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10MAT11

First Semester B.E. Degree Examination, June/July 2011
Engineering Mathematics - I

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only on OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART - A

- 1 a. i) If $y = (ax + b)^{-1}$, then y^n is (04 Marks)
 A) $\frac{(-1)^{n-1}(n-1)!a^n}{(ax+b)^n}$ B) $\frac{(-1)^n n! a^n}{(ax+b)^{n+1}}$ C) $\frac{n! a^n}{(ax+b)^{n+1}}$ D) Zero
- ii) The Taylor's theorem relates the value of the function and its
 A) Ist order derivative B) IInd order derivatives
 C) Constant D) Higher order derivatives
- iii) Cauchy's mean value theorem reduces to Lagrange's mean value theorem, if
 A) $f(x) = g(x)$ B) $f'(c) = g'(c)$ C) $g(x) = x$ D) $f(x) = 0$
- iv) To find the n^{th} derivative of a function $y = f(x)$, its $(n-1)$ derivatives must be a
 A) function of y B) function of x
 C) constant D) function of x & y
- b. If $\cos^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ Prove that $x^2 y_{n+2} + (2n+1) x y_{n+1} + 2n^2 y_n = 0$ (06 Marks)
- c. Verify Lagrange's mean value theorem for the function $f(x) = \log x$ in the interval $[1, 2]$ and find the value of 'C'. (04 Marks)
- d. Expand $\tan x$ in powers of $(x - \pi/4)$ upto third degree term. (06 Marks)
- 2 a. i) L Hospital's rule implies that each differentiation reduces the order of the infinitesimals by
 A) unity B) two C) zero D) four
- ii) If two curve cuts orthogonally, then angle between their tangents is equal to
 A) zero B) $\pi/4$ C) $3\pi/4$ D) $\pi/2$
- iii) Perpendicular distance from the pole on the tangent is equal to
 A) $\sin \phi$ B) $\cos \phi$ C) $r \sin \phi$ D) $r \cos \phi$
- iv) The value of radius of curve remains unchanged under the change of
 A) ordinates B) signs C) derivatives D) none of these (04 Marks)
- b. Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \cot x \right)$. (04 Marks)
- c. Prove that the radius of curvature ρ at any point (x, y) on the curve $\sqrt{\frac{x}{a}} + \sqrt{\frac{y}{b}} = 1$ is given by

$$\rho = \frac{2(ax + by)^{3/2}}{ab}$$
 (06 Marks)
- d. Find the pedal equation of the curve $\frac{2a}{r} = (1 + \cos \theta)$. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- 3 a. i) A partial increment corresponds to a change of one of the variables and all other variables are _____ (04 Marks)
 A) constant B) varying C) incremented D) decremented
- ii) If $x = r \cos \theta$, $y = r \sin \theta$, the Jacobian of (x, y) with respect to (r, θ) is equal to
 A) $\frac{1}{r}$ B) θ C) r D) zero
- iii) The necessary conditions for $f(x, y)$ to have a maximum or minimum at (a, b) .
 A) $f_x(a, b) = 0$ B) $f_y(a, b) = 0$
 C) $f_{xy}(a, b) = 0$ D) $f_x(a, b) = f_y(a, b) = 0$
- iv) In Lagrange's method of undetermined multipliers are cannot determine the nature of the
 A) Function B) Stationary point C) Multipliers D) None of these
- b. Find the extreme value of the function $f(x) = x^3 + y^3 - 3axy$, $a > 0$. (06 Marks)
- c. If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = -\frac{9}{(x+y+z)^2}$ (06 Marks)
- d. Find the percentage error in the area of an ellipse when an error of 1% is made in measuring the major and minor axis. (04 Marks)
- 4 a. i) Any motion in which the curl of the velocity vector is zero is said to be _____ (04 Marks)
 A) rotational B) solenoidal C) irrotational D) conservative
- ii) The directional derivative of a scalar function ϕ at any point is _____ along $\nabla \phi$.
 A) minimum B) maximum C) zero D) ∞
- iii) Gradient of a scalar field is a
 A) constant B) scalar C) vector D) None of these
- iv) If $\phi(x, y, z) = c$ is the equation of surface, then $\nabla \phi$ is _____ to the surface.
 A) parallel B) normal C) inclined D) not parallel
- b. Find the constants a, b, c so that the vector function
 $\hat{F} = (x + 2y + az) \hat{i} + (bx - 3y - z) \hat{j} + (4x + (y + 2z) \hat{k}$ is irrotational (04 Marks)
- c. Prove that $\text{grad div } F = \text{curl curl } F + \nabla^2 F$. (06 Marks)
- d. Show that the spherical co-ordinate system is orthogonal. (06 Marks)

PART - B

- 5 a. i) Any integral formula which express in terms of another similar integral in lower powers is called _____ formula (04 Marks)
 A) integral B) differential C) reduction D) trigonometric
- ii) If given equation contains only even powers of x , then the curve is symmetrical about
 A) y -axis B) x -axis C) both axis D) None of these
- iii) Surface of solid generated by revolution about x -axis of the curve $y = f(x)$ between $x = a$, $x = b$.
 A) $\int_a^b \pi y^2 dx$ B) $\int_a^b \pi x dy$ C) $\int_a^b \pi r^2 d\theta$ D) $\int_a^b 2\pi y ds$
- iv) Leibniz's rule for differentiation under integral sign is
 A) $\phi'(y) = \int_a^b \frac{\partial}{\partial y} f(x, y) dx$ B) $\phi'(y) = \int_a^b \frac{\partial}{\partial x \partial y} f(x, y) dx$
 C) $\phi(y) = \int_a^b \frac{\partial}{\partial x} f(x, y) dx$ D) None of these
- b. Obtain the reduction formula for $\int \cos^n x dx$. (06 Marks)

- c. Evaluate $\int_0^{\pi/2} \sin^7 \theta \cos^6 \theta d\theta$. (04 Marks)
- d. Find the volume of the solid obtained by revolving the Astraid $x^{2/3} + y^{2/3} = a^{2/3}$ about x - axis. (06 Marks)

6 a. i) The degree of the differential equation $\frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{dx^2} = C$ is (04 Marks)

- A) Two B) Three C) One D) Zero

ii) Variable separable form of the equation $\frac{y}{x} \frac{dy}{dx} = \sqrt{1+x^2+y^2+x^2y^2}$ is

A) $\frac{\sqrt{1+y^2}}{y} dy = \frac{\sqrt{1+x^2}}{x} dx$ B) $\frac{y}{\sqrt{1+y^2}} dy = x\sqrt{1+x^2} dx$

C) $\sqrt{1+x^2} dx + \sqrt{1+y^2} dy$ D) $\frac{y}{\sqrt{1+y^2}} dy = \frac{x}{\sqrt{1+x^2}} dx$

iii) The integrating factor of the differential equation $x \log x \frac{dy}{dx} + y = \log x^2$ is

- A) $\log x^2$ B) $\log x$ C) $x \log x$ D) $x \log x^2$.

iv) The differential equation $(x + x^8 + ay^2) dx + (y^8 - y + bxy) dy = 0$ is exact if $b =$ _____

- A) 4 B) 3x C) 2a D) 4a

b. Solve $\frac{dy}{dx} = \frac{y}{x - \sqrt{xy}}$. (04 Marks)

c. Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$. (06 Marks)

d. Find the orthogonal trajectories of the family of curve $r^n \cos n\theta = a^n$. (06 Marks)

7 a. i) The normal form of the matrix of rank r is (04 Marks)

A) $\begin{bmatrix} I_r & 0 \\ 0 & 0 \end{bmatrix}$ B) $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ C) $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$ D) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

ii) If rank of the coefficient matrix is equal to rank of the Augmented matrix then equations are

- A) consistence B) inconsistency
C) have no solution D) have infinite number of solutions.

iii) In Gauss - elimination method coefficient matrix reduces to _____ matrix.

- A) diagonal B) unit matrix C) triangular D) None of these

iv) The system of linear homogeneous equations have trivial solution if all variable are

($i = 1 \dots n$)

- A) $x_i > 0$ B) $x_i < 0$ C) $x_i = 0$ D) $x_i = \infty$

b. Investigate the value of λ and μ so that the equations $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ have i) unique solution ii) no solution iii) infinite number of solutions. (06 Marks)

c. Solve using the Gauss – Jordan method,

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 2 & -3 \\ -2 & -4 & -4 \end{bmatrix}$$

(06 Marks)

d. Find the rank of the Matrix of $A = \begin{bmatrix} 1 & 2 & 4 & 3 \\ 2 & 4 & 6 & 8 \\ 4 & 8 & 12 & 16 \\ 1 & 2 & 3 & 4 \end{bmatrix}$

(04 Marks)

- 8 a. i) Each eigen vector corresponding to a eigen value is (04 Marks)
 A) unique B) no unique C) infinite D) None of these
 ii) The sum of the eigen values of the matrix is the sum of the elements of
 A) Any row B) Any column
 C) diagonal D) Any row and column.
 iii) A homogeneous expression of the second degree in any number of variables is called
 A) linear form B) cubic form C) quadratic form D) None of these
 iv) Every square matrix satisfies its own _____ equation.
 A) quadratic B) cubic C) algebraic D) characteristic
- b. Find the characteristics equation and eigen vector of the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$$

(06 Marks)

c. Reduce the matrix $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ to the diagonal form using characteristic equation method. (06 Marks)

d. Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2zy$ to the canonical form. (04 Marks)

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10MAT21

Second Semester B.E. Degree Examination, June/July 2011
Engineering Mathematics – II

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

- 1 a. Choose your answers for the following :
- i) A differential equation of the first order but of second degree (solvable for P) has the general solution as,
 A) $F_1(x, y, c) + F_2(x, y, c) = 0$ B) $F_1(x, y, c) \times F_2(x, y, c) = 0$
 C) $F_1(x, y, c) - F_2(x, y, c) = 0$ D) $F_1(x, y, c) / F_2(x, y, c) = 0$
- ii) If the given differential equation is solving for x then it is of the form,
 A) $x = f(P/y)$ B) $y = f(x, P)$ C) $x = f(\frac{y}{P})$ D) $x = f(y, P)$
- iii) Clairaut's equation of $P = \sin(y - xP)$ is,
 A) $y = \frac{P}{x} + \sin^{-1} P$ B) $y = Px + \sin P$ C) $y = Px + \sin^{-1} P$ D) $y = x + \sin^{-1} P$
- iv) The differential equation for R, L series circuit is,
 A) $\frac{di}{dt} + Ri = E$ B) $L \frac{di}{dt} + i = E$ C) $\frac{di}{dt} + Ri = \frac{E}{L}$ D) $L \frac{di}{dt} + Ri = E$ (04 Marks)
- b. Solve $P(P + y) = x(x + y)$ by solving for P. (05 Marks)
- c. Solve $P^3 - 4xyP + 8y^2 = 0$ by solving for x. (05 Marks)
- d. Solve $(Px - y)(Py + x) = a^2P$, use the substitution $X = x^2$, $Y = y^2$. (06 Marks)
- 2 a. Choose your answers for the following :
- i) Roots of $y'' - 6y' + 13y = 0$ are,
 A) $2 \pm 3i$ B) $2 \pm i$ C) $3 \pm i$ D) $3 \pm 2i$
- ii) The value of $\frac{1}{D}(f(x))$ is,
 A) $f'(x)$ B) $\frac{1}{f'(x)}$ C) $\int f(x)dx$ D) $\int \frac{1}{f(x)}dx$
- iii) The particular integral of $(D^2 - 6D + 9)y = \log 2$ is,
 A) $6 \log 2$ B) $\frac{1}{9} \log 2$ C) $9 \log 2$ D) $\frac{1}{6} \log 2$
- iv) The displacement in the simple harmonic motion $\frac{d^2x}{dt^2} = -\mu^2x$ is,
 A) $C_1 \cos \mu t + C_2 \sin \mu t$ B) $C_1 \cos \mu t - C_2 \sin \mu t$
 C) $C_1 \cos \mu t \pm C_2 \sin \mu t$ D) $\cos \mu t \pm \sin \mu t$ (04 Marks)
- b. Solve $(D^3 - D)y = 2e^x + 4 \cos x$. (05 Marks)
- c. Solve $(D^2 + 2)y = x^2e^{3x} + \cos 2x$ (05 Marks)
- d. Solve the simultaneous differential equations, $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- 3 a. Choose your answers for the following :
- i) If y_1 and y_2 are the solutions of second order differential equation and u and v are variation of parameters of $y_p = uy_1 + vy_2$ then $v =$ _____
- A) $\int \frac{(y_1 X) dx}{y_1 y_2' - y_1' y_2}$ B) $\int \frac{(y_2 X) dx}{y_1 y_2' + y_1' y_2}$ C) $\int \frac{X dx}{y_1 y_2' - y_1' y_2}$ D) $\int \frac{dx}{y_1 y_2' - y_1' y_2}$
- ii) In $x^2 y'' + 4xy' + 2y = e^x$ if $x = e^t$ then we get for $x^2 y''$ as,
- A) $(D-1)y$ B) $D(D-1)y$ C) $D(D+1)y$ D) $D(D+2)y$
- iii) To transform $(ax+b)^2 y'' + K_1(ax+b)y' + K_2 y = X$ into Legendre's linear equation we put $ax+b =$ _____
- A) e^{-t} B) $\frac{1}{e^{-t}}$ C) $1+e^t$ D) $1-e^t$
- iv) Series solution is a regular singularity of the equation $P_0 y'' + P_1 y' + P_2 y = 0$ when
- A) $x < 0$ B) $x > 0$ C) $x = 0$ D) $x \neq 0$ (04 Marks)
- b. Solve $y'' - 6y' + 9y = \frac{e^{3x}}{x^2}$ using variation of parameters. (05 Marks)
- c. Solve $x^2 y'' + xy' + y = 2 \cos^2(\log x)$. (05 Marks)
- d. Solve $2xy'' + 3y' - y = 0$ by Frobenius method. (06 Marks)
- 4 a. Choose your answers for the following :
- i) Partial differential equation by eliminating a and b from the relation $Z = (x^2 + a)(y^2 + b)$ is,
- A) $Z_x Z_y = xyz$ B) $Z_{xy} = xyz$ C) $Z_{xy} = 4xyz$ D) $Z_x Z_y = 4xyz$
- ii) The solution of $Z_{yy} = \sin xy$ is $Z =$ _____
- A) $\sin xy + f(x) + g(y)$ B) $-\frac{1}{x^2} \cos xy + f(x) + g(y)$
- C) $-\frac{1}{x^2} \sin xy + yf(x) + g(y)$ D) $-\sin xy + f(x) + xg(y)$
- iii) For the Lagrange's linear partial differential equation, $Pp+Qq = R$, the subsidiary equations are _____
- A) $\frac{dx}{P} = \frac{-dy}{Q} = \frac{dz}{R}$ B) $\frac{-dx}{P} = \frac{-dy}{Q} = \frac{dz}{R}$
- C) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ D) $\frac{dx}{P^2} = \frac{dy}{Q^2} = \frac{dz}{R^2}$
- iv) In the method of separation of variables to solve $u_{xx} - 2u_x + u_t = 0$, the trial solution is $u =$ _____
- A) $X(x)T(t)$ B) $\frac{X(x)}{T(t)}$ C) $\sqrt{\frac{X(x)}{T(t)}}$ D) $X(x)\sqrt{T(t)}$ (04 Marks)
- b. Solve $Z_{xy} = \sin x \sin y$ for which $Z_y = -2 \sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\frac{\pi}{2}$. (05 Marks)
- c. Solve $(x^2 - y^2 - z^2)P + 2xyq = 2xz$. (05 Marks)
- d. Solve $3u_x + 2u_y = 0$, $u(x, 0) = 4e^{-x}$ by the separation of variables. (06 Marks)

PART - B

5 a. Choose your answers for the following :

i) The value of $\int_0^6 \int_0^6 xy dx dy$ is _____.

- A) 6 B) 7 C) 8 D) 9

ii) The integral $\int_0^1 \int_0^{\sqrt{1-x^2}} (x+y) dy dx$ after changing the order of integration is _____

- A)
- $\int_0^2 \int_0^{\sqrt{1-y^2}} (x+y) dx dy$
- B)
- $\int_0^1 \int_0^{\sqrt{1-y^2}} (x+y) dx dy$
- C)
- $\int_0^1 \int_0^{\sqrt{1+y^2}} (x+y) dx dy$
- D)
- $\int_0^1 \int_0^{\sqrt{1-y^2}} (x+y) dx dy$

iii) The value of $\int_0^{\infty} e^{-x^2} dx$ is _____

- A)
- $\pi\sqrt{2}$
- B)
- $2\sqrt{\pi}$
- C)
- $\sqrt{2\pi}$
- D)
- $\frac{\sqrt{\pi}}{2}$

iv) The value of $\Gamma\left(\frac{1}{2}\right)\Gamma\left(\frac{3}{2}\right) =$ _____

- A)
- $2\sqrt{\pi}$
- B)
- $\frac{2}{\sqrt{\pi}}$
- C)
- $\pi\sqrt{2}$
- D)
- $\frac{\sqrt{\pi}}{2}$
- (04 Marks)

b. Evaluate $\int_0^b \int_{\frac{a}{b}\sqrt{b^2-y^2}}^a xy dx dy$ by changing the order of integration. (05 Marks)c. Evaluate $\int_{-1}^1 \int_0^z \int_{x-z}^{x+z} (x+y+z) dy dx dz$ (05 Marks)d. Show that $\int_{-1}^1 (1+x)^{m-1} (1-x)^{n-1} dx = 2^{m+n-1} \beta(m, n)$. (06 Marks)

6 a. Choose your answers for the following :

i) If $\int_C \vec{F} \cdot d\vec{r} = 0$ then F is called

- A) Rotational B) Solenoidal C) Irrotational D) Dependent

ii) If f is the vector field over a region of volume V in three dimensional space then $\int_V f \cdot dV$

is called

- A) Scalar volume integral B) Vector volume integral
-
- C) Scalar surface integral D) Vector surface integral

iii) In Green's theorem in the plane $\iint_A \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y} \right) dx dy$ is _____

- A)
- $\int_C (M dx - N dy)$
- B)
- $\int_C (M dx) \times (N dy)$
- C)
- $\int_C (N dx - M dy)$
- D)
- $\int_C (M dx + N dy)$

iv) If C be a simple closed curve in space and S be the open surface, f be the vector field then $\int_C f \cdot d\vec{r} =$ _____

- A)
- $\int_S (\text{curl } f) \cdot n ds$
- B)
- $\int_S (\nabla \times f) \cdot ds$
- C)
- $\int_S (\nabla^2 f) \cdot n ds$
- D)
- $\int_S (\nabla \cdot f) \cdot n ds$
- (04 Marks)

b. Evaluate $\iiint_S f \cdot n ds$ where $f = yzi + 2y^2j + xz^2k$ and S is the surface of the cylinder $x^2 + y^2 = 9$ contained in the first octant between $z = 0$ and $z = 2$. (05 Marks)c. Verify Green's theorem for $\int_C (xy + y^2) dx + x^2 dy$ where C is the closed curve made up of the line $y = x$ and the parabola $y = x^2$. (05 Marks)

- 6 d. Verify Stoke's theorem for $f = (2x - y)i - yz^2j - y^2zk$ for the upper half of the sphere $x^2 + y^2 + z^2 = 1$. (06 Marks)

- 7 a. Choose your answers for the following :

i) $L\{\cosh at\} =$ _____

A) $\frac{a}{s^2 + a^2}$ B) $\frac{s}{s^2 - a^2}$ C) $\frac{a}{s^2 - a^2}$ D) $\frac{s}{s^2 + a^2}$

ii) $L\{t^2 e^{-3t}\} =$ _____

A) $\frac{1}{(s+3)^3}$ B) $\frac{2}{(s+3)^2}$ C) $\frac{3}{(s+3)^3}$ D) $\frac{2}{(s+3)^3}$

iii) Transform of unit function $L\{(u(t-a))\} =$ _____

A) $\frac{e^{as}}{s}$ B) $\frac{e^{-as}}{s^2}$ C) $\frac{e^{-as}}{s}$ D) $\frac{e^{as}}{s^2}$

- iv) Unit impulse function $\delta(t-a)$ is $\delta(t-a) = \infty$ for $t = a$; 0 for $t \neq a$ such that

$\int_0^{\infty} \delta(t-a) dt =$ _____

A) 1 B) 0 C) -1 D) $\frac{1}{2}$ (04 Marks)

- b. Find $L\{t(\sin^3 t - \cos^3 t)\}$. (05 Marks)

- c. Find $L\{f(t)\}$ when $f(t) = \begin{cases} E, & 0 \leq t \leq a \\ -E, & a \leq t \leq 2a \end{cases}$ where the period is $2a$. Sketch the graph also. (05 Marks)

- d. Express $f(t)$ in terms of unit step function and hence find the Laplace transform given that (06 Marks)

$$f(t) = \begin{cases} t^2, & 0 < t < 2 \\ 4t, & 2 < t < 4 \\ 8, & t > 4 \end{cases}$$

- 8 a. Choose your answers for the following :

i) $L^{-1}\left\{\frac{1}{(s-a)^2 + b^2}\right\} =$ _____

A) $\frac{e^{at}}{b} \cos bt$ B) $\frac{1}{a} e^{at} \sin bt$ C) $\frac{1}{b} \cos bt$ D) $\frac{1}{b} e^{at} \sin bt$

ii) $L^{-1}\left\{\frac{s^2 - 3s + 4}{s^4}\right\} =$ _____

A) $1 - 3t + 2t^3$ B) $1 + \frac{t^2}{3}$ C) $t - \frac{3}{2}t^2 + \frac{2}{3}t^3$ D) $t + \frac{3}{2}t^2 + 1$

iii) In convolution theorem, $L\left\{\int_0^t f(u)g(t-u)du\right\} =$ _____

A) $F(t)G(t)$ B) $F(S) \times G(S)$ C) $\frac{F(S)}{G(S)}$ D) $F(t) - G(t)$

- iv) The expression $S^4 L\{x(t)\} - S^3 x(0) - S^2 x'(0) - Sx''(0) - x'''(0)$ is due to,

A) $L\{y'''(t)\}$ B) $L\{x'''(t)\}$ C) $L\{y''(t)\}$ D) $L\{x^{IV}(t)\}$. (04 Marks)

- b. Find the inverse Laplace transform of $\tan^{-1}\left(\frac{2}{S^2}\right)$. (05 Marks)

- c. Find $L^{-1}\left\{\frac{s}{(s-1)(s^2+4)}\right\}$ using convolution theorem. (05 Marks)

- d. Solve $y''(t) + 4y'(t) + 4y(t) = e^t$ with $y(0)=0$ and $y'(0)=0$ using Laplace transform method. (06 Marks)

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10CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2011
Engineering Chemistry

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, choosing at least two from each part.**
2. Answer all objective type questions on OMR sheet only.

PART - A

- 1 a. i) If the direction of flow of electrons in a galvanic cell is left to right then the name of cell reaction is
 A) Reversible B) Irreversible C) Non - spontaneous D) Spontaneous.
- ii) Standard hydrogen electrode cannot be used in the presence of
 A) Reducing agent B) Oxidising agent C) Water diluting agent D) All of these.
- iii) Calomel electrode is reversible with respect to
 A) Calomel B) Mercury C) Chloride ions D) None of these
- iv) Glass electrode can be used with out an error upto a P^H of
 A) 4 B) 14 C) 9 D) 12. (04 Marks)
- b. Derive Nernst equation for the potential of an electrode. (05 Marks)
- c. Calculate the voltage of a cell which consists of a rod of iron immersed in a 1.0 M solution of Fe SO₄ and a rod of manganese immersed in a 0.1 M solution of Mn S₄ at 25°C. Write the cell reaction. Give E°_{Fe²⁺/Fe} = -44 V and E°_{Mn²⁺/Mn} = -1.18 V. (05 Marks)
- d. Discuss the construction and working of glass electrode to determine the P^H of a solution. (06 Marks)
- 2 a. i) Double sulphate theory of lead - acid battery is proposed by
 A) Nernst B) Faraday C) Glaston and taube D) Melmholtz.
- ii) Oxidation of methanol in methanol - oxygen fuel cell is a process of
 A) one electron B) Four electrons C) two electrons D) Six electrons
- iii) Active material for anode in Nickel - Metal hydride battery is
 A) Nio.OH B) Ni(OH)₂ C) H₂ D) None of these
- iv) Electrolyte used in lithium batteries is
 A) Aqueous B) Mixture of aqueous and non aqueous C) Non - aqueous
 D) None of these. (04 Marks)
- b. Discuss the construction and working of zinc- air battery. (05 Marks)
- c. Explain the following battery characteristics
 A) Voltage B) cycle life C) Energy efficiency. (06 Marks)
- d. Discuss the construction and working of hydrogen - oxygen fuel cell. (05 Marks)
- 3 a. i) Alkali and alkaline earth metals form an oxide
 A) Protective B) Highly adherent C) Non - porous D) Porous.
- ii) Caustic embrittlement is an example of corrosion of
 A) Differential metal B) differential aeration C) Stress D) Waterline.
- iii) Intense corrosion takes place when
 A) Smaller cathodic area B) Larger anodic area C) Larger cathodic area
 D) Smaller anodic area.
- iv) Copper containers to store the foodstuffs are coated with
 A) Zn B) Al C) Sn D) Ni. (04 Marks)
- b. Discuss the electrochemical theory of corrosion taking iron as corroding metal. (05 Marks)
- c. Explain the following types of corrosion
 A) Differential metal B) Waterline C) stress. (06 Marks)
- d. Discuss the sacrificial anode and impressed current methods of corrosion control. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- 4 a. i) Technological importance of metal finishing is to impart
 A) Corrosion resistance B) Solderability C) Thermal resistance D) all of these.
 ii) The moderate temperature range of the bath composition for good electrodeposit is
 A) 20 - 30°C B) 70 - 80° C) 35 - 60°C D) none of these.
 iii) Use of complexing agent during electrodeposition is to
 A) Obtain lustrous deposit
 B) Release the gas bubbles from the deposit surface
 C) Reduce the concentration of plating ions if high
 D) Increase the current density.
 iv) Driving force of electroless plating is
 A) Power supply B) Oxidising agent C) Autocatalytic redox reaction D) None of these. (04 Marks)
- b. Explain the following variables which influence the nature of deposit
 A) Current density B) P^H of the electrolytic bath
 C) Throwing power of the plating bath. (06 Marks)
- c. Explain the process of electroplating of chromium for decorative chromium. (04 Marks)
- d. Discuss the process of electroless plating of copper and explain its application in the manufacture of PCB. (06 Marks)

PART - B

- 5 a. i) Catalyst used in fluidized catalytic cracking is
 A) Pt B) Cr_2O_3 C) Al_2O_3 D) Al_2O_3 and SiO_2 .
 ii) Reformation of petrol involves
 A) Hydrogenation B) Oxidation C) Hydrocracking D) None of these.
 iii) Antiknocking value of petrol can be increased by
 A) amyl nitrite B) Acetone peroxide C) Ethyl nitrite D) Ethyl - t - butyl ether.
 iv) Photovoltaic cell devices convert
 A) Chemical energy into electrical energy
 B) Electrical energy into chemical energy
 C) Sunlight energy into electrical energy
 D) None of these. (04 Marks)
- b. Discuss the process of fluidized catalytic cracking of heavy oil. (06 Marks)
- c. Explain the working of photovoltaic cell. (05 Marks)
- d. On burning 1.15g of a coal sample in a bomb calorimeter, the temperature of 3.5 kg of water in the calorimeter increased from 26.5°C to 28.5°C. Water equivalent of calorimeter is 325 g. Specific heat of water is 4.187 J/g/k and latent heat of steam is 2458 J/g. If the fuel contains 4% hydrogen, calculate its gross and net calorific values. (05 Marks)
- 6 a. i) The number of degree of freedom of a system having equilibrium with ice, liquid water and water vapour is
 A) 1 B) 3 C) 2 D) zero.
 ii) The process of raising the relative proportion of silver in the alloy is known as
 A) Gibb's process B) Pattinson's process C) Beer's process D) Plante's process.
 iii) The equation of condensed phase rule is
 A) $F = C - P + 2$ B) $F = C - P + 3$ C) $F = C - P + 1$ D) None of these.
 iv) The law states that current flowing in a conductor is directly proportional to the resistance of the conductor is known as
 A) Lambert's law B) Bedworth's law C) Ohm's law D) Faraday's law. (04 Marks)
- b. Explain the terms phase, component and degree of freedom involved in the statement of phase rule. (06 Marks)
- c. Explain the applications of phase rule over lead - silver system. (05 Marks)
- d. Discuss the theory and instrumentation of conductometric electroanalysis. (05 Marks)

- 7 a. i) Termination of polymerization is by
 A) Combination of growing chains
 B) Combination of growing chain with free radical of initiator
 C) Disproportionation
 D) All of these.
- ii) As flexibility of polymer increases, T_g
 A) Increases B) Ceases C) Decreases D) None of these.
- iii) Polyurethanes are characterized by the presence of
 A) $-\text{CH}_2-\text{O}-\text{CH}_2-$ B) $-\text{NH}-\text{CO}-$ C) $-\text{O}-\text{CO}-\text{O}-$ D) $-\text{NH}-\text{CO}-\text{O}-$.
- iv) Neoprene is closely related to
 A) Nitrile rubber B) Butyl rubber C) Natural rubber D) Buna - S rubber. (04 Marks)
- b. Discuss the free radical mechanism of polymerization taking ethylene as a monomer. (04 Marks)
- c. Give the synthesis of
 A) PMMA B) EPOXY resin C) Butyl rubber. (06 Marks)
- d. What are conducting polymers? Discuss the mechanism of oxidative doping of polyacetylene. (06 Marks)
- 8 a. i) Permanent hardness of water is caused by
 A) Sodium chloride
 B) Calcium bicarbonate
 C) Potassium sulphate
 D) Magnesium sulphate.
- ii) Sea water can be desalinated by
 A) Boiling B) Limesoda process C) Electrodialysis D) None of these.
- iii) Alkalinity of water is due to the presence of
 A) OH^- ions B) CO_3^{2-} ions C) HCO_3^- ions D) All of these.
- iv) General impurities present in water are
 A) Organic matters
 B) Pathogenic bacterias
 C) calcium sulphate
 D) All of these. (04 Marks)
- b. Discuss the determination of sulphate in water by using benzidine hydrochloride. (06 Marks)
- c. Define BOD and COD. Calculate the BOD when 1 litre of effluent from sugar industry containing 150 mg of glucose was completely oxidized into CO_2 and H_2O . (06 Marks)
- d. Explain the desalination of water by reverse osmosis process. (04 Marks)

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10PHY12/22

First/Second Semester B.E. Degree Examination, June/July 2011

Engineering Physics

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.
 4. Physical constants : $h = 6.625 \times 10^{-34} \text{ J-S}$, $c = 3 \times 10^8 \text{ ms}^{-1}$, $m_e = 9.1 \times 10^{-31} \text{ kg}$,
 $k = 1.38 \times 10^{-23} \text{ JK}^{-1}$, $\epsilon_0 = 8.854 \times 10^{-12} \text{ Fm}^{-1}$.

PART - A

- 1 a. Choose your answers for the following :
- In Compton Effect, the wavelength of the x-rays scattered at an angle $\theta > 0$.
 A) increases B) doesn't change C) decreases D) none of these
 - K_e , K_p and K_α an respective kinetic energy of an \bar{e} , a proton and α - particle of same de-Broglie wavelength, then
 A) $K_e > K_p > K_\alpha$ B) $K_e > K_p < K_\alpha$ C) $K_e < K_p < K_\alpha$ D) $K_e = K_p = K_\alpha$
 - The heavier of the particles has smallest de-Broglie wave length when both of them.
 A) move with same speed B) move with same momentum
 C) move with same kinetic energy D) none of these
 - Matter waves are not electromagnetic waves because
 A) they move with variable velocity B) depend on charge
 C) move with constant velocity D) none of these (04 Marks)
- b. What are the basic postulates of quantum theory of radiations? Explain how Planck's overcome the drawbacks of Weins law and Rayliegh Jean's law. (06 Marks)
- c. Define group and phase velocity. Derive the expression for de-Broglie wavelength using group velocity concept. (06 Marks)
- d. Compute the de Broglie wavelength for a neutron moving with one tenth part of the velocity of light. (04 Marks)
- 2 a. Choose your answers for the following :
- An electron is moving in a box of length a ; if ψ_1 is the wave function at $x = \frac{a}{4}$ with $n = 1$ and ψ_2 at $x = a$ for $n = 2$, then $\frac{\psi_2}{\psi_1}$ is
 A) $\frac{\sqrt{2}}{a}$ B) $\frac{\sqrt{a}}{2}$ C) 0 D) ∞
 - For a particle in an infinite potential well in its 1st excited state, the probability of finding the particle at the center of box is
 A) 0 B) 0.25 C) 0.5 D) 0.1
 - To become a nuclear constituent, the K.R of \bar{e} must be of the order of
 A) 20 MeV B) 2 MeV C) 20eV D) zero
 - An electron has a speed of 100 m/s accurate to 0.05%. The uncertainty in its position is
 A) 0.01m B) 0.0115m C) 0.024m D) 0.04m (04 Marks)

- b. What is a wave function? Explain the properties of a wave function. (04 Marks)
- c. Derive the expression for energy eigen value for an electron in potential well of infinite depth. (06 Marks)
- d. A quantum particle confined to one-dimensional box of width 'a' is in its first excited state. What is the probability of finding the particle over an interval of $\left(\frac{a}{2}\right)$ marked symmetrically at the centre of box. (06 Marks)
- 3 a. Choose your answers for the following :
- i) If the mobility of \bar{e} in a metal increases the resistivity
 A) decreases B) increases C) remains constant D) none of these
- ii) The temperature dependence of electrical resistivity of metal is
 A) $\rho \propto \frac{1}{T}$ B) $\rho \propto \frac{1}{\sqrt{T}}$ C) $\rho \propto \sqrt{T}$ D) $\rho \propto T$
- iii) Zero percentage probability is the probability for \bar{e} to occupy the energy level above the Fermi energy level at $T = 0\text{K}$ is
 A) $E + E_F$ B) $E = E_F$ C) $E > E_F$ D) $E < E_F$
- iv) If the Fermi energy of a metal is 1.4eV, the Fermi temperature of the metal is approximately
 A) $1.6 \times 10^3 \text{ K}$ B) $1.6 \times 10^4 \text{ K}$ C) $1.6 \times 10^5 \text{ K}$ D) $1.6 \times 10^6 \text{ K}$ (04 Marks)
- b. Discuss the various drawbacks of classical free electron theory of metals. What are the assumptions made in Quantum theory to overcome the same? (06 Marks)
- c. Explain density of states? Derive the expression for electrical conductivity in terms of mean collision time. (06 Marks)
- d. The Fermi level potassium is 2.1eV. What are the energies for which the probabilities of occupancy at 300 K are 0.99 and 0.5? (04 Marks)
- 4 a. Choose your answers for the following :
- i) For ferromagnetic substances, the Curie-Weise law is given by
 A) $\psi = \frac{C}{T}$ B) $\psi = \frac{C}{T - \theta}$ C) $\psi = \frac{T - \theta}{C}$ D) $\frac{C}{T - \theta}$
- ii) Clausius-Mossotti equation does not hold for
 A) gasses B) liquids C) crystalline solids D) none of these
- iii) The Ferro electric material losses spontaneous polarization at
 A) room temperature B) 0 K C) $T_C\text{K}$ D) 100 K
- iv) In hysteresis, polarization
 A) moves with the electric field B) lags behind electric field
 C) ahead to the electric field D) none of these. (04 Marks)
- b. Explain the term internal field. Derive an expression for internal field in the case of one dimensional array of atoms in di-electric solids. (07 Marks)
- c. Derive Clausius-Mossotti equation. (04 Marks)
- d. Sulphur is elemental solid di-electric whose di-electric constant is 3.4. Calculate the electronic polarizability if its density is $2.07 \times 10^3 \text{ kg/m}^3$ and atomic weight is 32.07. (05 Marks)

PART - B

- 5 a. Choose your answers for the following :
- Wavelength of a laser beam can be used as a standard of
A) time B) temperature C) angle D) length
 - Image is stored on a hologram in the form of
A) interference pattern B) diffraction pattern
C) photograph D) none of these
 - Which event is likely to take place, when a photon of energy equal to the difference in energy between two levels is incident in a system
A) absorption B) emission
C) absorption and emission D) none of these
 - Quartz plates are fixed at the ends of the discharge tube in a He-Ne laser so that
A) there won't be leakage of gas
B) the tube can withstand high electric voltage
C) the light can pass out without any loss
D) the emergent light is polarized (04 Marks)
- b. Explain the requisites and conditions of a laser system. (05 Marks)
- c. Describe the principle and working of LIDAR used to measure pollutant in atmosphere. (06 Marks)
- d. Find the number of modes of standing waves and their frequency separation in the resonant cavity of 1m length of He-Ne operating at a wavelength of 632.8nm. (05 Marks)
- 6 a. Choose your answers for the following :
- The conductivity of a superconductor is
A) infinite B) zero C) finite D) none of these
 - The relation between superconducting transition temperature (T_C) and atomic weight (μ) of isotope is
A) $T_C \propto \mu$ B) $T_C \propto \frac{1}{\mu}$ C) $T_C \propto \sqrt{\mu}$ D) $T_C \propto \frac{1}{\sqrt{\mu}}$
 - If optic fibre is kept in a medium of R.I. $\mu (>1)$ instead of air, the acceptance angle
A) increases B) decreases C) remains constant D) none of these
 - In graded index fibre, the R.I. of cladding varies
A) exponentially B) linearly C) parabolically D) none of these (04 Marks)
- b. Discuss types of optical fibres and modes of propagation using suitable diagram. (06 Marks)
- c. Distinguish between type- I and type - II superconductors. (05 Marks)
- d. The angle of acceptance of an optical fibre is 30° when kept in air. Find the angle of acceptance when it is in a medium of R.I. 1.33. (05 Marks)
- 7 a. Choose your answers for the following :
- Four types of Bravais lattices are obtained in
A) rhombohedral system B) orthorhombic system
C) triclinic system D) monoclinic system
 - In BCC structure, the packing density of crystal is equal to
A) $\frac{\sqrt{3}\pi}{8}$ B) $\frac{\sqrt{3}\pi}{8}$ C) $\frac{3\pi}{8}$ D) $\frac{3\sqrt{3}\pi}{8}$

- 7 a. iii) Which of the following has greatest packing fraction
 A) simple cubic B) body centred cubic
 C) face centred cubic D) all have equal packing fraction
- iv) The space lattice of diamond is
 A) simple cubic
 B) body centred cubic
 C) face centred cubic with two atoms/unit cell
 D) face centred cubic with four atoms/unit cell (04 Marks)
- b. With a neat figure, explain the structure of diamond and show that atomic packing factor of diamond is 0.34. (10 Marks)
- c. Calculate the glancing angle of the (110) plane of a simple cubic crystal ($a = 2.814 \text{ \AA}$) corresponding to second order diffraction maximum for the x-rays of wavelength 0.710 \AA . (06 Marks)
- 8 a. Choose your answers for the following :
- i) The state of matter around the name – size is known as
 A) solid state B) liquid state
 C) plasma state D) mesoscopic state
- ii) The ultrasonic waves are detected by
 A) electromagnetic induction B) tuning fork
 C) piezo electric effect D) inverse piezo electric effect
- iii) A constant testing of product without causing any damage is called
 A) minute testing B) destructive testing
 C) non-destructive testing D) random testing
- iv) The frequency of ultrasonic waves is
 A) $< 20 \text{ kHz}$ B) between 20 Hz and 20 kHz
 C) $> 20 \text{ kHz}$ D) none of these (04 Marks)
- b. Describe a method for measurement of velocity of ultrasonic waves in a liquid and mention how the bulk modulus of the liquid could be evaluated. (08 Marks)
- c. Write a note on carbon nano tube. Discuss the various quantum structures. (08 Marks)

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10CCP13/23

First/Second Semester B.E. Degree Examination, June/July 2011
Computer Concepts and C Programming

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer FIVE full questions choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART - A

- 1 a. Select the correct answer :
- Which of the following device stored instructions that help computer to start up?
 A) Joystick B) RAM C) ROM D) Monitor
 - A collection of 8-bits is called
 A) Byte B) Word C) Record D) File
 - Which of the following is not an output device?
 A) Printer B) Keyboard C) VDU D) CRT Screen
 - Which of the following is not a type of keyboard connector?
 A) 5-pin connector B) 6-pin connector C) 8-pin connector D) USB connector. (04 Marks)
- b. With a neat diagram, explain the basic structure of a computer. (08 Marks)
- c. Explain two types of monitors based on the technique used to display image and text. (04 Marks)
- d. i) Convert the decimal number 37_{10} to binary form.
 ii) Convert the binary number 0011110 to decimal. (04 Marks)
- 2 a. Select the correct answer :
- Unlike a transistor, a magnetic disk can store data without a continual source of
 A) electricity B) RPMs C) polarity D) light
 - A magnetic disk's tracks are divided into smaller parts called
 A) clusters B) sectors C) bytes D) slices
 - A translator which reads an entire program written in high level language and converts it into machine language code is
 A) Assembler B) Translator C) Compiler D) System software
 - A distributed network configuration in which all data/information pass through center computer is
 A) Bus network B) Star network C) Ring network D) Point-to-point network (04 Marks)
- b. What is an operating system? List and explain different types of operating system based on usage and requirement. (08 Marks)
- c. What is OSI model? Explain the principle used to develop seven layers of OSI model. (04 Marks)
- d. List the basic components of a network. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 3 a. Select the correct answer :
- Which of the following are not valid identifiers?
A) student_name B) _total C) 2names D) int
 - Which of the following are not character constants?
A) 'C' B) "C" C) 'bb' D) '?'
 - Which field specification is used to read or write short integer?
A) %c B) %d C) %f D) %hd
 - Which function reads data from the keyboard?
A) display B) read C) printf D) scanf (04 Marks)
- b. List and explain coding constants. (06 Marks)
- c. What is variable? Explain variable initialization. (04 Marks)
- d. Explain the structure of 'C' program. (06 Marks)

- 4 a. Select the correct answer :
- _____ is used to determine the order in which different operations in an expression are evaluated.
A) Associativity B) precedence C) evaluation D) format
 - Which of the following is not a valid assignment expression?
A) X = 23 B) 4X = 8 = 3 C) Y% = 5 D) x = r = 5
 - Which of the following is not an expression format?
A) assignment B) conditional C) binary D) primary
 - Which of the following has highest precedence?
A) prefix increment B) Multiply C) Modulus D) Assignment (04 Marks)
- b. If a = 2, b = 8, c = 4, d = 10, what is the value of each of the following?
- $a + b / c * d - c / a$
 - $(b / a) \% c$
 - $a++ + b-- + d++$
 - $++a + b-- + ++d$ (04 Marks)
- c. Write a program to convert temperature from Fahrenheit to Celsius using the following formula.

$$\text{Celsius} = \left(\frac{100}{180}\right) * (\text{Fahrenheit} - 32) \quad (08 \text{ Marks})$$

- d. Convert the following mathematical expressions into 'C' expressions:
- $a + b * c$
 - $\frac{a + b}{2}$
 - $\sqrt{s(s-a) \times (s-b) \times (s-c)}$
 - $x^2 + y^2 + 2xy$ (04 Marks)

PART - B

- 5 a. Select the correct answer :
- A function that calls itself for its processing is known as
A) Inline function B) Nested function C) Overloaded function D) Recursive function
 - We declare a function with _____ if it does not have any return type.
A) long B) double C) void D) int
 - Variables inside parenthesis of a function declaration have _____ level access.
A) local B) global C) module D) universal
 - Arguments of a function are separated with
A) comma(,) B) semicolon (;) C) colon (:) D) None of these. (04 Marks)

- b. Explain the different ways of passing parameters to function. (08 Marks)
- c. Write a program to accept two numbers from the user and to add and subtract these two numbers using functions and display the result on the console. (08 Marks)
- 6 a. Select the correct answer :
- Operator used in logical and is
A) & B) ! C) && D) ||
 - Two-way selection is implemented with the _____ statement.
A) case B) switch C) else if D) if..else
 - Which of the following is not a relational operator?
A) < B) <= C) = D) >=
 - The _____ logical operator is true when both the operands are true.
A) and (&&) B) or (||) C) less than (<) D) > (04 Marks)
- b. Explain the logical operators used in C. (06 Marks)
- c. Write a recursive function to find the factorial of a number. (04 Marks)
- d. Using flow-chart and syntax, explain pretest and post-test loops. (06 Marks)
- 7 a. Select the correct answer :
- The process through which data are arranged according to their values is known as
A) arranging B) searching C) listing D) sorting
 - The _____ search locates the target item by starting at the beginning and moving towards end of the list.
A) selection B) binary C) sequential D) ascending
 - Which of the following statements assigns the value stored in x to the first element on an array ary?
A) ary = x B) ary = x[0] C) ary = x[1] D) ary[0] = x
 - _____ is an integral value used to access elements of an array.
A) Constant B) Element C) variable D) index. (04 Marks)
- b. Write a program to sort the elements of an array using bubble sort. (08 Marks)
- c. What is two dimensional array? Explain initialization of two dimensional array. (04 Marks)
- d. What is string? Explain about the string delimiter. (04 Marks)
- 8 a. Select the correct answer :
- Parallel computing is _____ execution of instructions in a computer system.
A) Simultaneous B) Serial C) Accurate D) Complete
 - Which of the following is not an example of parallel computing in the field of science and research?
A) Bio-informatics B) Quantum research
C) Solved grid problem D) Distributed processing
 - The individual sectors inside a section directives are specified with the help of which of the following directive?
A) sections B) region C) segment D) None of these
 - The use of threads reduces _____ time of the processor.
A) idle time B) Memory access time C) latency time D) None of these. (04 Marks)
- b. What are the motivating factors which drives us towards parallel computing? (08 Marks)
- c. What are threads? Highlight the need of threads. (08 Marks)

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10CIV13/23

First/Second Semester B.E. Degree Examination, June/July 2011
Elements of Civil Engineering and
Engineering Mechanics

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

- 1 a. Choose your answers for the following :
- Geotechnical engineering involves the study of
 A) Building B) Soil C) Air D) All the above
 - Building tanks and dams and carrying stored water to field is known as
 A) Structural engineering. B) Environmental engineering.
 C) Water resources and irrigation engg. D) Construction technology.
 - The structure which provides passage over the obstacles like valley, river without closing the way underneath is:
 A) Dam B) Bridge C) Harbour D) Airport
 - Highways which are superior to National Highways and are provided wherever volume of traffic is very high are:
 A) State highways B) High volume roads C) Air ways D) Expressways
 (04 Marks)
- b. Explain briefly the scope of civil engineering in:
- Water resources engineering; ii) Geotechnical engineering (10 Marks)
- c. Explain different types of roads. (06 Marks)
- 2 a. Choose your answers for the following :
- Which of the following is the basic concept of mechanics?
 A) Charge B) Power C) Force D) Energy
 - When more than three concurrent forces are in equilibrium, select the condition that is satisfied.
 A) All the forces must have equal magnitude.
 B) Polygon representing the forces will not close.
 C) The last side of the polygon will represent the resultant.
 D) Polygon representing the forces will close.
 - Effect of a force on a body depends upon its:
 A) Direction B) Position C) Magnitude D) All the above
 - Forces coexist on a plane and all the forces act helter-skelter over the body. These are
 A) Coplanar non-concurrent forces B) Coplanar concurrent forces
 C) Coplanar parallel forces D) Non-coplanar non-concurrent forces
 (04 Marks)
- b. State and explain basic idealization in mechanics. (06 Marks)
- c. Define a couple. Mention its characteristics. (04 Marks)
- d. A 100N vertical force is applied to the end of a lever which is attached to a shaft as shown in Fig. Q2 (d), determine
- The moment of force about O.
 - The horizontal force applied at 'A' which creates same moment about 'O'.
 - The smallest force applied at 'A' which creates same moment about 'O'. (06 Marks)

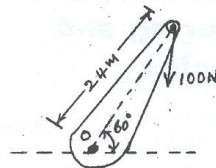


Fig. Q2(d)

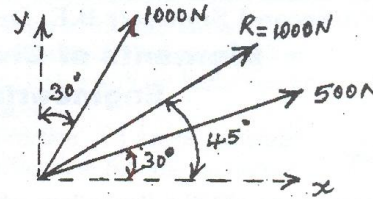


Fig. Q3(c)

- 3 a. Choose your answers for the following :
- If two equal forces of magnitude 'p' act at an angle ' θ ', their resultant will be
 A) $2p \cos \theta/2$ B) $P \tan \theta/2$ C) $2p \sin \theta/2$ D) $p \cos \theta/2$
 - The simplest resultant of a plane force system is always
 A) A single force B) A wrench C) A single moment
 D) A single force or a single moment.
 - The angle between two forces to make their resultant a minimum and a maximum respectively are:
 A) 0° and 90° B) 180° and 90° C) 90° and 180° D) 180° and 0°
 - The moment of a force about any point is numerically equal to times the area of the triangle whose base is the line representing the force and vertex is the point about which the moment is taken
 A) Half B) Same C) Twice D) Thrice
- b. State and prove Varignon's theorem of moments. (04 Marks)
- c. Two forces acting on a body are 500N and 1000N as shown in Fig. Q3 (c). Determine the third force F such that the resultant of all the three forces is 1000N directed at 45° to the x-axis. (10 Marks)
- (06 Marks)
- 4 a. Choose your answers for the following :
- The first moment of area of a semicircular area about its diameter d is given by
 A) $\frac{d^3}{12}$ B) $\frac{d^3}{24}$ C) $\frac{d^3}{6}$ D) $\frac{d^3}{36}$
 - Centroid of a triangular area of base 'b' and height 'h' taken about an axis coincident with the base is given by
 A) $\frac{bh^3}{12}$ B) $\frac{b^2h}{6}$ C) $\frac{bh^2}{6}$ D) $\frac{h}{3}$
 - Moment of total area about its centroidal axis is
 A) Twice the area B) Three times the area
 C) Zero D) none of the above
 - Centroid conveys some clue about
 A) The orientation of a surface B) Centre of a body
 C) Shape and disposition of the area D) Area of cross-section
- b. Determine the centroid of semicircle by the method of integration. (04 Marks)
- c. With reference to the co-ordinate axis x and y, locate the centroid of the area shown in Fig. Q4 (c). (06 Marks)
- (10 Marks)

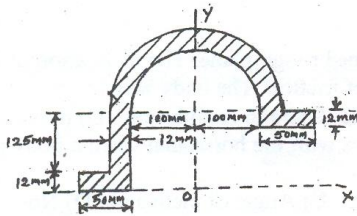


Fig. Q4(c)

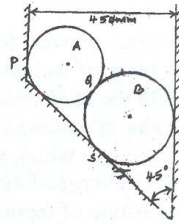


Fig. Q5(c)

PART - B

- 5 a. Choose your answers for the following :
- The force that cancels the effects of the force system acting on the body is known as
A) Resultant B) Neutral force C) Balancing force D) Equilibrant
 - If the sum of all the forces acting on a body is zero it may be concluded that the body
A) Must be in equilibrium B) cannot be in equilibrium
C) May be equilibrium provided the forces are concurrent.
D) May be in equilibrium provided the forces are parallel.
 - For a smooth spherical surface reaction acts
A) Horizontal to the plane of contact B) Inclined to the plane of contact
C) Perpendicular to the plane of contact D) None of the above.
 - A system that possesses a resultant:
A) Will be in equilibrium B) Will be under rest
C) Will not be in equilibrium D) None of these (04 Marks)
- b. Define free body diagram. Describe types of forces acting on a body. Explain them briefly. (06 Marks)
- c. Cylinder 'A' of diameter 200mm and cylinder B of diameter 300mm are placed in a trough shown in Fig. Q5 (c). If cylinder A weighs 800N and cylinder B weighs 1200N, determine the reactions developed at contact surfaces P, Q, R and S. Assume all contact surfaces are smooth. (10 Marks)
- 6 a. Choose your answers for the following :
- Minimum number of members required to form a simple truss
A) 2 B) 3 C) 4 D) 5
 - In the method of joints for the analysis of forces in the member of truss, the number of equilibrium equations available at each joint are
A) 2 B) 3 C) 4 D) 5
 - For a system of coplanar parallel forces to be in equilibrium
A) The resultant force must vanish alone is sufficient
B) The resultant couple must vanish alone is sufficient
C) Both resultant force and the resultant couple must vanish
D) None of the above
 - The beam is neither permitted to move in any direction nor allowed to rotate in the case of
A) Hinged support B) Fixed support C) Roller support D) Simple support (04 Marks)
- b. Briefly explain the method of joints and method of sections used in the analysis of simple trusses. (06 Marks)
- c. Determine the reactions at the support for the beam loaded shown in Fig. Q6(c). (10 Marks)

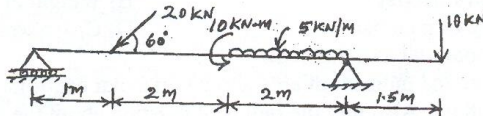


Fig. Q6(c)

- 7 a. Choose your answers for the following :
- A body of weight Q is placed on an inclined rough plane. The inclination of the plane with the horizontal is less than the angle of friction. The body will.
 - be in motion
 - move downwards
 - be in equilibrium
 - move upwards
 - The angle which an inclined surface makes with the horizontal when a body placed on it is in verge of moving down, is called
 - Angle of repose
 - Angle of friction
 - Angle of inclination
 - None
 - If ϕ = angle of friction and μ = coefficient of friction, then which equation is valid?
 - $\tan \phi = \mu$
 - $\tan \phi = \frac{1}{\mu}$
 - $\sin \phi = \mu$
 - $\cos \phi = \mu$
 - Angle of friction is the angle between
 - The incline and horizontal
 - The normal reaction and frictional force.
 - The weight of the body and the friction force.
 - Normal reaction and the resultant. (04 Marks)
- b. Explain limiting friction, angle of repose and cone of friction. (06 Marks)
- c. A uniform ladder of 4m length rests against a vertical wall with which it makes an angle of 45° as shown in Fig. Q7 (c). The coefficient of friction between the ladder and the floor is 0.5. If the man whose weight is one-half of that of ladder ascends it, how high will he be when the ladder slips? (10 Marks)

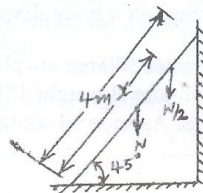


Fig. Q7(c)

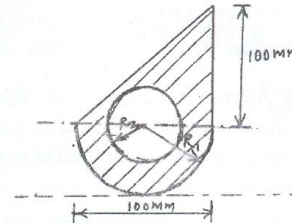


Fig. Q8(c)

- 8 a. Choose your answers for the following :
- The moment of inertia of a body is
 - Moment of its inertia
 - The rotational moment acting on the body
 - The rotational analogue of mass
 - The inertial moment acting on the body
 - The second moment of a plane area about any axis as compared to its second moment about the neutral axis
 - Is always more
 - Is always less
 - Is equal
 - Not equal
 - Moment of inertia of a square of side 'a' about an axis through its centre of gravity is
 - $\frac{a^4}{4}$
 - $\frac{a^4}{8}$
 - $\frac{a^4}{12}$
 - $\frac{a^4}{36}$
 - The value of moment of inertia depends on
 - Type of material
 - Weight of material
 - Density of material
 - Cross-sectional dimensions. (04 Marks)
- b. State and prove parallel axis theorem. (06 Marks)
- c. Determine the second moment of area about horizontal centroidal axis for shaded area shown in Fig. Q8 (c). Also find the radius of gyration about the same axis. Take $R_1 = 50\text{mm}$ and $R_2 = 20\text{mm}$. (10 Marks)

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10EME14/24

First/Second Semester B.E. Degree Examination, June/July 2011
Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer FIVE full questions choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.
 4. Use of steam tables is not permitted.

PART – A

- 1 a. Choose the correct answer:
- The steam heated beyond its dry saturated stage is called _____.
 A) Dry steam B) Wet steam C) Saturated steam D) Super heated steam
 - Sensible heat is also called as _____.
 A) Enthalpy of saturated water B) Enthalpy of evaporation
 C) Enthalpy of dry saturated steam D) Enthalpy of super heated steam.
 - Economiser is a device used to _____.
 A) heat the air fed to the furnace
 B) increase the temperature of steam above the saturation temperature
 C) heat the feed water
 D) separate the water particles present in the steam.
 - Lancashire boiler is of _____.
 A) fire tube type B) stationary type C) horizontal type D) All of these (04 Marks)
- b. With a neat sketch, explain the functioning of Ocean Thermal Energy Conversion (OTEC).
 (06 Marks)
- c. Find the enthalpy of heat in 2 kg of steam at 0.9 bar and 85% quality. Use the properties of steam given below.
 (06 Marks)
- | Saturation pressure (bar) | Saturation temperature (°C) | Specific enthalpy of saturated liquid (kJ/kg) | Specific enthalpy of saturated vapour (kJ/kg) |
|---------------------------|-----------------------------|---|---|
| 0.9 | 96.71 | 405.21 | 2670.9 |
- d. Differentiate between:
- Boiler mountings and accessories
 - Dry saturated steam and super heated steam. (04 Marks)

- 2 a. Choose the correct answer:
- In case of impulse steam turbine there is
 A) pressure drop in fixed and moving blades
 B) pressure drop only in moving blades
 C) pressure drop only in nozzles
 D) pressure drop only is fixed blades
 - Curtis turbine is
 A) reaction steam turbine
 B) pressure velocity compounded steam turbine
 C) pressure compounded impulse steam turbine
 D) velocity compounded impulse steam turbine

- iii) Mechanical efficiency of a gas turbine plant as compared to IC engine is
 A) higher B) lower C) same D) unpredictable.
- iv) Pelton turbine is a
 A) reaction turbine B) gas turbine
 C) tangential flow turbine D) mixed flow turbine (04 Marks)
- b. With a neat sketch, explain the working of a Pelton wheel. (06 Marks)
- c. Explain with a neat sketch, the working of Curtis and Moore impulse turbine. (06 Marks)
- d. What are the advantages of gas turbines over IC engines? (04 Marks)
- 3 a. Choose the correct answer:
- i) The combustion of fuel in petrol engine takes place at
 A) constant pressure B) constant volume
 C) constant temperature D) none of these.
- ii) In a four stroke engine, the number of rotations of the crank shaft to complete a working cycle is
 A) 1 B) 2 C) 3 D) 4
- iii) In CI engine, during the suction stroke _____ is sucked in to the cylinder.
 A) diesel B) diesel and air mixture
 C) diesel and petrol mixture D) air.
- iv) Scavenging is employed in _____.
 A) 4-stroke petrol engine B) 2-stroke petrol engine
 C) 4-stroke diesel engine D) None of these. (04 Marks)
- b. The following observations were recorded during a test on 4-stroke diesel engine:
 Bore = 200mm ; Stroke = 250mm ; Mean effective pressure = 0.6 MPa
 Brake drum diameter = 1.2m; Net brake load = 500N ; Speed of crank shaft = 600 rpm
 Find, i) Indicated power ii) Brake power iii) Friction power iv) Mechanical efficiency. (10 Marks)
- c. Name the thermodynamic cycle of petrol engine. Draw the PV diagram of the same indicating various processes. (06 Marks)
- 4 a. Choose the correct answer:
- i) _____ converts vapour refrigerant into liquid refrigerant.
 A) Compressor B) Evaporator C) Condenser D) Motor.
- ii) Throttle valve is used in a refrigerator to _____.
 A) compress the refrigerant B) expand the refrigerant
 C) absorb the heat from the refrigerant D) condense the refrigerant
- iii) Which of the following is not a desirable property of a refrigerant?
 A) High latent heat of vaporization B) High freezing point
 C) Low viscosity D) Low specific volume
- iv) The purpose of air conditioning is to
 A) control temperature B) control humidity
 C) clean and purify air D) all the above. (04 Marks)
- b. With a neat sketch, explain the working of room air conditioner. (10 Marks)
- c. Explain vapour absorption refrigeration system with a neat sketch. (06 Marks)

PART - B

- 5 a. Choose the correct answer:
- _____ is not a part of carriage assembly.
A) Apron B) Compound slide C) Tool post D) Tail stock
 - _____ is the operation of separating a piece of finished work from the bar stock.
A) Parting B) Facing C) Turning D) Knurling
 - _____ is the process of enlarging the previously drilled hole.
A) Reaming B) Boring C) Tapping D) Spot facing
 - _____ is the process of generating internal threads.
A) Reaming B) Boring C) Tapping D) Drilling. (04 Marks)
- b. Sketch and explain the following operations of a drilling machine:
- Boring ii) Counter sinking iii) Tapping iv) Spot facing (12 Marks)
- c. List the specifications of a lathe. (04 Marks)
- 6 a. Choose the correct answer:
- In _____ process the direction of rotation of cutter and the direction of feed of the workpiece are opposite to each other.
A) Conventional milling B) Down milling
C) Climb milling D) None of these.
 - Milling cutter in horizontal milling machine is held in _____.
A) Over arm B) Column C) Arbor D) Knee
 - _____ is not an abrasive material used in grinding wheels.
A) Emery B) Aluminium oxide C) Corundum D) Graphite
 - In _____ grinding the workpiece is held over a work rest in between two grinding wheels.
A) cylindrical centre B) centreless cylindrical
C) surface grinding D) None of these (04 Marks)
- b. Draw a schematic sketch of horizontal milling machine and briefly explain the functions of its main parts. (10 Marks)
- c. Sketch and explain centreless grinding. (06 Marks)
- 7 a. Choose the correct answer:
- The metal used to make the brush is _____.
A) Mild steel B) Gun metal C) Cast iron D) Copper
 - Wick lubrication works on the principle of _____.
A) gravity flow B) forced flow C) siphon D) free flow
 - Spelter is used in
A) soldering B) brazing
C) resistance welding D) arc welding
 - Graphite is used as
A) filler material B) flux C) spelter D) lubricant. (04 Marks)
- b. What are the differences between soldering and brazing? (05 Marks)
- c. Explain with a neat sketch splash lubrication. Where is it used? (05 Marks)
- d. What are the advantages and disadvantages of sliding contact bearings? (06 Marks)

- 8 a. Choose the correct answer:
- i) _____ belts are acid and water proof.
A) Leather B) Balata C) Textile D) Canvas
 - ii) _____ arrangement enables a machine to be started or stopped at will, without stopping the belt run.
A) Friction cones B) Compound belt drive
C) Fast and loose pulley D) Jockey pulley.
 - iii) In simple gear train, if the number of idler gears is odd, then the direction of rotation of driven gear will
A) be opposite to that of the driving gear
B) depends on the number of teeth on the driving gear
C) depends on the speed of driving gear
D) be same as that of the driving gear.
 - iv) Mitre gear is a type of
A) Spur gear B) Helical gear C) Bevel gear D) Worm gear (04 Marks)
- b. Derive an expression for length of belt in cross belt drive. (08 Marks)
- c. In an open belt drive arrangement, the speed of driver and driven pulley are 1000 rpm and 750 rpm respectively. If the diameter of driver pulley is 600 mm, determine the diameter of driven pulley
- i) without considering the thickness of belt and slip
 - ii) by considering the thickness of belt, assuming the thickness of belt as 10 mm.
 - iii) by considering both thickness of belt and slip, assuming the thickness of belt as 10 mm and overall slip as 5%. (08 Marks)

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10ELN15/25

First / Second Semester B.E. Degree Examination, June/July 2011

Basic Electronics

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART - A

- 1 a. Choose the correct answers for the following :
- Forward voltage across a conducting silicon diode is
 A) 0.3V B) 0.7V C) -0.7V D) -0.3V
 - Zener diode regulates only when it is connected in _____ mode.
 A) forward bias B) reverse bias C) short D) open
 - I_{rms} for half wave rectifier is _____
 A) $\frac{I_m}{2}$ B) $\frac{I_m}{\sqrt{2}}$ C) $\frac{2I_m}{\pi}$ D) $\frac{I_m}{\pi}$
 - Peak inverse voltage for bridge rectifier is
 A) V_m B) $2V_m$ C) $\frac{V_m}{2}$ D) $\frac{V_m}{\sqrt{2}}$ (04 Marks)
- b. Deduce the following for FWR :
- I_{rms} ii) I_{dc} iii) Ripple factor iv) Efficiency of rectification. (08 Marks)
- c. i) Calculate the ripple voltage of a full wave rectifier with a 120 μ f capacitor connected to a load and load current of 60 mA, frequency of 50 Hz.
 ii) If the peak voltage of the rectified wave is 60V, calculate the DC voltage.
 iii) Calculate the ripple factor. (08 Marks)
- 2 a. Choose the correct answers for the following :
- When a transistor is used as a switch, it works in the following region :
 A) active and cut-off B) saturation and cut-off
 C) saturation and active D) none of these
 - If the transistor amplifier has voltage gain of 100, if the input voltage is 15 mV, then the output voltage is
 A) 1.5V B) 15V C) 0.15V D) 1.15V
 - The phase difference between input and output of an emitter follower is
 A) in-phase B) out-of-phase C) 90° D) 45°
 - An amplifier is generally connected in _____ mode.
 A) saturation B) cut-off C) active D) short (04 Marks)
- b. A transistor amplifier connected in CE mode has $\beta = 100$ and $I_B = 50 \mu$ A. Compute the values of I_C , I_E and α . (06 Marks)
- c. Draw a sketch to show the various currents in a NPN transistor and deduce the relationship between various components. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- 3 a. Choose the correct answers for the following :
- Which is the bias technique that is very widely used
A) fixed B) collector C) emitter D) voltage divider
 - Which transistor bias circuit has poor stability because its Q-point varies with β_{dc} ?
A) collector feedback B) base
C) voltage divide D) emitter
 - Emitter follower is a _____.
A) voltage amplifier B) current amplifier
C) attenuator D) none of these
 - Emitter follower has an input of 1 volt, then its output voltage is _____.
A) 0.5V B) 10V C) 1V D) 5V (04 Marks)
- b. Explain the concept of voltage divider bias technique using transistor. (10 Marks)
- c. A collector to base circuit has $V_u = 24V$, $R_B = 180K\Omega$, $R_C = 3.3K\Omega$ and $V_{CE} = 10V$. Calculate h_{FE} , determine V_{CE} when a new transistor is replaced having $h_{FE} = 120$. (06 Marks)
- 4 a. Choose the correct answers for the following :
- The function of gate in SCR is to control the _____.
A) flow of current B) voltage regulation
C) voltage amplification D) none of these
 - η of UJT is known as _____ ratio.
A) ON B) pulse
C) negative D) intrinsic stand-off
 - The minimum point in V-I characteristic of UJT is known as _____ point.
A) negative B) valley C) latching D) firing
 - For a JFET, the value of V_{DS} at which I_D becomes essentially constant is the
A) pinch-off voltage B) cut-off voltage
C) breakdown voltage D) ohmic voltage (04 Marks)
- b. Explain V-I characteristic of SCR. (08 Marks)
- c. Explain working principle of UJT. (08 Marks)

PART - B

- 5 a. Choose the correct answers for the following :
- Cut-off frequencies of an amplifier are also called as
A) half power points B) square points
C) amplified points D) none of these
 - The objective of using a crystal oscillator is to get
A) DC B) 50-70 Hz
C) stable frequency D) variable frequency
 - An oscillator uses
A) negative feedback B) +ve feedback
C) +ve and -ve feedback D) none of these
 - Which of the following oscillators is used to generate high frequencies?
A) RC-phase shift B) wien bride
C) L-C oscillator D) blocking oscillator (04 Marks)
- b. Explain the working of RC coupled amplifier with its frequency response. (08 Marks)
- c. Explain Barkhausen criterion. (02 Marks)
- d. In a Hartley oscillator $L_1 = 20 \mu H$, $L_2 = 2 mH$ and capacitor is variable. Find the range of C if frequency is varied from 1 MHz to 2.5 MHz. (06 Marks)

- 6 a. Choose the correct answers for the following :
- An ideal OP-AMP has

A) infinite input impedance	B) infinite voltage gain
C) zero output resistance	D) all of these
 - The differential amplifier has

A) one input and one output	B) two inputs and two outputs
C) two inputs and one output	D) one input and two outputs
 - An OP-AMP shorted between inverting terminal and output terminal is called

A) adder	B) voltage follower	C) integrator	D) inverter
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 - The voltage gain of an OP-AMP in the open loop condition is of the order of

A) 10^1	B) 10^2	C) 10^4	D) 10^6
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 (04 Marks)
- b. Draw the following circuits using OP-AMP:
- adder
 - voltage follower
 - integrator
 - differentiator
- (08 Marks)
- c. Explain the working of CRT. (08 Marks)
- 7 a. Choose the correct answers for the following :
- The two complement of $(1001)_2$ is _____.

A) 1001	B) 0010	C) 0110	D) 1010
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 - The decimal number 20 in hexadecimal code is

A) 41	B) 14	C) 140	D) 410
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 - The principle used to transmit the signal is

A) modulation	B) de-modulation	C) amplification	D) attenuation
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 - 9's complementation is used for _____.

A) addition	B) subtraction	C) multiplication	D) division
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 (04 Marks)
- b. Explain the working of super heterodyne receiver with a suitable block diagram. (08 Marks)
- c. Perform the following :
- $(101010111100)_2 = (?)_8 = (?)_{16}$
 - $(240)_{10} = (?)_2 = (?)_{BCD}$
 - $(28)_{10} - (19)_{10}$ using 1's and 2's complement method
 - $(1100)_2 + (1111)_2$ and $(123)_8 + (126)_8$ (08 Marks)
- 8 a. Choose the correct answers for the following :
- Simplified form of Boolean expression of $1 + AB$ is

A) 1	B) AB	C) \overline{AB}	D) A + B
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 - Expression for EX-OR gate with inputs 'A' and 'B' is

A) A + B	B) $\overline{A} + \overline{B}A$	C) $AB + \overline{A}\overline{B}$	D) none of these
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 - Simplification of $\overline{A\overline{B}}$ is

A) A + B	B) $\overline{A} + B$	C) A + \overline{B}	D) $\overline{A} + \overline{B}$
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 - Full adder has _____ inputs.

A) 1	B) 2	C) 3	D) 4
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 (04 Marks)
- b. i) Realize $Y = \overline{AB} + A\overline{B}$ by using minimum number of NAND gates.
 ii) Simplify $ABC + A\overline{B}C + A\overline{B}C + \overline{A}BC$ and realize using basic gates. (08 Marks)
- c. State and prove Demorgan's theorem. (04 Marks)
- d. Simplify $\overline{XY} + \overline{XYZ} + X(Y + \overline{XY})$. (04 Marks)

- c. In a series parallel circuit, the two parallel branches A & B are in series with C. The impedances are $Z_A = (10 - j8)\Omega$, $Z_B = (9 - j6)\Omega$ & $Z_C = (3 + j2)\Omega$. The voltage across branch C is 100V. Find the currents I_A & I_B and the phase difference between them.

(08 Marks)

- 3 a. Choose the correct answer:
- When power factor is 0.5, the wattmeter reading is such that
A) $w_1 = w_2$ B) w_1 is +ve, w_2 is -ve C) w_1 is +ve, $w_2 = 0$ D) $w_1 = 2 w_2$.
 - The relation between line and phase quantities in a delta connection is
A) $E_l = \sqrt{3} E_{ph}$, $I_l = I_{ph}$ B) $E_l = E_{ph}$, $I_l = \sqrt{3} I_{ph}$
C) $E_l = \sqrt{3} E_{ph}$, $I_l = \sqrt{3} I_{ph}$ D) $E_l = E_{ph}$, $I_l = I_{ph}$.
 - The angle between line voltage and phase voltage for a balanced star connected circuit is
A) 30° B) $30^\circ \pm \phi$ C) 60° D) 120° .
 - In a 3ϕ system, if the instantaneous value of phase R and Y are +60V and -40V respectively, then instantaneous voltage of phase B is
A) -20 V B) 40 V C) 120 V D) none of the above. (04 Marks)
- b. What are the advantages of 3ϕ AC systems over 1ϕ AC system? (04 Marks)
- c. Show that two wattmeters are sufficient to measure 3ϕ power for balanced 3ϕ power system. (06 Marks)
- d. Three coils each of impedance $20\angle 60^\circ$ are connected in star to a 3ϕ , 400 V, 50 Hz supply. Find the reading on each of the two wattmeters connected to measure the power input. (06 Marks)
- 4 a. Choose the correct answer:
- Under no load condition, the revolution of the disc due to kinetic energy of an energy meter can be blocked by
A) Brake magnet B) Electromagnet
C) Creeping hole with Brake magnet D) Copper shading band.
 - The minimum fusing current of a fuse wire is 2.1 A and fusing factor is 1.1. Then, the rated carrying current of the fuse element is,
A) 2.2 A B) 2.31 A C) 1.909 A D) 0.5238 A.
 - Coke can be used as a sandwich between salt of an earthing system, to
A) by pass the current B) avoid melting of the salt
C) improve conductivity D) to hold moisture content.
 - When the pointer of an indicating instrument comes to rest in the final deflection position, then
A) Only controlling torque acts B) Only deflecting torque acts
C) Both torques act D) None of these. (04 Marks)
- b. With the help of a neat diagram, describe the constructional features and working of a dynamometer type wattmeter. (06 Marks)
- c. With a neat sketch, explain any three types of wiring. (06 Marks)
- d. What are the precautions to be taken to prevent electric shock? (04 Marks)

PART - B

- 5 a. Choose the correct answer:
- The yoke of a DC machine is made of
A) Silicon steel B) Soft iron C) Aluminum D) Cast steel.
 - Carbon brushes are used in a DC machine because
A) Carbon lubricates and polishes the commutator B) Contact resistance is decreased
C) Carbon is cheap D) none of these.
 - The efficiency of a DC generator means its
A) Electrical efficiency B) Overall efficiency
C) Mechanical efficiency D) None of the above.
 - A DC motor is still used in industrial applications because it is
A) Cheap B) Simple in construction
C) Provides fine speed control D) none of these (04 Marks)
- b. Explain with a neat sketch the constructional features of a DC machine and mention the function of each part. (05 Marks)
- c. What is the significance of back emf under no load and full load condition in a DC motor? (04 Marks)
- d. A 4 pole DC shunt motor takes 22A from 220V supply. The armature and field resistances are respectively 0.5Ω and 100Ω respectively. The armature is lap connected with 300 conductors. If the flux per pole is 20 mWb, calculate the speed and gross torque. (07 Marks)
- 6 a. Choose the correct answer:
- A transformer transfers electrical energy from primary to secondary usually with a change in
A) frequency B) power C) voltage D) time period.
 - when the supply frequency of a transformer is doubled then the hysteresis losses
A) remain same B) doubled
C) reduced by 50% D) hysteresis loss equal to eddy current loss.
 - Regulation and efficiency of a transformer should be respectively
A) high, high B) high, low
C) low, high D) low, low
 - The full load copper loss for a transformer is 800 W, then the copper loss at half the full load is
A) 400 W B) 800 W C) 200 W D) 1600 W (04 Marks)
- b. What are the various types of losses and how to overcome these losses in a transformer? (08 Marks)
- c. The max. efficiency at full load and upf of a 1 ϕ , 25 KVA, 500 /1000 V, 50 Hz, transformer is 98%. Determine its efficiency at i) 75% load, 0.9 pf ii) 50% load, 0.8 pf iii) 25% load, 0.6 pf. (08 Marks)

- 7 a. Choose the correct answer:
- The stator of an alternator is identical to that of a
 - DC generator
 - three phase induction motor
 - single phase induction motor
 - none of these.
 - The field winding of an alternator is _____ excited.
 - DC
 - AC
 - Both DC and AC
 - none of these
 - High speed alternators are driven by
 - diesel engine
 - hydraulic turbines
 - steam turbines
 - none of these.
 - The disadvantages of a short pitched coils in an alternator is that
 - harmonics are introduced
 - waveform become non sinusoidal
 - voltage round the coil is reduced
 - none of the above. (04 Marks)
- b. Derive an expression for emf equation of an alternator. What is the necessity of considering pitch factor and distribution factor for emf equation? (08 Marks)
- c. A 12 pole, 500 rpm, Δ connected alternator has 60 slots, with 20 conductors per slot. The flux per pole is 0.02 wb and is distributed sinusoidally. The winding factor is 0.97. Calculate
 i) frequency ii) phase emf iii) line emf. (08 Marks)
- 8 a. Choose the correct answer:
- The difference between synchronous speed and actual speed is 100 rpm and the synchronous speed is 1500 rpm, then the value of slip is
 - 2%
 - 10%
 - 6.66%
 - 15%.
 - External resistance is connected to the rotor of a 3 ϕ phase wound induction motor in order to
 - reduce starting current
 - collector current
 - as a star connected load
 - none of these.
 - When the rotor of a 3 ϕ induction motor is blocked, the slip is
 - zero
 - 0.5
 - 0.1
 - 1.
 - Phase wound induction motors are less extensively used than squirrel cage induction motors because,
 - slip rings are required on the rotor circuit
 - rotor windings are generally star connected
 - they are costly and require greater maintenance
 - none of the above. (04 Marks)
- b. Explain the working principle of a 3 ϕ induction motor and give reasons for "An induction motor can not run at synchronous speed". (06 Marks)
- c. Define slip. Derive an expression for frequency of rotor current. (04 Marks)
- d. An 8 pole alternator runs at 750 rpm, and supplies power to a 6 pole, 3 ϕ induction motor which runs at 970 rpm. What is the slip of the induction motor? (06 Marks)

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Question Paper Version : D

First/Second Semester B.E Degree Examination, June/July 2011
Environmental Studies
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. The radiations absorbed by ozone layer are
a) Infra-red b) Ultra-violet c) Gamma rays d) Visible
 2. Bhopal gas tragedy occurred due to the leakage of
a) Methyl Isocyanate b) Sulphur dioxide c) Mustard gas d) Methane gas
 3. Environmental protection is the responsibility of
a) Government of India b) NGO's
c) Individuals d) All
 4. Which of the following is NGO?
a) Bengaluru Mahanagara Palike b) Narmada Bachao Andolan
c) Karnataka Power Corporation Limited d) None of these
 5. The objectives of the Wild Life (protection) Act 1972 is
a) To preserve the biodiversity
b) To maintain essential ecological and life supporting systems
c) Protection and conservation of wild life
d) All the above
 6. Which of the following is the authority to monitor state industrial effluents?
a) Centre for science and development b) State pollution control board
c) Indian environmental association d) None of these

7. Environmental education is targeted to
 - a) General public
 - b) Professional social groups
 - c) Technicians and scientists
 - d) All of these
8. Trickle irrigation reduces
 - a) Percolation
 - b) Salinization
 - c) Water evaporation
 - d) All of these
9. Hydro electricity is generated from
 - a) Lakes and ponds
 - b) Coal plants
 - c) Water reservoir of river dams
 - d) Forests
10. The pollution caused by transportation depends on
 - a) Type of vehicle's engine
 - b) Age of vehicle
 - c) Traffic congestion
 - d) All of these
11. Which of the following resource is inexhaustible?
 - a) Solar
 - b) Fossil fuel
 - c) Mineral
 - d) Coal
12. Cow dung can be used
 - a) As manure
 - b) For production of biogas
 - c) Both (a) and (b)
 - d) None of these
13. Recycled water can be used for
 - a) Crop irrigation
 - b) Landscape gardening
 - c) Replenishing fast depleting aquifers
 - d) All of these
14. Noise pollution limit in industrial area is
 - a) 95 dB
 - b) 80 dB
 - c) 65 dB
 - d) 100 dB
15. Solar radiations consist of
 - a) Infra-red region
 - b) Visible region
 - c) Both (a) and (b)
 - d) None of these
16. Liquefied petroleum gas is a mixture of
 - a) Methane and ethane
 - b) Propane and butane
 - c) Methane and butane
 - d) Methane and propane
17. Global warming affects
 - a) Food production
 - b) Melting of glaciers
 - c) Climate change
 - d) All of these
18. The science of animal husbandry is called
 - a) Animal science
 - b) Human science
 - c) Soil science
 - d) Plant science
19. Chernobyl nuclear disaster occurred in the year
 - a) 1987
 - b) 1986
 - c) 1982
 - d) 1980
20. Environment Protection Act of 1986 is meant for
 - a) Waste management
 - b) Desert management
 - c) Forest management
 - d) Protection of human environment including human, plants, animals and property
21. The sequence of eating and being eaten in an ecosystem is called
 - a) carbon cycle
 - b) food chain
 - c) sulphur cycle
 - d) hydrological cycle

22. The adverse effect of modern agriculture is
a) water pollution b) soil pollution c) water logging d) All the above.
23. An animal that feeds upon another animal is
a) consumer b) producer c) predator d) decomposer
24. Which part of plant contains nitrogen fixing bacteria?
a) Roots b) Stems c) Leaves d) Flowers
25. Green revolution is
a) Crop variety improvement b) Judicious use of fertilizers
c) Expansion of irrigation d) All the above.
26. The important goal of a EIA is to
a) increase pollution level b) resource conservation
c) stop developmental activities d) deforestation
27. Organic farming is
a) farming without using pesticides and chemical fertilizers
b) enhancing biodiversity
c) Promoting soil biological activity
d) All the above.
28. Percentage of nitrogen in earth's atmosphere is
a) 98% b) 78% c) 21% d) 12%
29. Eutrophication results from
a) industrial effluents b) vehicular exhausts
c) accumulation of plant materials in water bodies d) purified water
30. 'Earth Day' is held every year on
a) June 5th b) April 22nd c) November 23rd d) January 26th
31. Population stabilization is essential for
a) sustainable development b) economic growth
c) agriculture improvement d) industrial development
32. Cholera, Typhoid, Meningitis and Hepatitis are the diseases caused due to
a) electromagnetic radiation b) radioactive rays
c) dirty water d) x-rays
33. Presence of high levels of nitrates in water causes
a) dehydration b) obesity c) Blue-baby-syndrome d) Pneumonia
34. Which of the following is a natural source of environmental pollution?
a) Sewage b) Industries c) Automobiles d) Earthquake
35. The depletion of trees is causing accumulation of
a) NO₂ b) SO₂ c) CO₂ d) O₂
36. _____ is the best environmental clean alternative fuel.
a) Diesel b) CNG c) Coal d) Petrol

37. Direct conversion of solar energy is attained by
a) Solar photovoltaic system b) Galvanic cells
c) Electrolytic cells d) Hydrogen fuel cells
38. Nuclear power plant in Karnataka is located at
a) Bhadravathi b) Sandur c) Kaiga d) Raichur
39. Nuclear fusion reaction occurs in the
a) sun b) stars c) hydrogen bomb d) All of these.
40. Demography is the study of
a) Animal behaviour b) Population growth c) Rivers d) All of these.
41. Smog is a
a) natural phenomenon b) colourless gas
c) combination of smoke and fog d) none of these.
42. Air pollution from automobiles can be controlled by fitting
a) electrostatic precipitator b) wet scrubber
c) catalytic converter d) all the above.
43. 'Minamata' disease is caused by
a) Lead b) Mercury c) Cadmium d) Arsenic
44. The major objective of the family welfare programs in India is
a) disease control b) population growth rate control
c) employment generation d) None of these
45. The protocol that reduces green house gas emissions is
a) Kyoto protocol b) Cartagena protocol c) Montreal protocol d) Vienna protocol
46. Green house effect causes
a) lowering in temperature of earth b) rise in temperature of earth
c) lowering of acid rain d) increase in rainfall.
47. Excess of fluoride in drinking water is likely to cause
a) Hepatitis b) Stomach upset c) Cholera d) Fluorosis
48. Primary cause of acid rain around the world is due to
a) carbon dioxide b) sulphur dioxide c) carbon monoxide d) Ozone
49. Major compounds responsible for the destruction of Ozone layer is
a) oxygen b) CFCs c) CO₂ d) CH₄
50. Which of the following is the remedial measure for acid rain?
a) Reducing the release of oxides of nitrogen and sulphur into the atmosphere
b) Use of coal, free from sulphur
c) Use of electrostatic precipitator and catalytic converters
d) All of these.

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Question Paper Version : C

**I / II Semester B.E Degree, Examination, June/July 2011
CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS
(COMMON TO ALL BRANCHES)**

Time: 2 hrs.]

[Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all FIFTY questions; each question carries ONE Mark.
2. Use only **Black ball point pen** for darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting and using whiteners** on the **OMR** sheet are strictly prohibited.

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1. The Election Commission does not conduct election to the
 - a) Members of State Legislative Assembly
 - b) Members of Parliament
 - c) President
 - d) Speaker of Lok Sabha
 2. What is the system used to elect the President of India?
 - a) Direct Election
 - b) Proportional Representation
 - c) Secret Ballet
 - d) Preferential system
 3. Engineering Ethics is a
 - a) Developing ethics
 - b) Natural ethics
 - c) Scientifically developed ethics
 - d) Preventive ethics
 4. This is not the aim of studying Engineering Ethics
 - a) Analyzing concepts
 - b) Engaging sense of responsibility
 - c) Addressing unclarity
 - d) Procuring faultless results
 5. An engineer may not be held legally liable for causing harm, when the harm is caused.
 - a) Intentionally
 - b) Ignorantly
 - c) Negligently
 - d) Recklessly
 6. This is not impediment to responsibility
 - a) Self - deception
 - b) Self - respect
 - c) Ignorance
 - d) Fear
 7. These are not trade secrets
 - a) Principles
 - b) Patterns
 - c) Formulas
 - d) Devices

8. The use of intellectual property of others without their permission or credit is referred as
a) Trimming b) Cooking c) Forging d) Plagiarism
9. Patent holder does not allow others to use patented information for _____ years from date of filing.
a) 40 b) 30 c) 20 d) 10
10. Which of the following does not depict the attitude towards responsibility?
a) Good works b) Protest c) Reasonable care d) Minimalist
11. Which of the following is not preserved as an intellectual property?
a) Government Regulations b) Copy rights
c) Patents d) Trade secrets
12. The 'Amendment Procedure' to the constitution is borrowed from the constitution of
a) South Africa b) United States c) Australia d) Britain
13. The idea of the Constitution of India was flashed for the first time by
a) Dr. B.R. Ambedkar b) Dr. Rajendra Prasad
c) Mahatma Gandhi d) Jawaharlal Nehru
14. The famous Dandi March done by Mahatma Gandhiji was against
a) British Rule b) Untouchability c) Sati System d) Salt Tax
15. The Indian constitution came into force on
a) 26.11.1949 b) 26.01.1950 c) 15.08.1947 d) 26.12.1950
16. The Preamble of the Constitution of India has been amended so far
a) Four times b) Thrice c) Twice d) Once
17. A state which does not promote or interfere in the affairs of religion is referred to as
a) Socialist b) Democratic c) Secular d) Sovereign
18. Our constitution grants to the citizens _____ fundamental rights
a) Six b) Five c) Ten d) Seven
19. Who are not entitled to form union?
a) Students b) Police c) Teachers d) Entrepreneurs
20. Minority may be
a) Regional or National b) Linguistic or Religious
c) National or Racial d) Racial or Regional
21. Which one is not a fundamental right?
a) Right against exploitation b) Right to freedom of religion
c) Right to strike d) Right to equality
22. The Directive principles of State Policies are
a) Social Rights b) Political Rights
c) Constitutional Rights d) Legal Rights
23. Which part of the constitution aims at establishing a welfare state in the country?
a) Preamble b) Fundamental Rights
c) Fundamental Duties d) Directive Principles of State Policy

24. The Phrase 'Economic Justice' is found in
a) Preamble and Fundamental Rights
b) Preamble and Directive Principles
c) Fundamental Rights and Duties
d) Directive Principles and Fundamental Duties.
25. This is not a fundamental duty
a) To develop scientific temper
b) To protect natural environment
c) Not to indulge in corrupt practice
d) To abide by the constitution
26. To respect the National Flag and National Anthem is a
a) Fundamental duty of every citizen
b) Fundamental right of every citizen
c) Directive principle of the state
d) None of these
27. Fundamental duties under the Indian Constitution are provided by
a) An order of the President
b) An order of the Supreme Court
c) An amendment to the Constitution
d) A legislation by the Parliament
28. Which of the following is not one of the three organs of the Union / State?
a) Executive
b) Press
c) Judiciary
d) Legislative
29. Under the Indian Constitution, the subjects of administration have been divided into
a) Two lists
b) Four lists
c) Five lists
d) Three lists
30. How many Anglo - Indians and other members can be nominated by the President to the Lok Sabha and Rajya Sabha?
a) 2 and 12
b) 2 and 10
c) 1 and 12
d) 1 and 10
31. The minimum gap permissible between the two sessions of the legislature is
a) Three months
b) Six months
c) Two months
d) Six weeks
32. Who is the neutral in the affairs of the party politics?
a) Chief Minister
b) Home Minister
c) Finance Minister
d) Speaker
33. According to the Marriage Act of 1954, the age is fixed at ____ years for men and ____ years for women.
a) 21 and 18
b) 24 and 30
c) 21 and 20
d) 22 and 18
34. Indian Constitution guarantees reservation to SCs and STs in
a) Legislative Assembly only
b) Lok Sabha only
c) Legislative Assembly and Lok Sabha
d) Rajya Sabha only.
35. Jobs are reserved for scheduled castes and scheduled tribes people
a) Both at the time of appointment and promotion
b) On the basis of their annual income
c) At the time of appointment
d) At the time of promotion.
36. Breakdown of constitutional machinery in a State is popularly known as
a) National Emergency
b) President's Rule
c) Financial Emergency
d) All of these

37. The President can proclaim an emergency on the ground of
 a) War
 b) Armed rebellion
 c) External aggression
 d) All of these
38. Which one of the following types of emergency has not yet declared, till now?
 a) State Emergency
 b) National Emergency
 c) Financial Emergency
 d) None of these
39. Regional Election Commissioners may be appointed by the President with the consultation of the
 a) Governor
 b) Prime Minister
 c) Vice President
 d) Election Commission
40. Who will preside over the Joint session of both houses of Parliament?
 a) President
 b) Prime Minister
 c) Speaker
 d) None of these
41. 'Railways' is a subject under _____ list
 a) Union
 b) State
 c) Concurrent
 d) Residuary
42. What is the minimum age in years for becoming the MP at Lok Sabha and Rajya Sabha?
 a) 18 and 25
 b) 25 and 18
 c) 25 and 30
 d) 30 and 25
43. Full form of PIL is
 a) Public Interest Legislation
 b) Private Interest Legislation
 c) Private Interest Litigation
 d) Public Interest Litigation
44. When the office of the President falls vacant, the same must be filled within
 a) Four months
 b) Six months
 c) Twelve months
 d) Eighteen months
45. Who interprets the Indian constitution?
 a) Supreme Court
 b) Parliament
 c) President
 d) Prime Minister
46. Which was the lengthiest Amendment to the constitution?
 a) 46th
 b) 44th
 c) 42nd
 d) 24th
47. Generally the Governor belongs to
 a) Neighbouring State
 b) Same State
 c) Some other State
 d) IAS Officer
48. The emoluments, allowances and privileges of the Governor shall be determined by the
 a) Chief Minister
 b) Prime Minister
 c) President
 d) Parliament
49. 'Bicameral' means
 a) Presence of two Houses in the State
 b) Presence of one House in the State
 c) Presence of half House in the State
 d) Presence of no House in the State
50. What is the effect of the resignation or death of the Chief Minister of the State?
 a) New Chief Minister takes Oath
 b) Mid-term polls
 c) Dissolves the Legislative Assembly
 d) None of these