Explain the purpose of Preprocessor. 6

   (b) What is Macro ? Explain simple macro, Parametrized macro and Nested macro giving example. 10

9. What are the directives used for conditional compilation ? Explain giving examples. 16

Roll No. .....

Printed Pages : 2

1534

BCA / M–16
LOGICAL ORG. OF COMPUTER–II
Paper–BCA–122

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

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

1. (a) Differentiate Sequential and combinational circuits. 3
   (b) Make excitation Table of T-ff. 3
   (c) Define fetch cycle. 3
   (d) What is ROM, Name types of ROM. 3
   (e) What is external Interrupt. 3
   (f) How many FFs are needed to make Mod-5 counter. 1

Unit–I

2. Explain clocked SRFF, its problem and discuss its solution. 16

3. (a) What is Race-Around Problem. Discuss Master-Slave FF to solve it. 12
   (b) Discuss. D-FF 4

Unit–II

4. Differentiate Synchronous and Asynchronous counter. Explain Mod–16 Asynchronous counter using 8421 code. 16

5. (a) Make Shift-Register to store 1011.
   (b) Make Mod–5 counter using Jkff. 16

Unit–III

6. (a) Define Memory and discuss Types of memory.
   (b) Discuss Flash Memories. 16

7. (a) Discuss storage operation in Magnetic Disk.
   (b) Explain Non-Impact Printers. 16

Unit–IV

8. (a) Explain Addressing Modes.
   (b) Discuss various Instruction formats to solve
   $Z = (A - B) * (C + D)$ 16

9. (a) Explain Program controlled data transfer.
   (b) Discuss speed mismatch between Main-Memory and I/O. 16

Roll No. .....

Printed Pages : 2

1535

BCA / M–16
MATHEMATICAL FOUNDATIONS–II
Paper–BCA–123

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

Note : *Attempt **five** questions in all. Selecting at least **one** question from each unit. **Question No. 9 is compulsory.***

Unit–I

1. (a) Show that $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a tautology. 8

(b) Prove that $3^n > 2^n$ by P.M.I. for all $n \in N$. 8

2. (a) Prove that $n(n+1)(n+2)$ is a multiple of 6 by using P.M.I. for all $n \in N$. 8

(b) Show that $\sim (p \leftrightarrow q) \equiv (\sim p) \leftrightarrow q = p \leftrightarrow \sim q$. 8

Unit–II

3. (a) Prove that a group of four elements is an abelian group. 8

(b) Define Ring with example. 8

4. (a) Prove that the intersection to two subring is a ring. 8

(b) Prove that $[\{0, 1, 2, 3, 4\}, +_5, \times_5]$ is a field. 8

Unit–III

5. (a) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, show that $A^3 - 23A - 40I = 0$. 8

(b) For $A=\begin{bmatrix}3 & 1\\ 7 & 5\end{bmatrix}$, find x and y so that $A^2 + xI = yA$. 8

6. (a) Solve $x + 2y = 4$; $2x + 5y = 9$ by Matrix Method. 8

(b) If $A = \begin{bmatrix}1 & 2\\ -2 & 1\end{bmatrix}$ and $B = \begin{bmatrix}2 & 1\\ 2 & 4\end{bmatrix}$ prove that $(AB)^{-1} = B^{-1} A^{-1}$. 8

Unit–IV

7. Find eigen values and eigen vectors of matrix

$$A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$$ 16

8. Verify Cayley-Hamilton theorem for matrix $A=\begin{bmatrix}0 & 0 & 1\\ 3 & 1 & 0\\ -2 & 1 & 4\end{bmatrix}$ and hence find A^{-1}. 16

Unit–V (Compulsory)

9. (a) Define Group with example. 4

(b) Define Prime ideal of ring. 2

(c) Define characteristic equation of a square matrix. 2

(d) Define Rank of a Matrix. 2

(e) If $A=\begin{bmatrix}2 & 3\\ 1 & 4\end{bmatrix}$, $B=\begin{bmatrix}1 & 2 & 3\\ 4 & 1 & 0\end{bmatrix}$ find AB. 2

(f) Define symmetric matrix with example. 2

(g) Define subgroup. 2

Roll No. .....

Printed Pages : 2

1536

BCA / M–16
OFFICE AUTOMATION TOOLS
Paper–124

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.***

Compulsory Question

1. (a) What is purpose of linking and embedding of object ? 3

(b) What is purpose of working with columns. 2

(c) Explain word wrap. 3

(d) What is the purpose of document setup dialog box in pagemaker ? 3

(e) What is the purpose of In-built sound effect ? 2

(f) What is meant by Pagemaker Preferences ? Explain. 3

Unit–I

2. Which are hardware and software requirements of Desk top publishing. What is the purpose of window control option in paragraph specification dialog box in Pagemaker. 16

3. Explain any four DTP packages in brief. 16

Unit–II

4. Explain various text formatting feature in Pagemaker. 16

5. Explain various text editing feature in Pagemaker. 16

Unit–III

6. (a) What are the advantages and disadvantages of office Automation ? Explain. 8

(b) Explain various steps to create a style in MS-Word. 8

7. (a) Explain purpose of autotext in MS-Word. 8

(b) Explain various steps to add a hyper link in MS-Word. 8

Unit–IV

8. (a) What is purpose of Powerpoint ? Explain various application of power point. 8

(b) Explain various steps to insert, move and resize text box on a slide. 8

9. (a) Explain various steps to insert recorded sound effect. 8

(b) Explain various steps to insert animated pictures. 8

Roll No. .....

Printed Pages : 2

1537

BCA / M–16
STRUCTURED SYSTEM ANALYSIS AND DESIGN
Paper–125

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

Note : ***Question No. 1 compulsory.*** *Attempt any* ***four*** *questions selecting at least* ***one*** *question from each unit.*

1. Define and explain following :

(a) Secondary data. 3

(b) Questionaries. 3

(c) Logic view of data. 3

(d) Decision table. 3

(e) Operational feasibility. 3

(f) White box testing. 3

Unit–I

2. What are man made information system ? What are their characteristics. Explain with example and flow chart. 18

3. How will you classify Physical or Abstract systems ? Give eg. 18

Unit–II

4. What are different Tools used for system Analysis. 18

5. Why system planning is necessary before system development ? What are different phases of system planning. 18

Unit–III

6. Explain Form Design. Give example. What are the characteristics of form Design. 18

7. How file is organised in different ways ? 18

Unit–IV

8. What are test plans ? Why they are made ? Give eg. 18

9. What are primary activities for system maintenance ? 18

5. What are interpersonal skills ? Describe the factors in detail that block interpersonal skills. 16

Unit–III

6. Write a note on the ingredients and advantages of Group Discussion. 16

7. What do you mean by oral presentation ? Explain significant aspects of oral presentation. 16

Unit–IV

8. Write a note on the importance of interview. Describe various types of interviews. 16

9. Describe important features of a resume. Write a resume for the post of an Assistant Manager in a company. 16

Roll No. .....

Printed Pages : 2

1538

BCA / M–16
PERSONALITY DEVELOPMENT
Paper–BCA–126

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

Note : *Attempt **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. Write short answers of the following : 8×2=16
   (a) What is self concept.
   (b) What is etiquette ?
   (c) Describe briefly factors responsible for success in an interview.
   (d) Define the Seminar.
   (e) Write a brief note on personal grooming.
   (f) Define personality.
   (g) Briefly describe the features of a team.
   (h) Briefly describe the determinants of personality.

Unit–I

2. Write a note on the process of listening. Also describe the advantages of effective listening. 16

3. What is meant by Body Language ? Discuss the types and significance of Body Language. 16

Unit–II

4. What is Group Dynamics ? Describe the factors which you should keep in mind while dealing with customers and suppliers. 16

[Turn over

3. How do we place an order ? Explain by giving examples.

Or

Prepare a sample layout of a business letter. 6

4. Explain the meaning of any *six* of the following terms :
   (a) Above cited
   (b) Abstract of tender
   (c) Adverse report
   (d) Arbitrary
   (e) Balance sheet
   (f) Brain drain
   (g) Contingency
   (h) De jure
   (i) Earnest money. 1×6=6

5. Explain the meaning of any *six* of the following terms :
   (a) Ibidem
   (b) Inadvertently
   (c) Minutes
   (d) Modus operandi
   (e) Ones
   (f) Punitive query
   (g) Status quo
   (h) Unanimity
   (i) Waive. 1×6=6

Roll No. ..... Total Pages : 02

BSIT/M-16 **12129**

COMMUNICATION SKILLS

English–II

Paper–201

Time : Three Hours] [Maximum Marks : 30

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

1. Answer the following (Compulsory question) : 1×6=6
   (a) What is a telegram ?
   (b) Write one fact that must be taken into consideration while placing an order.
   (c) Give the meaning of the term "Benevolence".
   (d) Give the meaning of the term "Censure".
   (e) Give the meaning of the term "In toto".
   (f) Explain the meaning of "Prima facie".

2. Write a note drawing distinction between official and business correspondance. 6

Or

What is an endorsement ? Explain.

Roll No. ..... Total Pages : 03

BSIT/M-16 **12131**

ELECTRONIC DEVICES AND CIRCUITS

BSIT-203

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.

1. (a) How drift and diffusion currents can be distinguished in a semiconductor ? 2

(b) Clamping circuits are called D.C. restorer. Comment. 2

(c) Why base of a transistor is made very thin. Justify your answer. 2

(d) Input resistance of FETs is very high Justify. 2

Unit I

2. (a) Explain in brief Avalanche and Zener breakdowns in diode. 4

(b) Discuss a high pass filter. Draw its frequency response and determine its cut of frequency. 4

3. (a) Discuss Zener diode as voltage regulator. 5

(b) Discuss space charge capacitance and diffusion capacitance of pn junction diode. 3

Unit II

4. Discuss working of a Bridge rectifier. Calculate its ripple factor and rectification efficiency. What are its advantages over a centre-tapped full wave rectifier ? 8

5. (a) Draw the circuit diagram of a voltage-doubler and discuss its working. What is PIV required for each diode in the circuit ? 4

(b) Discuss a shunt clipping circuit. 4

Unit III

6. Discuss the different current components in a PNP transistor. Deduce an expression for collector current I_c. Define each symbol in the equation. Finally deduce the generalized expression for I_c so that it is valid even if the transistor is not operating in its active region. 8

7. (a) Discuss a basic transistor ampliffier circuit and obtain the expression for voltage gain in terms of load resistance. 6

(b) Prove that : 2

$$\alpha = \frac{\beta}{\beta+1}$$

Unit IV

8. Discuss the construction, drain and transfer characteristics of an enhancement type MOSFET. 8

9. (a) Draw and discuss the small signal low frequency model of JFET. 4

(b) Discuss source follower circuit and show that its voltage gain is almost unity. 4

Roll No. ..... Total Pages : 03

BSIT/M-16 **12132**

DIGITAL ELECTRONICS–II

BSIT-204

Time : Three Hours] [Maximum Marks : 40

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

1. (a) Write the applications of shift registers. 2
   (b) Explain briefly, why dynamic RAM requires refreshing ? 2
   (c) Define the terms accuracy and resolution of DAC. 2
   (d) In applications where the required memory capacity cannot be sataisfied by a single available memory IC chip, w hat should the designer do to meet this requirement ? 2

Unit I

2. (a) What is shift register ? Describe the working of 4–bit serial–in serial–out. register. Give the table which shows systematic shifting of data. 4
   (b) Discuss the working of ring counter using timing diagram. 4

3. (a) With the help of circuit diagram explain the working of 4–bit bi–directional Shift register. 4

(b) Explain the working of twisted ring counter. 4

Unit II

4. (a) Draw and explain the circuit of Successive approximation analog–to–digital converter. 5

(b) Calculate the value of LSB, MSB, and full–scale output for an 8–bit DAC for 0–12V range. 3

5. (a) Discuss the binary ladder digital–to–analog converter (DAC). Find the general expression for the output voltage of a binary ladder network. 4

(b) Draw and explain the circuit of counter type analog–to–digital converter. 4

Unit III

6. (a) With the help of a circuit diagram, explain the read and write operation of a dynamic RAM cell. 4

(b) How are the bipolar transistors connected to form a bipolar ROM cell, which can be used as PROM ? 4

7. (a) Explain the working of a bipolar static RAM. 4

(b) Define the following terms relating to memory unit : MAR, Access time, Memory cycle time and volatile memory. 4

Unit IV

8. (a) Discuss the principle and working of Magnetic disk memory. What are the main advantages of magnetic memories over semiconductor memories ? 4

(b) Discuss content addressable memory with an example. 4

9. (a) Explain magenetic surface memory in detail. 5

(b) How many 128×8 RAM chips are required to provide a memory capacity of 2048 bytes ? How many lines of address bus must be used to access 2048 bytes of memory ? How many lines of these will be common to each chip ? 3

Roll No. ..... Total Pages : 03

BSIT/M-16 12134

PROGRAMMING TECHNIQUES

BSIT–206

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.

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

(a) Explain Micro and Macro levels of Flowchart.

(b) Explain the Divide and Conquer problem solving strategy.

(c) Explain computational complexity of an algorithm.

(d) Differentiate between relative and absolute cell referencing techniques with the help of sample data.

Unit I

2. (a) Draw a flowchart to find the addition of two matrices of order mxn. 4

(b) What are the advantages and limitations of Pseudocode ? 4

3. (a) Design a Decision table to print the greatest of the three unequal positive numbers. 4

(b) Design a pseudocode to print largest of n given numbers. 4

Unit II

4. (a) Explain the worst and average case behaviour of an algorithm. 4

(b) Explain, how does the verification of program segments with branches and loops is performed. 4

5. (a) Explain the inefficiency that creep into the implementation of algorithm due to Redundant Computations. 4

(b) Explain the characteristics of a problem that can be solved efficiently using Dynamic programming technique. 4

Unit III

6. Develop an algorithm to compute sums for the first n terms (n>=0) of the following series : 8

S = 1+1 2+1/3+.....

7. Develop an algorithm to compute 1/n! for given n. 8

Unit IV

8. How are charts useful in Excel ? Compare any *four* chart types available in Excel. 8

9. (a) Write the steps to import a database in excel worksheet. 4

(b) Explain any *two* logical functions used in MS Excel. 4

नियंत्रण पटल की सहायता से समझाइए :

(क) सेटिंग टाइम (ख) स्क्रीन सेवर परिवर्तन

(ग) वॉलपेपर परिवर्तन (घ) प्रिंटर सेटअप 20

6. Explain using MS-Word :

(a) Use of fonts (b) Use of Spell-Checker

(c) Clip-art (d) Text alignment 20

एम एस वर्ड का उपयोग करते हुए समझाइए :

(क) फॉण्टों का उपयोग (ख) स्पेल चेकर का उपयोग

(ग) क्लिप आर्ट (घ) टेक्स्ट अलाइनमेंट 20

7. (a) Explain Mail-Merge using Word.

(b) Discuss use of tables in word. 20

(क) वर्ड का उपयोग करते हुए मेल-मर्ज की व्याख्या कीजिए।

(ख) वर्ड में सारणियों के उपयोग की विवेचना कीजिए। 20

8. Explain Internet and its applications in Education. 20

इंटरनेट तथा शिक्षा में इसके अनुप्रयोग को समझाइए। 20

9. (a) Explain any two Browsers.

(b) Discuss how to send e-mail to multiple uses. 20

(क) किन्हीं दो ब्राउज़र्स की व्याख्या कीजिए।

(ख) बहुत से उपयोगकर्ताओं को किस प्रकार से ईमेल भेजा जा सकता है, चर्चा कीजिए। 20

10. Write note on :

(a) Macros in word (b) Storage Devices. 20

निम्न पर टिप्पणियां लिखिए :

(क) वर्ड में मैक्रोज़ (ख) भण्डारण युक्तियां। 20

Roll No. .....

Printed Pages : 2

70

BAE / A–16

COMPUTER AWARENESS

Paper–Level-I

Basic Computer Education

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions.*

नोट : *कोई **पाँच** प्रश्न कीजिए।*

1. Make a block diagram of computer and explain essential parts. 20

कम्प्यूटर का ब्लॉक चित्र बनाइए तथा आवश्यक भागों की व्याख्या कीजिए। 20

2. Write a note on :

(a) Non-Impact Printers (b) Any 4 Input Devices. 20

निम्न पर एक टिप्पणी लिखें :

(क) गैर आघाती मुद्रक (ख) कोई 4 इनपुट युक्तियां। 20

3. Define operating system and functions of operating system. 20

प्रचालन प्रणाली तथा प्रचालन प्रणाली के कार्यों को परिभाषित कीजिए। 20

4. Explain Using Windows :

(a) Taskbar (b) Icons

(c) Folders (d) Desktop. 20

विण्डोज़ का उपयोग करते हुए समझाइए :

(क) टास्कबार (ख) आइकन्स

(ग) फोल्डर्स (घ) डेस्कटॉप। 20

5. Explain with help of control-panel :

(a) Setting Time (b) Change Screen Saver

(c) Change Wallpaper (d) Printer Setup. 20

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

18

BAE / A–16

ENVIRONMENTAL STUDIES

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Answer any **five** questions in total. **Question 1 is compulsory.***

नोट : *कुल **पाँच** प्रश्नों के उत्तर दें। **प्रश्न संख्या 1 अनिवार्य है।***

1. Write short notes on the following :

निम्नलिखित पर संक्षिप्त टिप्पणियां लिखिए :

(a) Name any three endangered plant species of India.

भारत की किन्हीं तीन संकटापन्न पादप प्रजातियों का नाम लिखिए।

(b) Deforestation.

वनोन्मूलन

(c) Drought

सूखा

(d) Waterlogging

जलभरण

(e) Overgrazing

अति चराई

(f) Food web

खाद्य जाल

(g) Natural disasters

प्राकृतिक आपदाएँ

(h) Thermal pollution

ताप प्रदूषण

(i) Global warming.

वैश्विक उष्णता

(j) Reasons of Soil pollution. 10×2.5=25

भूमि प्रदूषण के कारण। 10×2.5=25

2. Describe the scope and importance of environmental studies. Discuss how environmental studies is related to other subjects. 6+6½=12½

पर्यावरण अध्ययन के क्षेत्र व महत्व का वर्णन कीजिए। पर्यावरण अध्ययन दूसरे विषयों से किस प्रकार सम्बन्धित है, व्याख्या कीजिए। 6+6½=12½

3. Write short notes on :

(i) Role of an individual in conservation of natural resources.

(ii) Environmental effects of extracting mineral resources. 6,6½

निम्नलिखित पर संक्षेप में नोट लिखिए :

(क) प्राकृतिक संसाधनों के संरक्षण में व्यक्ति की भूमिका।

(ख) खनिज संसाधनों के खनन का पर्यावरण पर प्रभाव। 6,6½

4. Define ecological pyramids. Describe in detail different types of ecological pyramids. 2+10½

पारिस्थितिक पिरामिड की परिभाषा दीजिए। विभिन्न प्रकार के पारिस्थितिक पिरामिडों का विस्तार से वर्णन कीजिए। 2+10½

5. Write short notes on :

(i) Habitat loss of biodiversity.

(ii) Hot-spots of biodiversity. 6,6½

निम्नलिखित पर संक्षेप में नोट लिखिए :

(क) जैव विविधता के आवास स्थल का नष्ट होना।

(ख) जैव विविधता के तप्त स्थल। 6,6½

6. Define Pollution. What are the causes and effects of noise pollution. Describe. 2+10½

प्रदूषण को परिभाषित कीजिए। ध्वनि प्रदूषण के कारण एवं प्रभाव क्या हैं ? वर्णन कीजिए। 2+10½

7. Write short notes on :

(i) Effects of thermal pollution.

(ii) Effects of Nuclear pollution. 6,6½

निम्नलिखित पर संक्षेप में नोट लिखिए :

(क) ताप प्रदूषण के प्रभाव

(ख) नाभिकीय प्रदूषण के प्रभाव। 6,6½

8. Describe in detail Air (Prevention and Control of Pollution) Act, 1981. 12½

वायु (सुरक्षा एवं प्रदूषण नियंत्रण) अधिनियम, 1981 का विस्तार से वर्णन कीजिए। 12½

9. Write short notes on :

(i) Population explosion.

(ii) Women and child welfare. 6,6½

निम्नलिखित पर संक्षेप में नोट लिखिए :

(क) जनसंख्या विस्फोट

(ख) महिला एवं बाल कल्याण। 6,6½