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

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 :

     i)   If $y = a^{mx}$ then y_n is

       A) $m \log a . a^{mx}$ B) $(m \log a)^n . a^{mx}$ C) $\log a . a^{mx}$ D) $(m \log a)^2 . a^{mx}$

     ii)   The nth derivative of $\sin(ax + b)$ is

       A) $a^n \sin(ax + b + \frac{n\pi}{2})$ B) $a^2 \sin(ax + b + \frac{n\pi}{2})$

       C) $a^n \sin(ax + b + \frac{3\pi}{2})$ D) $a^n \sin(a + bx + \frac{n\pi}{2})$

     iii) If ϕ be the angle between the radius vector and the tangent at any point of the curve $r = f(\theta)$ then,

       A) $\cot \phi = \dfrac{d\theta}{dr}$ B) $\tan \phi = r \dfrac{d\theta}{dr}$ C) $\tan \phi = \dfrac{d\theta}{dr}$ D) None of these.

     iv) The Pedal equation in polar coordinate system is

       A) $|\phi_1 - \phi_2| = -1$ B) $r = (1 - \cos\theta)$ C) $\tan \phi = \dfrac{d\theta}{dr}$ D) $\dfrac{1}{p^2} = \dfrac{1}{r^2} + \dfrac{1}{r^4}\left(\dfrac{dr}{d\theta}\right)^2$

                                                                     (04 Marks)

   b.   Find the nth derivative of $y = e^{ax} \sin(bx + c)$.   **(04 Marks)**

   c.   If $y^{1/m} + y^{-1/m} = 2x$, prove that $(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$ **(06 Marks)**

   d.   Find the angle between the curves $r = \dfrac{a}{1 + \cos\theta}$ and $r = \dfrac{b}{1 - \cos\theta}$.   **(06 Marks)**

2   a.   Select the correct answer :

     i)   If $u = x^y$, then $\dfrac{\partial^2 u}{\partial x \partial y}$ is equal to

       A) $x^{x-1}(y\log x + 1)$ B) $x^{y-1}(y\log x + 1)$ C) $x^{y-1}(x\log x + 1)$ D) $x^{y-1}(y\log x - 1)$

     ii)   If u be a homogeneous function of degree n in a and y then

       A) $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = n$ B) $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = n^2$ C) $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = nu$ D) $x\dfrac{\partial u}{\partial x} - y\dfrac{\partial u}{\partial y} = nu$

     iii) If $u = x^2 + 2xy + y^2 + x + y$ then $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y}$ is equal to

       A) $2u$ B) u C) Zero   D) None of these.

     iv) If $x = r\cos\theta$, $y = r\sin\theta$, then $\dfrac{\partial(x, y)}{\partial(r, \theta)}$ is equal to

       A) 1   B) r   C) 1/r   D) Zero   **(04 Marks)**

   b.   If $u = x^2 \tan^{-1}(y/x) - y^2 \tan^{-1}(x/y)$, show that $\dfrac{\partial^2 u}{\partial x \partial y} = \dfrac{x^2 - y^2}{x^2 + y^2}$ **(04 Marks)**

c. If $u = x^2 - y^2$, $v = 2xy$ and $x = r\cos\theta$, $y = r\sin\theta$, find $\dfrac{\partial(u, v)}{\partial(r, \theta)}$. **(06 Marks)**

d. In estimating the cost of a pile of bricks measured as $2m \times 15m \times 1.2m$, the tape is stretched 1% beyond the standard length. If the count is 450 bricks to 1 cu.m and bricks cost Rs.530 per 1000, find the approximate error in the cost. **(06 Marks)**

3 a. Select the correct answer :

i) $\displaystyle\int_0^{\pi/2} \sin^n x\, dx$ is equal to

A) $\dfrac{n+1}{n} I_{n-2}$ B) $\dfrac{n+1}{n} I_{n+2}$ C) $\dfrac{n-1}{n} I_{n-1}$ D) $\dfrac{n-1}{n} I_{n-2}$

ii) $\displaystyle\int_0^{\pi/2} \sin^4 x \cos^2 x\, dx$ is equal to

A) $\dfrac{1}{16}$ B) $\dfrac{1}{32}$ C) $\dfrac{\pi}{32}$ D) $\dfrac{\pi}{4}$

iii) The curve $y^2(2a - x) = x^3$ is symmetrical about the
   A) y – axis   B) x – axis   C) x and y axis   D) None of these.

iv) The asymptote for the curve $r = a\sin3\theta$ is equal to
   A) $\theta = a$ B) $\theta = 3\theta$ C) $\theta = 0$ D) No asymptotes.
(04 Marks)

b. Using the reduction formula, evaluate $\displaystyle\int \tan^6 x\, dx$. **(04 Marks)**

c. If n is a positive integer, show that $\displaystyle\int_0^{2\pi} x^n \sqrt{2ax - x^2}\, dx = \dfrac{(2n+1)!}{(n+2)!n!} \cdot \dfrac{a^{n+2}}{2^n} \cdot \pi$ **(06 Marks)**

d. Trace the Leminiscate $a^2y^2 = x^2(a^2 - x^2)$ **(06 Marks)**

4 a. Select the correct answer :

i) Area bounded by the curve $r = f(\theta)$ and the radii vectors $\theta = \alpha$, $\theta = \beta$ is

A) $\dfrac{1}{2}\int r^2 d\theta$ B) $\dfrac{1}{2}\int r^3 d\theta$ C) $\dfrac{1}{2}\int_\alpha^\beta r^2 d\theta$ D) $\dfrac{1}{2}\int_\alpha^\beta r^3 d\theta$

ii) The length of the arc of the curve $y = f(x)$ between the points where $x = a$ and $x = b$ is

A) $\displaystyle\int_a^b \left[1 + \left(\dfrac{dy}{dx}\right)^2\right] dx$ B) $\displaystyle\int_a^b \sqrt{1 - \left(\dfrac{dy}{dx}\right)^2}\, dx$ C) $\displaystyle\int_a^b \sqrt{1 + \left(\dfrac{dy}{dx}\right)^2}\, dx$ D) $\displaystyle\int_a^b \sqrt{1 + \left(\dfrac{dy}{dx}\right)}\, dx$

iii) The surface area of the solid generated by the revolution about x-axis of the arc of the curve $y = f(x)$ from $x = a$ to $x = b$ is

A) $\displaystyle\int_{x=a}^{x=b} 2\pi y\, ds$ B) $\displaystyle\int_{x=a}^{x=b} 2\pi y\, dx$ C) $\displaystyle\int_{x=a}^{x=b} 2\pi x\, ds$ D) $\displaystyle\int_{x=a}^{x=b} 2\pi\, ds$

iv) $\dfrac{d}{d\alpha}\left[\displaystyle\int_a^b f(x, \alpha)\, dx\right]$ is equal to

A) $\displaystyle\int_b^a \dfrac{\partial}{\partial\alpha} f(x, \alpha)\, dx$ B) $\displaystyle\int_b^a \dfrac{d}{dx} f(x, \alpha)\, dx$ C) $\displaystyle\int_a^b \dfrac{d}{d\alpha} f(x, \alpha)\, dx$ D) $\displaystyle\int_a^b \dfrac{\partial}{\partial\alpha} f(x, \alpha)\, dx$ **(04 Marks)**

b. Find the entire length of the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$, using the value of $\dfrac{dy}{dx} = \dfrac{y^{1/3}}{x^{1/3}}$.
(04 Marks)

c. Find the volume of the solid generated by the revolution of the cardioid $r = a(1 + \cos\theta)$ about the initial line. (06 Marks)

d. Evaluate $\int_0^1 \dfrac{x^\alpha - 1}{\log x}\,dx$, $\alpha \geq 0$. (06 Marks)

PART – B

5 a. Select the correct answer :

i) The order of the equation $\left[1 + \left(\dfrac{dy}{dx}\right)^2\right]^3 = c^2\left(\dfrac{d^2y}{dx^2}\right)^2$ is

A) 1   B) 2   C) 3   D) None of these.

ii) The standard form of a linear differential equation of the first order is

A) $\dfrac{dy}{dx} + y = P$ B) $\dfrac{dy}{dx} + Py = Q$ C) $\dfrac{dy}{dx} - Py = P$ D) $\dfrac{dy}{dx} + Qy = Q$

iii) What is the value of $\dfrac{\partial M}{\partial y}$, for the differential equation

$(1 + 2xy\cos x^2 - 2xy)dx + (\sin x^2 - x^2)dy = 0$

A) $2x\cos x^2 - 2x$ B) $2y\cos x^2 - 2x$ C) $2x\cos x^2 - 2y$ D) $-2x\cos x^2 - 2x$

iv) The differential equation of the family $y^2 = 4a(x + a)$ is

A) $y^2 = \dfrac{dy}{dx}\left(x + \dfrac{1}{2}y\dfrac{dy}{dx}\right)$ B) $y^2 = y\dfrac{dy}{dx}\left(x + \dfrac{1}{2}y\dfrac{dy}{dx}\right)$

C) $y^2 = 2y\dfrac{dy}{dx}\left(x + \dfrac{1}{2}y\dfrac{dy}{dx}\right)$ D) $y^2 = 2y\dfrac{dy}{dx}\left(x + y\dfrac{dy}{dx}\right)$ (04 Marks)

b. Solve $dy/dx = e^{3x-2y} + x^2 e^{-2y}$ (04 Marks)

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

d. Find the orthogonal trajectories of the family of confocal conics $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2 + \lambda} = 1$, where λ is the parameter. (06 Marks)

6 a. Select the correct answer :

i) The series $\dfrac{1}{1^P} + \dfrac{1}{2^P} + \dfrac{1}{3^P} + \ldots\ldots$ converges if

A) $P > 0$ B) $P < 1$ C) $P > 1$ D) $P \leq 1$.

ii) In a positive term series Σu_n, if $\underset{n \to \infty}{\text{Lim}}\dfrac{u_{n+1}}{u_n} = \lambda$, then the series diverges for

A) $\lambda > 1$ B) $\lambda < 1$ C) $\lambda = 1$ D) $\lambda \leq 1$.

iii) The nth term of the series $\left(\dfrac{2^2}{1^2} - \dfrac{2}{1}\right)^{-1} + \left(\dfrac{3^3}{2^3} - \dfrac{3}{2}\right)^{-2} + \left(\dfrac{4^4}{3^4} + \dfrac{4}{3}\right)^{-3} + \ldots\ldots\ldots \infty$ is

A) $\left[\dfrac{(n+1)^n}{n^{n+1}} - \dfrac{n+1}{n}\right]^{-n}$ B) $\left[\dfrac{(n+1)^{n+1}}{n^{n+1}} + \dfrac{n+1}{n}\right]^{-n}$ C) $\left[\dfrac{(n+1)^{n+1}}{n^{n+1}} - \dfrac{n+1}{n}\right]^{n}$ D) $\left[\dfrac{(n+1)^{n+1}}{n^{n+1}} - \dfrac{n+1}{n}\right]^{-n}$

iv) The series $\dfrac{2}{1^2} - \dfrac{3}{2^2} + \dfrac{4}{3^2} - \dfrac{5}{4^2} + \ldots\ldots\ldots$ is

A) Conditionally convergent   B) Absolutely convergent

C) Divergent   D) None of the above.   (04 Marks)

b. Test the convergence of the series $\dfrac{1}{1.2.3} + \dfrac{3}{2.3.4} + \dfrac{5}{3.4.5} + ... \dfrac{2n-1}{n(n+1)(n+2)} + ... \infty$ (04 Marks)

c. Discuss the nature of the series $\dfrac{1}{2} + \dfrac{2}{3}x + \left(\dfrac{3}{4}\right)^2 x^2 + \left(\dfrac{4}{5}\right)^3 x^3 + ...\infty \ (x > 0)$ (06 Marks)

d. Discuss the absolute convergence and conditional convergence of the series $\dfrac{5}{2} - \dfrac{7}{4} + \dfrac{9}{6} - \dfrac{11}{8} + ...$ (06 Marks)

7 a. Select the correct answer :
i) If l, m, n be the direction cosine of the normal to the plane, then the normal form of the equation of the plane is
A) $ln + my + nz = 0$ B) $ln + my - nz = p$
C) $ln + my + nz = p$ D) None of these.

ii) Symmetrical form of the equations of the straight line through the point $A(x_1, y_1, z_1)$ and having direction cosines l, m, n are
A) $\dfrac{x-x_1}{l} = \dfrac{y-y_1}{m} = \dfrac{z-z_1}{n}$ B) $\dfrac{x+x_1}{l} = \dfrac{y+y_1}{m} = \dfrac{z+z_1}{n}$
C) $\dfrac{x-x_1}{lx} = \dfrac{y-y_1}{my} = \dfrac{z-z_1}{nz}$ D) $lx + my + nz = 0.$

iii) The equation of any plane through the line $\dfrac{x-x_1}{l} = \dfrac{y-y_1}{m} = \dfrac{z-z_1}{n}$ is
A) $a(x-x_1) + b(y-y_1) + c(z-z_1) = 0$ where $al + bm + cn = 0$
B) $a(x+x_1) + b(y+y_1) + c(z+z_1) = 0$ where $al + bm + cn = 0$
C) $(x+x_1) + (y+y_1) + (z+z_1) = 0$ where $al + bm + cn = 0$ D) None of these.

iv) A point on the line $\dfrac{x+1}{2} = \dfrac{y-3}{3} = \dfrac{z}{-1}$ is
A) (1, 6, 1)   B) (-1, 6, -1)   C) (1, -6, 1)   D) (1, 6, -1)   (04 Marks)

b. Find the equation of the plane which passes through the point (3, -3, 1) and is parallel to the plane $2x + 3y + 5z + 6 = 0$ (04 Marks)

c. Show that the lines $\dfrac{x-5}{4} = \dfrac{y-7}{4} = \dfrac{z+3}{-5}$; $\dfrac{x-8}{7} = \dfrac{y-4}{1} = \dfrac{z-5}{3}$ are coplanar. Find their common point and the equation of the plane on which they lie. (06 Marks)

d. Find the magnitude and the equations of the shortest distance between the lines $\dfrac{x}{2} = \dfrac{y}{-3} = \dfrac{z}{1}$ and $\dfrac{x-2}{3} = \dfrac{y-1}{-5} = \dfrac{z+2}{2}$. (06 Marks)

8 a. Select the correct answer :
i) The velocity of the moving particle along the curve $x = t^3 + 1, y = t^2, z = 2t + 3$ is
A) $(t^3 + 1)i + t^2j + (2t + 3)k$ B) $(t^3 + 1)i + 2tj + (2t + 3)k$
C) $3t^2i + t^2j + (2t + 3)k$ D) $3t^2i + 2tj + 2k$

ii) The divergence of a continuously differentiable vector point function F is denoted by divF and is defined by
A) $i\dfrac{\partial F}{\partial x} - j\dfrac{\partial F}{\partial y} + k\dfrac{\partial F}{\partial z}$ B) $i\dfrac{\partial F}{\partial x} + j\dfrac{\partial F}{\partial y} - k\dfrac{\partial F}{\partial z}$ C) $i\dfrac{\partial F}{\partial x} - j\dfrac{\partial F}{\partial y} - k\dfrac{\partial F}{\partial z}$ D) $i\dfrac{\partial F}{\partial x} + j\dfrac{\partial F}{\partial y} + k\dfrac{\partial F}{\partial z}$

iii) div curl F is equal to
A) $i + j + k$ B) 1   C) 0   D) 2.

iv) If $F = x^2 + y^2 + z^2$, then curl grad F is
A) -1 B) 0   C) 1   D) 2. (04 Marks)

b. Find div F, where $F = grad (x^3 + y^3 + z^3 - 3xyz)$ (04 Marks)

c. Prove that curl (grad ϕ) = 0. (06 Marks)

d. Show that $r^\alpha R$ is any irrotational vector for any value of α but is solenoidal if $\alpha + 3 = 0$ where $R = xi + yj + zk$ and r is the magnitude of R. (06 Marks)

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06MAT21

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. Select the correct answer :

i) An expression for the radius of curvature in parametric form is

A) $\rho = \dfrac{(1+y_1^2)^{\frac{3}{2}}}{y_2}$ B) $\rho = \dfrac{(1+y_1)^{\frac{3}{2}}}{y_2^2}$ C) $\rho = \left\{\dfrac{(\dot{x}^2+\dot{y}^2)^{\frac{3}{2}}}{\dot{x}\ddot{y}-\dot{y}\ddot{x}}\right\}$ D) None of these

ii) The curvature of a circle is a
A) constant   B) variable   C) 1   D) 0

iii) If a function f(x) is continuous in [a, b] then $\phi(x) = f(x) - kx$ is also
A) differentiable   B) continuous   C) Both A and B   D) None of these

iv) If $y = \dfrac{x}{\sin x}$, then $\dfrac{dy}{dx}$ at x = 0 is

A) 1   B) 0   C) Both A and B   D) 2   (04 Marks)

b. Find the radius of curvature for the curve $y^2 = \dfrac{4a^2(2a-x)}{x}$, where the curve meets the

x-axis.   (04 Marks)

c. State and prove Cauchy's mean value theorem.   (06 Marks)

d. Obtain the Maclaurin's series expansion of $\log(1 + e^x)$, upto 4th degree terms.   (06 Marks)

2 a. Select the correct answer :

i) The value of $\displaystyle \lim_{x \to 0} \dfrac{\log x}{\operatorname{cosec} x}$ is

A) 0   B) 1   C) –1   D) 2

ii) If f′(a) = 0 and g′(a) = 0, then we have $\displaystyle \lim_{x \to a} \dfrac{f(x)}{g(x)}$ is equal to

A) $\displaystyle \lim_{x \to a} \dfrac{f'(x)}{g'(x)}$ B) $\displaystyle \lim_{x \to a} \dfrac{f''(x)}{g''(x)}$ C) $\displaystyle \lim_{x \to a} \dfrac{f'(x)}{g''(x)}$ D) None of these

iii) The necessary conditions for f(x, y) = 0 to have extremum are
A) $f_{xy} = 0 = f_{yx}$ B) $f_{xx} = 0 = f_{yy}$ C) $f_x = 0 = f_y$ D) None of these

iv) The point (a, b) is called a stationary point and the value f(a, b) is called
A) stationary point   B) stationary value   C) maximum value   D) minimum value
                                                                        (04 Marks)

b. Evaluate : $\displaystyle \lim_{x \to 0} \dfrac{\tan x - x}{x^2 \tan x}$.   (04 Marks)

c. Examine the function $f(x, y) = x^4 + y^4 - 2(x - y)^2$ for extreme values.   (06 Marks)

d. If xyz = 8, find the values of x, y, z for which $u = \dfrac{5xyz}{x + 2y + 4z}$ is a maximum.   (06 Marks)

1 of 4

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 :

    i) The value of $\int_0^1 \int_x^{\sqrt{x}} xy \ dydx$ is

        A) $\dfrac{1}{24}$ B) $\dfrac{1}{48}$ C) $\dfrac{1}{25}$ D) $\dfrac{1}{50}$

    ii) $I = \int_0^1 \int_0^{1-x} dx \ dy$ represents the area of triangle with vertices.

        A) (0, 0) (0, 1) (1, 0)   B) (0, 0) (0, 1)
        C) Both A and B   D) None of these

    iii) The function $\sqrt{n+1}$ is defined for all
        A) Positive integers
        B) Real numbers
        C) Both A and B
        D) Real numbers except for negative fractions

    iv) The value of $\beta\left(\dfrac{1}{2}, \dfrac{1}{2}\right)$ is

        A) 3.1416   B) 1.1416   C) 2.1416   D) None of these
                                                                     (04 Marks)

b. Change the order of integration and hence evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 \ dxdy$.   (04 Marks)

c. Prove that $\beta(m, n) = \dfrac{\sqrt{m} \cdot \sqrt{n}}{\sqrt{m+n}}$.   (06 Marks)

d. Show that $\int_0^1 \dfrac{x^2}{\sqrt{1-x^4}} \times \int_0^1 \dfrac{dx}{\sqrt{1+x^4}} = \dfrac{\pi}{4\sqrt{2}}$.   (06 Marks)

4 a. Select the correct answer :

    i) If $\vec{F} = x^2 i + xyj$, then $\int_C \vec{F} . d\vec{r}$, from (0, 0) to (1, 1) along the line $y = x$ is

        A) $\dfrac{3}{2}$ B) $\dfrac{2}{3}$ C) 2   D) 4

    ii) Green's theorem in the plane is applicable to
        A) xy - plane   B) yz - plane   C) xz - plane   D) All of these

    iii) With usual notations Gauss-divergence theorem state that $\iiint_V div \ \vec{F} \ dv$ is equal to

        A) $\iint_S \vec{F} \cdot \hat{n} \ ds$ B) $\iint_S \vec{F} \times \hat{n} \ ds$ C) $\iint_S \vec{F} \times \hat{n} . ds$ D) None of these

    iv) Cylindrical polar coordinates (ρ, ϕ, z) are given by
        A) $x = \rho \cos\phi \quad y = \rho \sin\phi \quad z = 1$ B) $x = \cos\phi \quad y = \rho \sin\phi \quad z = \rho$
        C) $x = \rho \cos\phi \quad y = \rho \sin\phi \quad z = z$ D) None of these   (04 Marks)

b. Find the total work done by the force represented by $\vec{F} = 3xyi - yj + 2xzk$ in moving a particle around the circle $x^2 + y^2 = 4$.   (04 Marks)

c. State and prove Green's theorem on the plane.   (06 Marks)

d. Express divergence of $\vec{F}$, where $\vec{F} = xi - yj + zk$ in spherical polar coordinates.   (06 Marks)

PART – B

5   a.   Select the correct answer :

   i)   The differential equation $\dfrac{dy}{dx} = y^3$ is

   A) Linear   B) Quasi linear   C) Non-linear   D) None of these

   ii)   The P.I of $y'' + y = \cos x$ is

   A) $\dfrac{1}{2}\sin x$ B) $\dfrac{1}{2}\cos x$ C) $\dfrac{1}{2}x\cos x$ D) $\dfrac{1}{2}x\sin x$

   iii)   The P.I. of $(D^2 + 3D + 2)y = 1 + 3x + x^2$ is

   A) x^2 B) $\dfrac{x^2}{2}$ C) $2x^2$ D) $4x^2$

   iv)   The general solution of an nth order differential equation contains
   A) Atleast 'n' independent constants   B) Atmost 'n' independent constants
   C) Exactly 'n' independent constants   D) Exactly 'n' dependent constants
                                                                                     (04 Marks)

   b.   Solve : $(D^3 - 2D^2 + 4D - 8)y = 0$.   **(04 Marks)**

   c.   Solve : $y'' - 2y' + y = xe^x \sin x$.   **(06 Marks)**

   d.   Solve : $y'' - 4y' + 3y = 20\cos x$,by the method of undetermined coefficients.   **(06 Marks)**

6   a.   Select the correct answer :

   i)   The homogeneous linear differential equation whose auxiliary equation has roots 1, 1, and -2 is
   A) $(D^3 + D^2 + 2D + 2)y = 0$ B) $(D^3 + 3D - 2)y = 0$
   C) $(D^3 - 3D + 2)y = 0$ D) None of these

   ii)   The general solution of $(x^2 D^2 - xD)y = 0$ is
   A) $y = C_1 + C_2 e^x$ B) $y = C_1 + C_2 x$ C) $y = C_1 + C_2 x^2$ D) $y = C_1 x + C_2 x^2$

   iii)   The equation $a_0(ax + b)^2 y'' + a_1(ax + b)y' + a_2 y = \phi(x)$ is
   A) Legendre's linear equation   B) Cauchy's linear equation
   C) Both A and B   D) None of these

   iv)   The differential equation $y'' + 5y' + 6y = 0$, $y(0) = 0$ and $y'(0) = 0$ is an
   A) Initial value problem   B) Boundary value problems
   C) Both A and B   D) All of these   **(04 Marks)**

   b.   Solve by the method of variation of parameters $y'' + a^2 y = \sec ax$.   **(05 Marks)**

   c.   Solve $(x + 1)^2 y'' + (x + 1)y' + y = 4\cos \log(1 + x)$.   **(06 Marks)**

   d.   Solve $y'' + 4y' + 4y = 8x^2$, given $y(0) = 1$ and $y(1) = 1$.   **(05 Marks)**

7   a.   Select the correct answer :

   i) $L\left[\dfrac{\sin t}{t}\right] =$

   A) $\cot^{-1} s$ B) $\dfrac{1}{s^2 + 1}$ C) $\tan^{-1} s$ D) $\cot^{-1}(s - 1)$

   ii) $L[3\sin h\, 2t] =$

   A) $\dfrac{6}{s^2 - 4}$ B) $\dfrac{6}{s^2 + 4}$ C) $\dfrac{36}{s^2 + 4}$ D) None of these

7 a. iii) $L\left[\dfrac{1-e^{-at}}{t}\right] =$

     A) $\log\left(\dfrac{s}{s+a}\right)$
     B) $\log\left(\dfrac{s+a}{s}\right)$
     C) $\log\left(\dfrac{s-a}{s}\right)$
     D) None of these

     iv) If $u(t-a)$ is a unit step function then Laplace transform of $u(t-a)$ is

     A) $\dfrac{e^{as}}{s}$
     B) $\dfrac{e^{-s}}{s}$
     C) $\dfrac{e^{-as}}{s}$
     D) $\dfrac{e^{s}}{s}$ (04 Marks)

b. Prove that $L[t^n] = \dfrac{n!}{s^{n+1}}$.   (04 Marks)

c. If $f(t) = t^2$, $0 < t < 2$, is a periodic function with period 2, then find $L[f(t)]$.   (06 Marks)

d. Find Laplace transform of $f(t) = \begin{cases} \sin t & 0 < t < \frac{\pi}{2} \\ \cos t & t > \frac{\pi}{2} \end{cases}$ using unit step function.   (06 Marks)

8 a. Select the correct answer :

     i) $L^{-1}\left[\dfrac{1}{s^2+5}\right] =$

     A) $\dfrac{\sin\sqrt{t}}{5}$
     B) $\dfrac{\sin\sqrt{5t}}{\sqrt{5}}$
     C) $\dfrac{\sin\sqrt{5}t}{\sqrt{5}}$
     D) $\sin\sqrt{5}.t$

     ii) $L^{-1}\left[\dfrac{s^3+6s^2+12s+8}{s^6}\right] =$

     A) $\dfrac{t^2}{2!}+t^3+\dfrac{t^4}{2!}+\dfrac{t^5}{15}$
     B) $\dfrac{t^2}{2}+t^3+t^4+t^5$

     C) $t^2+t^3+t^4+\dfrac{t^5}{3}$
     D) None of these

     iii) Convolution of $f(t)$ and $g(t)$ is given by $f(t)*g(t)$ is equal to

     A) $\int_0^t f(u)\,g(t-u)\,du$
     B) $\int_0^t f(u)\,g(t+u)\,du$

     C) $\int_0^t f(u)\,du$
     D) $\int_0^t g(u)\,du$

     iv) $L[y''(t)]$ is equal to
     A) $s^2 L[y(t)] - sy(0) - y'(0)$
     B) $s^2 - sy(0) - y'(0)$
     C) $s^2 L[y(t)] - sy'(0) - y(0)$
     D) None of these   (04 Marks)

b. Find : $L^{-1}\left(\dfrac{s+2}{(s+1)^4}\right)$ (04 Marks)

c. Find $L^{-1}\left(\dfrac{1}{s(s^2+a^2)}\right)$, by using convolution theorem.   (06 Marks)

d. Solve by Laplace transform method, given $y'' + k^2 y = 0$ and $y(0) = 2$, $y'(0) = 0$.   (06 Marks)

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USN | | | | | | | | | | 06CHE12/22

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 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 answer   (04 Marks)
    i)   Ignition point of fuel depends on
         A) Hydrogen content   B) Oxygen content
         C) Sulfur content   D) Nitrogen content
    ii) Mention the catalyst and working temperature required for fluidized bed catalytic
         cracking process.
         A) Clays and 350^0C B) Clays and 550^0C
         C) Zeolites and 550^0C D) Zeolites and 350^0C
    iii) Reformation is a process of
         A) Structural rearrangement of hydrocarbon
         B) Breaking of heavier hydrocarbon to lower hydrocarbon
         C) Structural rearrangement without altering the number of carbon atoms
         D) None of these
    iv) Mention the catalyst used to convert carbon monoxide and hydrogen at $180 - 250^0C$
         to form a mixture of aliphatic hydrocarbons
         A) Copper   B) Tin   C) Zinc   D) Iron
    b. Define calorific value of fuel. Explain the determination of calorific value of solid fuel
       sample.   (06 Marks)
    c. Define octane number. Explain the methods of improving octane number.   (05 Marks)
    d. Explain the construction and working of photovoltaic cell.   (05 Marks)

2. a. Choose the correct answer   (04 Marks)
    i)   Galvanic cells can convert
         A) Chemical energy into electrical energy
         B) Electrical energy into chemical energy
         C) Solar energy into chemical energy
         D) None of these
    ii) Electrochemical reactions are spontaneous when change in free energy is
         A) Positive   B) Negative   C) Zero   D) None
    iii) Cell potential of a concentration cell is positive only if
         A) $C_2 < C_1$ B) $C_2 = C_1$ C) $C_2 > C_1$ D) None
    iv) Glass electrode exchanges
         A) Fluoride ions   B) Hydrogen ions
         C) Chloride ions   D) None
    b. Define single electrode potential. Derive Nernst equation for single electrode.
                                                                     (06 Marks)
    c. What are reference electrodes. Explain the construction and working of coloured
       electrode.   (05 Marks)

d. For the cell, Fe/Fc^{2+}(0.015M) || Ag$^+$ (0.13M) / Bg, write the cell reaction and calculate the emf of the cell at STP, if standard electrode potentials of iron and silver are -0.44V and 0.80V respectively. **(05 Marks)**

3. a. Choose the correct answer **(04 Marks)**
   i) Shelf life of a dry cell is limited to 2 years because
      A) Zinc metal always contacts with ammonium hydroxide.
      B) Zinc metal always contacts with ammonium chloride.
      C) Zinc metal always contacts with potassium chloride
      D) None of these.
   ii) Mention the electrolyte used in NiCad battery
      A) Sodium hydroxide   B) Sulfuric acid
      C) Hydrochloric acid   D) Potassium chloride
   iii) Which battery has more power density?
      A) $Zn - MnO_2$ B) $Zn - Ag_2O$ C) $Zn - HgO$ D) $Zn - O_2$
   iv) Which electrolyte is used in hydrogen – oxygen fuel cell
      A) Potassium chloride   B) Potassium nitrate
      C) Potassium hydroxide   D) Potassium sulfate
   b. What are primary batteries? Explain the construction and working of a dry cell.
   (06 Marks)
   c. Explain the construction and working of Lead – Acid battery. **(05 Marks)**
   d. What are fuel cells? Explain the construction and working of hydrogen – oxygen fuel cell. **(05 Marks)**

4. a. Choose the correct answer **(04 Marks)**
   i) Rate of corrosion is more if
      A) Cathodic area is larger than anodic area
      B) Cathodic area is smaller than anodic area
      C) Cathodic and anodic areas are equal
      D) None of these
   ii) Water line corrosion is an example of
      A) Differential metal corrosion   B) Differential aeration corrosion
      C) Stress corrosion   D) None of these
   iii) Caustic embrittlement is a classical example of
      A) Stress corrosion   B) Differential metal corrosion
      C) Differential aeration corrosion D) None of these.
   iv) Galvanising is the process of coating a base metal by :
      A) Tin   B) Copper   C) Zinc   D) Nickel
   b. Define the term corrosion. Explain the electrochemical theory of corrosion with respect to iron. **(06 Marks)**
   c. What is cathodic protection? How a metal is cathodically protected by sacrificial anode method. **(06 Marks)**
   d. Write a note on Galvanisation. **(04 Marks)**

PART – B

5. a, Choose the correct answer   (04 Marks)
    i) Polarization effect will be minimum during metal finishing if
        A) Rate of anode reaction is equal to cathode reaction.
        B) Rate of anode reaction is smaller than that of cathode.
        C) Rate of anode reaction is greater than that of cathode
        D) None of these.
    ii) Which anode is used in chromium electroplating?
        A) Soluble chromium anode   B) Insoluble anodes
        C) Inert anodes   D) None of these
    iii) When the metal structure to be plated is irregular, the process employed is :
        A) Electroplating   B) Electroless plating
        C) Electropolishing   D) None of these
    iv) Reducing agent used in electroless plating of copper is :
        A) Sodium hypophosphite   B) Formaldehyde
        C) Sodium acetate   D) Sodium Succinate
    b. Define the term metal finishing. Mention any four technological importance of metal finishing.   (06 Marks)
    c. Explain the process of electroplating of gold.   (04 Marks)
    d. What is electroless plating? Explain the process of electroless plating of nickel.
                                                                          (06 Marks)

6. a. Choose the correct answer   (04 Marks)
    i) The mesophases which are formed by heating and cooling are called
        A) Lyotropic phases   B) Thermotropic phases
        C) Monotropic phases   D) None of these
    ii) Mention the electrodes used in conductivity cell
        A) Platinum electrode   B) Glass electrode
        C) Both are platinum electrode
        D) Glass electrode and platinum electrode
    iii) In the estimation of FAS by potentiometry, the indicator electrode used is
        A) Calomel electrode   B) Glass electrode
        C) Platinum electrode   D) None of these
    iv) An ion selective electrode used in the determination of pH of a solution is
        A) Calomel electrode   B) Glass electrode
        C) Ag – AgCl electrode   D) None of these
    b. Define thermotrophic and tyotrophic liquid crystal with suitable example. (06 Marks)
    c. What are homologous series? Explain the liquid crystalline behaviour in PAA series.
                                                                          (05 Marks)
    d. Explain the nature of conductometric graph for the following titrations :
        i) Strong acid with strong base   ii) Strong acid with weak base. (05 Marks)

7. a. Choose the correct answer   (04 Marks)
    i) Temporary hardness of water is caused due to the presence of dissolved salts of
        A) Calcium and magnesium carbonates   B) Calcium and magnesium bicarbonates
        C) Calcium and magnesium sulfate   D) Calcium nitrate

ii) The products that are formed under anaerobic oxidation in BOD experiment are
    A) Carbon dioxide and water   B) Ammonia and hydrogen sulfide
    C) Both A and B   D) None of these

iii) Role of oxidizing agent in determination of COD of waste water
    A) It helps to reduce wastes present in water
    B) It helps to oxidize wastes present in water
    C) Both A and B
    D) None of these

iv) Which indicator is used in determination of chloride ions present in water using silver nitrate solution?
    A) Potassium dichromate   B) Potassium nitrate
    C) Potassium sulfate   D) Potassium chromate

b. Explain the determination of total hardness of water sample.   **(06 Marks)**

c. What is meant by desalination? Explain the process of reverse osmosis.   **(05 Marks)**

d. $25cm^3$ of sewage sample for COD is reacted with $10cm^3$ of $K_2Cr_2O_7$ solution and the unreacted $K_2Cr_2O_7$ requires $8.5cm^3$ of 0.025N FAS solution. Under similar conditions, in blank titration $15cm^3$ of same FAS is used up. Calculate the COD of the sample.
   (05 Marks)

8. a. Choose the correct answer   **(04 Marks)**

i) Phenol – formaldehyde resin is commercially called as
    A) PVC   B) Nylon   C) Bakelite   D) Teflon

ii) Hexamethylene diamine and adipic acid gives the following polymer.
    A) Nylon 66   B) PVC   C) Nylon   D) None

iii) Sulfur is used particularly in
    A) Compounding of resins   B) Vulcanization of rubber
    C) Both A and B   D) None of these

iv) Which types of polymer is used in smart window material.
    A) Teflon   B) PVC   C) Polyaniline   D) Buna S

b. Explain the free radical mechanism of addition polymerization.   **(06 Marks)**

c. Explain the preparation and mention the application of the following polymers :
   i) Polymethyl methacrylate   ii) Teflon   **(06 Marks)**

d. Define the term glass transition temperature of a polymer. Mention the factors which affect the same.   **(04 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐ 06PHY12/22

First 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 : $h = 6.625 \times 10^{-34}$ J-Sec, $\epsilon_0 = 8.854 \times 10^{-12}$ Fards/mt, $m_e = 9.1 \times 10^{-31}$ kgs, $N_A = 6.025 \times 10^{26}$/ k – mole, $c = 3 \times 10^8$ mn/Sec, $k = 1.38 \times 10^{-23}$ J/K.*

PART – A

1 a. Choose your answers for the following :
   i) Let n_r and n_b be the number of photons emitted by a red bulb and a blue bulb respectively having equal power. Then
      A) $n_r = n_b$ B) $n_r < n_b$ C) $n_r > n_b$ D)The information is insufficient to get a relation between n_r and n_b.
   ii) An electron, neutron and a proton have the same de – Broglie wavelength which particle has grater velocity.
      A) Proton   B) Neutron   C) Electron   D) All particles have same velocity.
   iii) If a charged particle of mass m is accelerated through a potential difference of V volts, the de – Broglie wavelength is proportional to
      A) V   B) $V^{-1/2}$ C) $V^{1/2}$ D) V^2
   iv) The wavelength of matter waves is independent of
      A) Mass   B) Charge   C) Momentum   D) velocity.   **(04 Marks)**
   b. Give an account of the attempts made through various laws to explain the black body spectrum.   **(06 Marks)**
   c. What is group velocity? Show that group velocity of de – Broglie wave length is equal to velocity of the particle with which the waves are associated.   **(06 Marks)**
   d. Calculate the kinetic energy of an electron whose de – Broglie wavelength is equal to that of a 10 keV photon.   **(04 Marks)**

2 a. Choose your answers for the following :
   i) If the uncertainty in the location of a particles is equal to its de – Broglie wavelength, the uncertainty in its velocity is of the order of
      A) its velocity   B) half its velocity   C) twice its velocity   D) Four times its velocity
   ii) If an electron moves in a 1 – D box of length 2 nm, the normalization constant is
      A) $(1 \text{ nm})^{-1/2}$ B) $(2 \text{ nm})^{-1}$ C) $\sqrt{2}(\text{nm})^{-1}$ D) 0
   iii) A free particle can carry any amount of energy and hence its energy is
      A) Discrete   B) Continuous   C) Degenerate   D) Neither continuous nor discrete.
   iv) The lowest possible energy for a particle in a potential well of infinite height is 2 eV. Its energy in the first excited state is
      A) 4 eV   B) 8 eV   C) 16 eV   D) 21 eV.   **(04 Marks)**
   b. Set up time independent Schrödinger's wave equation for free particle in one – dimensional   **(06 Marks)**
   c. What is the physical significance of the wave function? Also discuss the nature of eigen values and eigen functions.   **(06 Marks)**
   d. The velocity of an electron was measured to be 5×10^5 mts/sec with an uncertainty of 1%. What is the uncertainty involved in the measurement of its position?   **(04 Marks)**

VTU 9 – 15/04

3 a. Choose your answers for the following :

i) The temperature dependence of classical expression for electrical resistivity of metal is

A) $\rho \propto T^2$ B) $\rho \propto \dfrac{1}{T^2}$ C) $\rho \propto T^{1/2}$ D) $\rho \propto \dfrac{1}{T}$

ii) If the Fermi –energy of a metal is 3 eV the Fermi temp of the metal is

A) 3.4×10^4 k   B) 1.6×10^2 k   C) 4.8×10^3 k   D) -10^{-12} k

iii) The quantum mechanical expression for electrical conductivity is

A) $\sigma = \dfrac{ne^2 \lambda_F}{m^* v_F}$ B) $\sigma = \dfrac{m^* v_F}{\lambda_F ne^2}$ C) $\sigma = \dfrac{ne^2 \lambda}{m^*}$ D) $\sigma = \dfrac{m^*}{ne^2 \lambda_F}$

iv) If mobility of electrons in a metal increases, the resistivity
A) Decreases   B) Increases   C) Remains constant   D) None of the above.
(04 Marks)

b. Derive an expression for density of states as per quantum free electron theory.   (08 Marks)
c. Discuss effects of temperature and impurity on electrical resistivity of metals.   (04 Marks)
d. Calculate the Fermi velocity and mean free path for conduction electrons in aluminium given that its Fermi energy is 91.63 eV and relaxation time for electron is 7.3×10^{-15} sec.
(04 Marks)

4 a. Choose your answers for the following :

i) Clausius – Mossotti equation with usual meaning of notations can be written as

A) $\dfrac{\epsilon_r +2}{\epsilon_r -1} = N\alpha_e$ B) $\dfrac{\epsilon_r +1}{\epsilon_r -2} = \dfrac{N\alpha_e}{3\epsilon_0}$

C) $\dfrac{\epsilon_r -1}{\epsilon_r +2} = \dfrac{N\alpha_e}{3\epsilon_0}$ D) $\dfrac{\epsilon_r +2}{\epsilon_r -1} = \dfrac{N\epsilon_0}{3\alpha_e}$.

ii) Insertion of a di – electric material between the plates of a capacitor

A) Increases the capacitance   B) Decreases the capacitance
C) Results no charge in capacitance   D) None of above.

iii) For a given di – electrics the electronic polarizability α_e,

A) increases with temperature
B) decreases with temperature
C) is not affected by temperature change
D) May increase decrease with temperature.

iv) The area of hysteresis loop of a ferromagnetic material gives

A) coercive force   B) Remanent flux density
C) intensity of magnetization   D) hysteresis loss.   (04 Marks)

b. Derive Clacesius – Mossotti equation for a di – electric material.   (06 Marks)
c. Explain magnetic hysteresis on the basis of domain theory.   (05 Marks)
d. Sulphar is elemental solid di electric whose di – electric constant is 3.4. Calculate electronic polarisability if its density is 2.07×10^3 kg /mt^3 and atomic weight is 32.07.   (05 Marks)

PART – B

5 a. Choose your answers for the following :

       i) In spontaneous emission the emitted photon can move
          A) in the direction of field   B) in a straight direction
          C) in any random direction   D) opposite to the direction of field.
      ii) A laser requires mirrors because
          A) they provide optical feed back
          B) they invert the population inversion
          C) they determine the wavelength at which lasing occurs
          D) None of these
     iii) Ratio of probabilities of spontaneous emission and stimulated emission is
          A) Proportional to frequency γ B) Independent of frequency γ
          C) Proportional to γ^2 D) Proportional to γ^3
     iv) The wavelength of He – Ne laser is
          A) 6943 A^0 B) 6328 A^0
          C) 6534 A^0 D) 6845 A^0.   **(04 Marks)**

  b. Explain the following terms
     A) Stimulated emission
     B) population inversion
     C) Spontaneous emission.   **(06 Marks)**
  c. Write a note on measurements of pollutants in the atmosphere using laser.   **(05 Marks)**
  d. A pulsed laser has an average power output of 1.5 mW per pulse and pulse duration is 20 nS. The number of photons emitted per pulse is estimated to be 1.0472×10^8. Find the wavelength of the emitted laser.   **(05 Marks)**

6 a. Choose your answers for the following :

       i) In an optical fibre if n_1 is R. I of the core and n_2 that of cladding, then
          A) $1 - \dfrac{n_2}{n_1} > 1$ B) $1 - \dfrac{n_2}{n_1} = 0$

          C) $1 - \dfrac{n_2}{n_1} < 1$ D) $\dfrac{n_2 - n_1}{n_1} = \infty$

      ii) Which of the following is correct?
          A) cladding is for providing greater mechanical strength
          B) core has higher R,I than cladding
          C) cladding has higher R.I. than the core
          D) None of these.
     iii) The relation between T_c and H_c for a super conductor is
          A) $H_c = H_0 (1 + T^2)$ B) $H_c = T_c^2$

          C) $H_c = H_0 \left[1 - \left(\dfrac{T}{T_c} \right)^2 \right]$ D) $H_c = H_0 \left[1 + \left(\dfrac{T}{T_c} \right)^2 \right]$

     iv) Type – II superconductor has
          A) only one critical magnetic field   B) Two critical magnetic fields
          C) Three critical magnetic fields   D) All above are false.   **(04 Marks)**

  b. What are the different losses in optical fibres? Write a brief note on each.   **(06 Marks)**
  c. The numerical aperture of an optical fibre is 0.2 when surrounded by air. Determine the R. I. of core, given R. I. of cladding 1.59. Also find acceptance angle when the fibre is sunnounded by water.   **(05 Marks)**
  d. Discuss the Maglev vehicles.   **(05 Marks)**

7 a. Choose your answers for the following :

   i) The number of lattice points in a primitive cell are

     A) 1   B) 1/2   C) 2   D) 3/2

   ii) The Miller indices of the plane parallel the x and y axis are

     A) (100)   B) (010)   C) (111)   D) (001)

   iii) The packing factor of the B.C.C structure is

     A) 52%   B) 68%   C) 92%   D) None of the above

   iv) For a cubic system the inter planar spacing for (111) plane is

     A) $\dfrac{a}{\sqrt{2}}$ B) $\dfrac{a}{\sqrt{3}}$ C) $\dfrac{a}{2}$ D) $\dfrac{a}{2\sqrt{2}}$.   (04 Marks)

  b. Define : i) Co-ordination number
          ii) Packing factor. Calculate packing factor for B.C.C structure.   (06 Marks)
  c. Derive Bragg's law for x – ray diffraction.   (04 Marks)
  d. Draw the following plane in a simple cubic crystal
    i) (132)
    ii) (T 10)
    iii) (010).   (06 Marks)

8 a. Choose your answers for the following :

   i) Ultrasonics are

     A) Sound waves of frequencies > 20 Hz
     B) Sound waves of frequency > 20 KHz
     C) Transverse waves
     D) None of the above

   ii) Carbon nonotubes are made up of

     A) Graphite sheet   B) Plastic   C) Glass   D) All above

   iii) Non destructive testing of materials can be carried out by

     A) Ultrasonic method   B) X- ray method   C) Magnetic methods   D) All the above

   iv) The bulk material when reduced in three dimensions is known as

     A) Quantum wire   B) Quantum dot   C) Film   D) None of above.
                                                    (04 Marks)
  b. Give an account of carbon nanotubes.   (06 Marks)
  c. Describe in detail how a flow in solid material is detected by non destructive method using ultrasonics.   (10 Marks)

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USN [ ][ ][ ][ ][ ][ ][ ][ ][ ]   06CCP13/23

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 computer converts data into_____
        A) Information   B) Charts
        C) Software   D) Input/Output
   ii) Which of the following is a soft copy device?
        A) Dot matrix printers   B) Inkjet printers
        C) Laser printers   D) Monitors
   iii) The quality of the monitor does not depend on
        A) Size   B) Resolution
        C) Dot pitch   D) Speed
   iv) The common key board arrangement is called the _____ layout
        A) QWERTY   B) QUWTYR
        C) QYWERT   D) QWERTY   **(04 Marks)**
   b. Explain in brief the types of computers used in an organization.   **(08 Marks)**
   c. What are output devices? What are the various output devices?   **(08 Marks)**

2 a. Choose your answers for the following :
   i)   The process of mapping magnetic disk surface is called _____
        A) Polarizing   B) Charging   C) Formatting   D) Accessing
   ii) The back of a CRT monitor's screen is coated with _____
        A) Phosphors   B) Electrons   C) Elements   D) None of these
   iii) Which of the following is the unit of data?
        A) Tera byte   B) Nibble   C) Bit   D) All of these
   iv) The term dots/inch (dpi) refers to a printers _____
        A) Speed   B) Resolution   C) Output   D) Colours
                                                                   (04 Marks)
   b. Differentiate between :
   i)   Primary memory and secondary memory.
   ii) Floppy disk and hard disk.   **(08 Marks)**
   c. What are the steps to be taken to optimize the computer drive? Explain. **(08 Marks)**

3 a. Choose your answers for the following :
   i) A device that connects two or more LANs is a
      A) HUB   B) SWITCH   C) BRIDGE   D) ROUTER
   ii) A program which is used to access the contents of web and view webpages is
      A) Website   B) Web brouser C) Hot mail   D) None of these
   iii) Which of the following is not an O.S?
      A) Windows   B) Linux   C) Apple   D) Macintosh
   iv) The O.S. is used in _____ systems
      A) Real time   B) Multi user   C) Single user D) All of these
                                                              (04 Marks)
   b. What is an operating system? Mention its functions.   (06 Marks)
   c. What are the various types of network topologies? Explain in brief, with their advantages
      and disadvantages.   (10 Marks)

4 a. Choose your answers for the following :
   i) A digital integer constant can be any combination of digits from
      A) '1' to '10'   B) '0' to '10'   C) '0' to '9'   D) None of these
   ii) Which of the following is not a bitwise operator?
      A) < <   B) | C) &&   D) ∧
   iii) Identify formatted console input function
      A) get char ( ) B) gets ( )   C) scanf ( )   D) fgets ( )
   iv) The valid floating point number is
      A) 10 E 10.5   B) 10,555.55   C) 10.5 e 10.5 D) 10.5 E 10
                                                              (04 Marks)
   b. What is an algorithm? Write an algorithm to find the biggest of three numbers using if-else
      statement.   (05 Marks)
   c. What is a variable? List out the rules to define a variable.   (05 Marks)
   d. What is an operator? Explain the different types of an operator.   (06 Marks)

PART – B

5 a. Choose your answers for the following :
   i) Identify the invalid statement
      A) case 4   B) case 'a'   C) case4   D) case 1
   ii) Identify the conditional branch statement
      A) goto   B) break   C) continue   D) switch
   iii) The break statement is used
      A) to skip the statement   B) in switch statement
      C) in looping statements   D) All of these
   iv) The output of the following program is
      # include <stdio.h>
      void main ( )
      {
         int i = 8 ;
         printf("%d", i>>1) ;
      }
      A) 8   B) 4   C) 16   D) Invalid printf
                                                              (04 Marks)
   b. Explain the various unformatted I/O functions in C.   (08 Marks)
   c. Differentiate between nested if and ladder if statements.   (03 Marks)
   d. Write a program to find the roots of a quadratic equation with switch statement. (05 Marks)

6 a. Choose your answers for the following :
   i)   Identify the correct syntax for 'for' loop
        A) for (Exp1 ; exp2 ; exp3)   B) for (Exp1 : Exp2 : exp3)
        C) for (Exp1 ; exp2 ; exp3) ;   D) for (Exp1 : Exp2 ; exp3)
   ii) The minimum number of times the do-while loop will be executed.
        A) 0   B) 1   C) 2   D) both A and B
   iii) The keyword 'else' can be used with
        A) switch   B) while   C) if   D) for
   iv) What is the output of the following program?
        # include <stdio.h>
        void main ( )
        {
            int i ;
            for (i = 1 ; i < = 4 ; i++)
            printf ("%d", i) ;
        }
        A) 1234   B) 123   C) 234   D) None of these
                                                                        (04 Marks)
   b. Differentiate between while and do-while statement.   **(06 Marks)**
   c. Write a flow chart and C – program to check the given number is prime or not.   **(10 Marks)**

7 a. Choose your answers for the following :
   i)   The array elements are represented by
        A) Index value   B) Subscripted variable
        C) Array name   D) Size of array
   ii) Identify the correct declaration
        A) int a[6] [5] ;   B) int a[5], [5] ;
        C) int a (10) (10) ;   D) int b (10, 10) ;
   iii) Identify the correct array initialization
        A) int a [5] = {10, 20, 15, 30, 40}   B) float a [4] = {10.0, 15.00, 17.6, 6.0}
        C) char s [8] = welcome   D) A and B
   iv) An array subscript may be
        A) Integer constant   B) Integer variable
        C) Integer expression   D) All of these
                                                                        (04 Marks)
   b. What is an array? How you are initializing an array in C?   **(06 Marks)**
   c. Write a 'C' program to find the product of two matrices with suitable messages.   **(10 Marks)**

8 a. Choose your answers for the following :
   i)   Which is the user defined function?
        A) main ( )   B) sqrt ( )   C) clrscr ( )   D) gets ( )
   ii) Identify the statement used to return the control to the calling function
        A) continue   B) break   C) return   D) exit
   iii) A function connot be called as
        A) module   B) procedure   C) subprogram   D) application
   iv) The default return type of function is
        A) float   B) int   C) void   D) None of these
                                                                        (04 Marks)
   b. Differentiate between call be value end call by reference.   **(05 Marks)**
   c. Differentiate global and local variables.   **(04 Marks)**
   d. Write 'C' program to sort the elements by bubble sort technique using functions.   **(07 Marks)**

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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 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.Answers to objective type questions on sheets other than OMR will not be valued.

PART – A

1 a. Select the correct answer :
   i)   The topmost layer of the road over which the traffic moves is
        A) Edging   B) Wearing coat   C) Bern   D) Pavement
   ii) The branch of civil engineering which deals with planning scheduling and execution of project is
        A) Geotechnical Engg.   B) Surveying
        C) Construction Technology and management   D) Structural Engg.
   iii) The bridges of span between 8 m and 30 m are
        A) Minor bridges B) Major bridges   C) Culverts   D) Longspan bridges.
   iv) Bituminous road is also known as
        A) Flexible pavement   B) Rigid pavement
        C) Kankar road   D) Moorum road.   (04 Marks)
   b. What is meant by surveying? Write a brief note on classification based on nature of field survey.   (08 Marks)
   c. Briefly explain the following specialization of civil engineering:
       i) Geotechnical Engineering   ii) Transportation Engineering   (08 Marks)

2 a. Select the correct answer :
   i)   Branch of mechanics which deals with the motion of bodies referring to the forces causing the motion is
        A) Kinetics   B) Kinematics   C) Statics   D) Viscous fluid
   ii) Geometrical representation of moment of a force about a point is given by
        A) Area of triangle   B) Twice the area of triangle
        C) Thrice the area of triangle   D) Twice the area of rectangle
   iii) A single force which can nullify the effect of system of forces is
        A) Resultant   B) Couple   C) Equilibrant   D) Moment
   iv) If a given force system can be replaced by another system with exactly same net effect as given system, the two systems are said to be
        A) Equivalent   B) Concurrent   C) Unequivalent D) Continuous   (04 Marks)
   b. Resolve 400 N force acting on a block as shown in Fig.Q2(b) into two components as given below.   a) Horizontal and vertical components.   b) Along the inclined plane and at right angles to the plane.   (08 Marks)
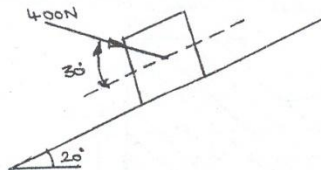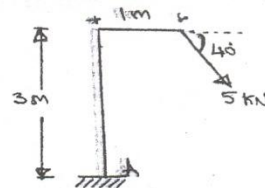

Fig.Q2(b)   Fig.Q2(c)

   c. Determine the moment of force about "A" shown in Fig.Q2(c).
   d. Explain the principle of transmissibility of force.   (04 Marks)

3 a. Select the correct answer :

    i) Maximum and minimum resultant of two concurrent forces 20 kN and 12 kN are
       A) 40 & 24 kN   B) 32 & 8 kN   C) 10 & 6 kN   D) None of these.

    ii) A couple consists of
       A) two equal parallel and opposite forces separated by a distance
       B) two equal and like parallel forces
       C) two unequal and like parallel forces
       D) None of these.

    iii) Resultant of two unlike parallel forces 10 kN and 15 kN is
       A) 25 kN   B) 5 kN   C) 150 kN   D) None of these

    iv) Varignon's theorem is applicable to
       A) only coplanar force system   B) only concurrent force system
       C) only nonconcurrent force system D) coplanar, concurrent and nonconcurrent systems

                                                           (04 Marks)

  b. A dam section is shown in Fig.Q3(b). Determine the magnitude, direction and position of resultant with respect to 'O'.   (08 Marks)
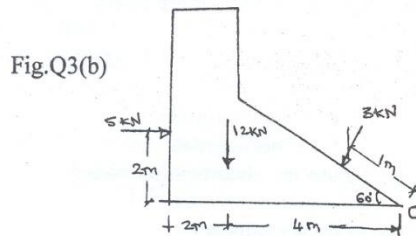
Fig.Q3(b)
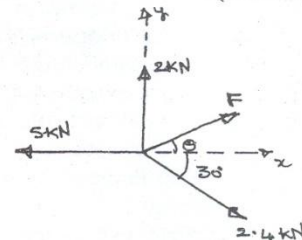
Fig.Q3(c)

  c. 2 kN force is the resultant of system of forces acting up along y-axis as shown in Fig.Q3(c). Determine the value of F and θ.   (08 Marks)

4 a. Select the correct answer :

    i) Centroid of a lamina must be
       A) within lamina   B) Outside the lamina
       C) Not necessarily with in lamina   D) None of these.

    ii) Centroid of a sector hich is symmetrical about horizontal axis is given by
       A) $\dfrac{2R}{3\alpha}\sin\alpha$ B) $\dfrac{4R}{3\alpha}\sin\alpha$ C) $\dfrac{2R}{3\alpha}\cos\alpha$ D) $\dfrac{2R}{4\alpha}\sin\alpha$

    iii) The centroid of lamina is determined by the principle of
       A) Lami's theorem   B) Varignon's theorem
       C) Triangle law of forces   D) None of these.

    iv) One of the coordinates of centroid of a lamina symmetrical about vertical axis with a width of 200mm and depth 150mm is
       A) 100 mm   B) 75 mm   C) 200 mm   D) 150 mm   (04 Marks)

  b. Determine the centre of gravity of the lamina shown in Fig.Q4(b) with respect to O.

Fig.Q4(b)
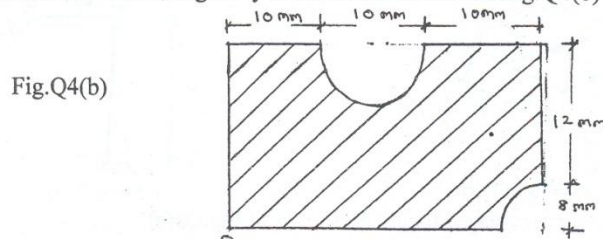
                                                             (12 Marks)

  c. Locate the centroid of right angled triangle from first principles.   (04 Marks)

PART – B

5 a. Select the correct answer :
    i) Lami's theorem is applicable for
        A) coplanar concurrent forces   B) Non coplanar concurrent forces
        C) coplanar nonconcurrent forces   D) Parallel forces.
    ii) Forces in equilibrium produce
        A) Maximum resultant   B) Maximum moment
        C) Zero resultant   D) Maximum torque
    iii) A body lies in equilibrium under the action of three forces when
        A) Resultant of any two forces is equal, opposite and colinear with third force
        B) Resultant of any two forces is equal, parallel and colinear with third force
        C) Resultant of any two forces is unequal, opposite and colinear with third force
        D) All three forces are like parallel forces.
    iv) The reaction at the surface of contact of a sphere is
        A) parallel to the surface of contact   B) normal to the surface of contact
        C) inclined to the surface of contact   D) None of these.   **(04 Marks)**

  b. Determine the forces in the wires shown in Fig.Q5(b).   **(10 Marks)**
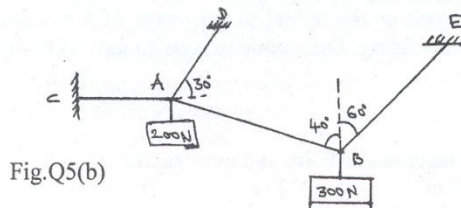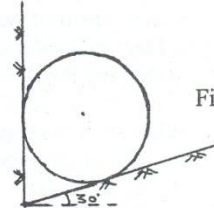

Fig.Q5(b)

Fig.Q5(c)

  c. A sphere of weight 300 N rests on an incline as shown in Fig.Q5(c). Determine the surface reactions.   **(06 Marks)**

6 a. Select the correct answer :
    i) A beam supported by roller and hinge supports subjected to only vertical loads has
        A) Vertical and horizontal reactions   B) Two vertical reaction
        C) Two horizontal reactions   D) One vertical and a moment.
    ii) A determinate beam can be analyzed by applying maximum
        A) two conditions of equilibrium   B) three conditions of equilibrium
        C) four conditions of equilibrium   D) one vertical and a moment.
    iii) Water in a tank is an example of
        A) point load   B) Udl   C) UVL   D) None.
    iv) A cantilever beam is one
        A) whose ends are fixed
        B) whose both ends are simply supported
        C) whose one end is fixed and the other simply supported
        D) whose one end is fixed and the other end free.   **(04 Marks)**

  b. What is the difference between determinate and indeterminate beams?   **(04 Marks)**
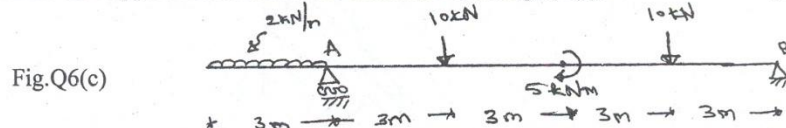 c. Determine the support reactions for the beam shown in Fig.Q6(c).   **(06 Marks)**

Fig.Q6(c)

  d. Two men A & B carry a stone block weighing 2 kN, suspending the stone block on a horizontal beam and carrying it on their shoulders at each end. The beam is 2 m long and is of weight 580 N/m. A can carry maximum weight of 1.2 kN and B can carry a weight of 0.9 kN. Determine the distance at which the stone block is suspended from the end carried by A.   **(06 Marks)**

3 of 4

7 a. Select the correct answer :
   i) The force of friction is independent of
     A) force applied on body   B) weight of body
     C) velocity of sliding   D) None of these.
   ii) The body remains at rest as along as the frictional force is
     A) Equal to the force applied   B) Greater than the force applied
     C) Less than the force applied   D) None of these.
   iii) Solid friction is the friction between two surfaces
     A) when no lubrication is used   B) when lubrication is used
     C) when surfaces are heated   D) None of these.
   iv) Ratio of limiting force of friction to the normal reaction is
     A) Angle of friction   B) Coefficient of friction
     C) Angle of repose   D) None of these.   **(04 Marks)**

  b. What is meant by 'angle of repose'? Show that angle of repose is equal to angle of friction.
                                                     (08 Marks)

  c. A uniform ladder of weight 850 N and of length 6 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 65°. When a man of weight 700 N stands on the ladder at a distance of 4 m from the top of the ladder, the ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor.   **(08 Marks)**

8 a. Select the correct answer :
   i) M.I. of an annular area with outer radius 0.8m and inner radius 0.5m is
     A) $0.2726 \, m^4$ B) $0.3726 \, m^4$ C) $1.222 \, m^4$ D) None of these
   ii) The distance at which an area can be imagined to be placed and squeezed, so that there is no change in moment of inertia is known as
     A) Radius of gyration   B) Polar moment of inertia
     C) Moment of area   D) Second moment of area
   iii) Moment of inertia is
     A) Resistance to change in rotational motion
     B) Acceptance to change in rotational motion
     C) Resistance to deformation
     D) None of the above.
   iv) M.I. of a rectangle about the base is
     A) $\dfrac{bd^3}{6}$ B) $\dfrac{bd^3}{3}$ C) $\dfrac{bd^3}{12}$ D) $\dfrac{db^3}{12}$ **(04 Marks)**

  b. State and prove parallel axis theorem.   **(06 Marks)**
  c. Determine M.I. about horizontal centroidal axis for the shaded area shown in Fig.Q8(c). Also find radius of gyration about the same axis.   **(10 Marks)**
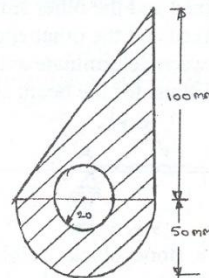
Fig.Q8(c)
* * * * *

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

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 answer   (04 Marks)
    i)   Energy derived from the fuels existing in the Earth is _____
         A) Capital Energy   B) Stored Energy
         C) Celestial Energy   D) Transitional Energy
    ii) A measure of Quality of wet steam _____
         A) Quality of steam   B) Dryness fraction
         C) Wetness fraction   D) All the above
    iii) Example of a Fire tube Boiler is _____
         A) La – Mount Boiler   B) Babcock and Wilcox Boiler
         C) Locomotive Boiler   D) Stirling Boiler
    iv) Safety valves are used in Boiler for _____
         A) Safety   B) Operation
         C) To increase η   D) None of these
    b. Enumerate the merits and demerits of conventional and non – conventional energies.
                                                                     (06 Marks)
    c. Explain with a neat sketch the working principle of a Lancashire Boiler.   (10 Marks)

2. a. Choose the correct answer   (04 Marks)
    i)   Panson's turbine is an example of _____
         A) Impulse turbine   B) Gas turbine
         C) Reaction turbine   D) None of these
    ii) Francis turbine is _____ reaction turbine
         A) Axial flow   B) Mixed flow
         C) Tangential flow   D) Inward flow
    iii) Super charging is supplying additional _____ to the engine cylinder to achieve more η
         A) Fuel   B) Coal
         C) Air   D) Water
    iv) Hydro power is the energy of _____
         A) Air   B) Water
         C) Fuel   D) Wind
    b. Explain with a neat sketch the working principle of constant pressure closed cycle gas
        turbine.   (06 Marks)
    c. Differentiate between i) Impulse and Reaction turbine   ii) Francis turbine and
        Kaplan turbine.   (10 Marks)

3. a. Choose the correct answer   (04 Marks)
    i) The number of revolutions of crank per cycle for 4 – stroke engine are _____
        A) 1   B) 2   C) 3   D) 4
    ii) Compression ratio of a petrol engine varies from _____
        A) 12 : 1 to 22 : 1   B) 4 : 1 to 10 : 1
        C) 1 : 4 to 1 : 10   D) 1 : 12 to 1 : 22
    iii) Indicated power is given by _____
        A) IP = BP - FP   B) IP = BP/FP
        C) IP = BP + FP   D) All the above
    iv) The power developed at the output end of the engine shaft is called _____
        A) BP   B) IP   C) FP   D) None of these
    b. Explain the working principle of 4 – stroke diesel engine with PV diagram. (10 Marks)
    c. A single cylinder four stroke engine runs at 1000 rpm and has a bore of 115mm and
        has a stroke of 140mm. The brake load is 60N at 600mm radius and the mechanical
        efficiency is 80%. Calculate brake power and mean effective pressure.   (06 Marks)

4. a. Choose the correct answer   (04 Marks)
    i) The working fluid used in refrigerators is _____
        A) Freon - 12   B) Freon - 13
        C) Freon - 22   D) All the above
    ii) The measure of effectiveness of a refrigeration system is _____
        A) COP   B) Mechanical η
        C) Thermal η D) Overall η
    iii) One ton of refrigeration means _____
        A) 35 kW   B) 350 kW   C) 3.5 kW   D) 3500 kW
    iv) _____ is used to control the rate of admission of refrigerant to the evaporator.
        A) Condenser   B) Compressor
        C) Absorber   D) Throttle valve.
    b. With a neat sketch, explain the construction and working principle of a vapour
        compression refrigeration unit.   (10 Marks)
    c. Explain the principle of Air conditioner, also list the applications of Air conditioner.
                                                                             (06 Marks)

PART - B

5. a. Choose the correct answer   (04 Marks)
    i) The operation to produce a conical surface called taper is _____
        A) Cylindrical turning   B) Facing
        C) Taper turning   D) Knurling
    ii) A Lathe is specified by _____
        A) Height of Lathe centre from Bed   B) Maximum swing over Bed
        C) Distance between centres   D) All the above
    iii) The portion of the drill which is held in the machine to drive the drill is _____
        A) Body   B) Shank
        C) Point   D) Land
    iv) _____ is the process of generating internal threads.
        A) Tapping   B) Turning
        C) Milling   D) Knurling
    b. Explain with a neat sketch the principle of operation of taper turning by tail stock set
        over method.   (10 Marks)
    c. With a neat sketch explain Radial Drilling Machine.   (06 Marks)

6. a. Choose the correct answer (04 Marks)
    i) The Milling operation in which the cutter rotation is in the same direction of the feed of workpiece is called _____
        A) Down Milling   B) UP Milling
        C) Face Milling   D) None of these
    ii) The process of Machining several surfaces of a workpiece simultaneously at one pass is called _____
        A) Form Milling   B) Angular Milling
        C) Gang Milling   D) Straddle Milling
    iii) _____ is the surface finishing operation.
        A) Lapping   B) Precession Grinding
        C) Rough grinding   D) All the above
    iv) Grinding is also called _____
        A) Abrasive Machining B) Twisting
        C) Lapping   D) Honing
    b. Explain with a neat sketch knee and column type vertical milling machine. (08 Marks)
    c. Explain with a neat sketch cylindrical grinding machine. (08 Marks)

7. a. Choose the correct answer (04 Marks)
    i) _____ Promotes the fusing of metals and provides a protective layer to the weld from atmospheric contammations
        A) Electrodes (bare) B) Flux
        C) Electric arc   D) Iron
    ii) Lead and Tin are present in
        A) Hard solder   B) Soft solder   C) Spelter   D) Flux
    iii) _____ is an example of semi liquid lubricant
        A) Vegetable oil B) Animal oil   C) Mineral oil D) Grease
    iv) Bearing supporting a vertical shaft is _____
        A) Collor Bearing   B) Pivot Bearing
        C) Ball Bearing   D) Roller Bearing
    b. Write the differences between welding and Brazing. (06 Marks)
    c. List the properties of lubricants and give the requirements of a good lubricant. (10 Marks)

8. a. Choose the correct answer (04 Marks)
    i) Jockey Pulley is used to _____
        A) Change the direction   B) To increase the angle of contact
        C) To change the speed   D) None of these
    ii) _____ gears are used to connect shaft whose axes are perpendicular to each other.
        A) Bevel gear   B) Spur gear
        C) Helical gear   D) Worm gear
    iii) The index of the tooth size is _____
        A) Pitch circle diameter   B) Circular pitch
        C) Module   D) Face width
    iv) _____ gear is used to convert rotory motion into linear motion.
        A) Helical gear   B) Rack and Pinion gear
        C) Spur gear   D) Bevel gear
    b. Explain the following i) Slip ii) Creep iii) Fast and loose pulley. (06 Marks)
    c. Explain with a neat sketch i) Simple gear train and ii) Compound gear train. (10 Marks)

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

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.Answers to objective type questions on sheets other than OMR will not be valued.

PART – A

1 a. Select the correct answer :
   i) An excessively high reverse voltage applied to a junction diode will cause an effect known as:
      A) punch through   B) saturation   C) diffusion   D) avalanche break down
   ii) Forward biasing a P-N junction
      A) increases its resistance   B) decreases its resistance
      C) shorts the junction   D) increases the potential barrier height
   iii) When a diode is heavily doped,
      A) the zener voltage will be low   B) the avalanche voltage will be high
      C) the depletion region will be thin   D) the leakage current will be low.
   iv) Leakage current of a junction diode
      A) is due to majority carriers   B) decreases with temperature
      C) is in mA or μA range   D) depends on the method of its fabrication.
                                                         (04 Marks)

   b. What is a P-N junction? Discuss its behaviour under i) No bias; ii) Forward bias; iii) Reverse bias.   **(10 Marks)**

   c. For a bridge rectifier circuit, derive the expression for i) Average value, ii) Rectifier efficiency.   **(06 Marks)**

2 a. Select the correct answer :
   i) The efficiency of half wave rectifier is
      A) 40.6%   B) 0.46%   C) 1.21%   D) 81.2%
   ii) A zener diode
      A) is always forward biased   B) is connected in series
      C) has a sharp breakdown at low reverse voltage   D) has a negative resistance.
   iii) A filter circuit is used to remove the
      A) AC voltage   B) DC voltage   C) Both A and B   D) None of these.
   iv) If, by mistake, AC source in a bridge rectifier is connected across the dc terminals, it will burn out and hence short _____ diodes.
      A) one   B) two   C) three   D) four   **(04 Marks)**

   b. In a full wave bridge rectifier, the transformer secondary voltage is 100 sin ωt. The forward resistance of each diode is 25Ω and the load resistance is 950Ω. Calculate
      i) DC output voltage   ii) ripple factor   iii) efficiency of rectification   iv) PIV across non-conducting diode.   **(09 Marks)**

   c. Sketch typical transistor common-base current gain characteristics. Explain the shape of the characteristics.   **(07 Marks)**

3   a. Select the correct answer :
    i) The biasing circuit, which gives most stable operating point is
      A) Base bias   B) Collector to base bias C) Voltage divider bias D) None of these
    ii) The arrow on the emitter of a transistor indicates
      A) the direction of electron flow   B) the positive voltage point
      C) the direction of positive current flow D) the ground connections.
    iii) The common emitter transistor circuit configuration is most often used because of its higher
      A) power gain   B) frequency
      C) output impedance   D) voltage gain.
    iv) In a transistor with normal bias, the emitter junction
      A) is reversed biased   B) has a high resistance
      C) has a low resistance   D) emits carriers in base which are in majority there
                                          (04 Marks)

   b. Define 'α' and 'β' of a transistor. Show that $\beta = \dfrac{\alpha}{(1-\alpha)}$.   (04 Marks)

   c. Discuss the causes of unstability in a transistor.   (06 Marks)

   d. In the circuit shown in Fig.Q3(d), a NPN Transistor with $\beta = 100$ is used. Find I_C and V_{CE}. Draw the DC load line output characteristics and indicate the Q point. Take $V_{BE} = 0.7$ Volts.
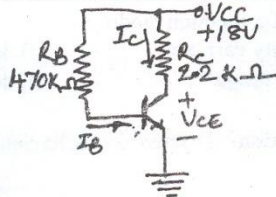
Fig.Q3(d)   (06 Marks)

4   a. Select the correct answer :
    i) A JFET behaves like a
      A) Resistor   B) Constant current
      C) Constant voltage source   D) All the above in different regions.
    ii) When JFET is operated above pinch off voltage, its drain current
      A) increases sharply   B) becomes constant
      C) starts decreasing   D) becomes zero.
    iii) The output of a UJT can be taken from its
      A) base 1   B) base 2   C) emitter   D) any one of three terminals
    iv) When a UJT is turned ON, the resistance between emitter terminal and base 1 is
      A) increased   B) decreased   C) zero   D) infinite   (04 Marks)

   b. Sketch the voltampere characteristic of a typical silicon-controlled rectifier. Explain the behavior of the SCR reference to its V-I characteristic.   (08 Marks)

   c. Draw the output characteristics of a P-channel JFET with external bias. Indicate various regions of operation and explain the shapes of the curves qualitatively.   (08 Marks)

2 of 4

PART – B

5 a. Select the correct answer :
   i) As compared to the resistance of the source, the input impedance of a good voltage amplifier should be
      A) high   B) low   C) equal   D) twice.
   ii) Coupling capacitors mainly affect
      A) upper cut-off frequency   B) lower cut-off frequency
      C) with upper and lower cutoff frequency D) gain in high frequency range.
   iii) The voltage gain of a common-base amplifier depends upon
      A) load resistor RL   B) Input resistance of transistor
      C) ac alpha   D) All the above.
   iv) In a common base amplifier, a smaller load resistance will produce:
      A) high voltage gain   B) high current gain
      C) low power gain   D) all the above.   (04 Marks)

   b. What is an oscillator? Write the circuit of a phase-shift oscillator and describe its operation given the expression for its frequency of oscillation.   (09 Marks)

   c. Sketch a typical frequency response graph for an RC coupled amplifier. Briefly explain the salient points on it.   (07 Marks)

6 a. Select the correct answer :
   i) An advantage of an inverting amplifier is its ability to handle _____ input at a time.
      A) more than one   B) less than one   C) equal to one   D) None of these.
   ii) Op-amp is a direct coupled multistage
      A) voltage amplifier   B) current amplifier
      C) voltage-current amplifier   D) power amplifier
   iii) The common-mode rejection ratio of an ideal op-amp is
      A) zero   B) low   C) high   D) infinite.
   iv) _____ converts physical quantity to electrical signal.
      A) Receiver   B) Transducer   C) Modulator   D) Transmitter.   (04 Marks)

   b. Derive an expression for output voltage of an op-amp
      i) Inverting amplifier   ii) Adder   iii) Integrator.   (10 Marks)

   c. What do you mean by the term modulation? Why is it required in communication system?
                                                                          (06 Marks)

7 a. Select the correct answer :
   i) Radio communication is the process of sending information in the form of
      A) mechanical signal   B) electrical signal
      C) electro-mechanical signal   D) all of these.
   ii) $(762)_8 = (?)_{10}$
      A) $(468)_{10}$ B) $(248)_{10}$ C) $(128)_{10}$ D) $(498)_{10}$
   iii) $(0.125)_{10} = (?)_2$
      A) $(0.001)_2$ B) $(0.010)_2$ C) $(0.100)_2$ D) $(0.110)_2$
   iv) Computer system only support numbers for the
      A) binary data B) decimal number C) hexadecimal number D) octal number
                                                                          (04 Marks)

b. Convert : i) $(434.514)_8 = (\;?\;)_{10} = (\;?\;)_{16}$
         ii) $(44030)_{10} = (\;?\;)_2 = (\;?\;)_{16}$
         iii) To subtract $(101011)_2$ from $(100110)_2$ using 2's complement.   **(09 Marks)**

c. A 500 W, 1 MHz carrier is amplitude modulated with a sinusoidal signal of 1 kHz. The depth of modulation is 60%. Calculate the band width power in the side bands and the total power transmitted.   **(04 Marks)**

d. Write the symbol, truth table and output expression for EX-OR gate.   **(03 Marks)**

8 a. Select the correct answer :
     i) In a half adder when both the inputs A and B are high then
        A) SUM = 1 and carry = 0   B) SUM = 0 and carry = 0
        C) SUM = 0 and carry = 1   D) All of these.

     ii) NAND gate is a combination of _____ gate.
        A) OR and NOR   B) NOT and NAND
        C) NOT and AND   D) None of these.

     iii) Demorgan theorem states that $\overline{A + B} =$ _____
        A) $\overline{A} + \overline{B}$ B) $\overline{A} \cdot \overline{B}$ C) $\overline{AB}$ D) None of these.

     iv) $A + \overline{A} =$ _____
        A) 0   B) 1   C) A   D) None of these.   **(04 Marks)**

b. Simplify and realize the expression $(A + \overline{B} + C)(\overline{A} + B + C)(\overline{A} + B)$ using only NAND gates.   **(06 Marks)**

c. Draw the circuit of a TWO input transistor logic NAND gate. Explain its operation.   **(07 Marks)**

d. Draw the logic circuit of Full adder.   **(03 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐ 06ELE15/25

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

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)   Electrical appliances are connected in parallel because it
        A) is a simple circuit
        B) draws less current
        C) results in reduced power loss
        D) makes the operation of appliances independent of each other
   ii) Two electric bulbs rated for the same voltage have powers of 200 W and 100 W. If their resistances are respectively R_1 and R_2, them,
        A) $R_1 = 2R_2$ B) $R_2 = 2R_1$ C) $R_2 = 4R_1$ D) $R_1 = 4R_2$
   iii) The main advantage of temporary magnets is that we can
        A) Change the magnetic flux   B) Use any magnetic material
        C) Decrease the hysteresis loss   D) None of these
   iv) Mutual inductance between two coils is 4H. If the current in one coil changes at the rate of 2A/sec, then emf induced in the other coil is
        A) 8V   B) 2V   C) 0.5V   D) 0V   (04 Marks)
   b. State and explain Kirchoff's laws with electric circuits.   (06 Marks)
   c. Two resistors $R_1 = 2500\ \Omega$ and $R_2 = 4000\ \Omega$ are joined in series and connected to 100 V supply. The voltage drop across R_1 and R_2 are measured successively by a voltmeter having a resistance of 50,000 Ω. Find the sum of the two readings.   (05 Marks)
   d. An air cored solenoid of 500 turns has a mean length of 50 cm and diameter of 2cm. Determine the energy stored in the inductor, if the current rises from 0 to 10A in 50 msec.   (05 Marks)

2 a. Choose your answers for the following :
   i)   The inductive reactance of an inductor in a d.c. circuit is
        A) ωL B) $\frac{1}{\omega L}$ C) zero   D) infinity
   ii) In an a.c. circuit, the instantaneous current and voltage are represented by $i = I_m \sin(\omega t - \pi/6)$ and $v = V_m \sin(\omega t + \pi/3)$. The voltage leads current by
        A) $\pi/3$ B) $\pi/2$ C) $\pi/4$ D) $\pi/6$
   iii) The voltage drop across R, L and C in RLC series circuit is 20V, 85V and 100V respectively. Then the magnitude of applied voltage is
        A) 205 V   B) 35 V   C) 25V   D) None of these
   iv) The active and apparent power of an a.c. circuit are equal in magnitude. The circuit power factor is
        A) 0.707   B) 0.5   C) 0.8   D) 1   (04 Marks)

b. Define RMS and average value of an alternating quantity and hence show that form factor for a sine wave is 1.11 **(08 Marks)**

c. Two circuits with the impedances of $Z_1 = 10 + j15\ \Omega$ and $Z_2 = 6 - j8\ \Omega$ are connected in parallel. If the supply current is 20A, determine the current and power dissipated in each branch. **(08 Marks)**

3 a. Choose your answers for the following :
    i)   In a three phase system, if the instantaneous values of phase R and Y an +60V and -40V respectively then the voltage of phase B if
       A) -20V   B) 40V   C) 120V   D) None of these
    ii) The power consumed in the 3ϕ, 400V star connected load of RΩ/ph is 690W. The line current is
       A) 2.5 A   B) 1A   C) 1.725 A   D) None of these
    iii) In a 3ϕ circuit, if load power factor is decreased, then the line current
       A) decreases   B) increases   C) remains the same D) None of these
    iv) In a balanced star connected system, the angle difference between line voltages and phase voltages are
       A) 30°   B) 60°   C) 120°   D) in phase **(04 Marks)**

b. Show that two wattmeter's are sufficient to measure power in the three phase balanced star connected circuit with the aid of neat circuit diagram. **(06 Marks)**

c. What are the various types of power available with respect to power triangle in 3ϕ system? **(04 Marks)**

d. A delta connected load consists of a resistance of 10 Ω and a capacitance of 100 μF in each phase. A supply of 410V at 50 Hz is applied to the load. Find the line current, power factor and power consumed by the load. **(06 Marks)**

4 a. Choose your answers for the following :
    i)   Dynamometer type instruments are used to measure parameters of
       A) DC only   B) AC only   C) both DC and AC D) None of these
    ii) The pointer of an indicating instruments are generally made of
       A) Copper   B) Aluminium   C) Silver   D) Soft steel
    iii) The fusing material should have
       A) Low melting point, low resistivity   B) Low melting point, high resistivity
       C) high melting point, Low resistivity   D) high melting point, high resistivity
    iv) In a 1ϕ AC supply, the voltage measured between phase and ground is
       A) 0 V   B) <5 V   C) 230 V   D) None of these **(04 Marks)**

b. Define earthing for electrical appliances and need of it. With a neat sketch, explain the pipe earthing. **(08 Marks)**

c. With a neat sketch, explain the construction and working principle of a single phase induction type energy meter. **(08 Marks)**

PART – B

5 a. Choose your answers for the following :
   i)   The armature of a D.C. machine is made of
         A) Silicon steel   B) Wrought iron
         C) Cast steel   D) Soft iron
   ii)   High voltage dc machines use _____ windings
         A) Lap   B) Wave
         C) Either lap or wave   D) Combination of both
   iii) A DC motor is still used in industrial applications because it
         A) is cheap   B) is simple in construction
         C) provides fine speed control   D) None of these
   iv)   The torque developed by a d.c. motor is directly proportional to
         A) flux per pole X armature current   B) armature resistance X applied voltage
         C) armature resistance X armature current D) applied voltage X number of poles
                                                                        (04 Marks)

   b. Explain the characteristics of a dc shunt and dc series motor for torque versus armature
       current and speed versus armature current.   (08 Marks)
   c. A 440 V dc shunt motor takes an armature current of 20 A and runs at 500 RPM. The
       resistance of the armature is 0.6 Ω. If the flux is reduced by 30% and the torque is increased
       by 40% what are the values of armature current and speed?   (08 Marks)

6 a. Choose your answers for the following :
   i)   A transformer is an efficient device because it
         A) is a static device   B) uses inductive coupling
         C) uses capacitive coupling   D) uses electric coupling
   ii)   The flux in the core of a single phase transformer is
         A) purely alternating one   B) purely rotating one
         C) partly alternating and partly rotating D) constant flux
   iii) A transformer has 200 W at iron loss at full load. The iron loss at half the full load
         would be
         A) 50 W   B) 100 W
         C) 400 W   D) 200 W
   iv)   The efficiency and regulation of a transformer should be respectively
         A) High, high   B) High, low
         C) Low, high   D) Low, low   (04 Marks)

   b. What are the various types of losses occur in transformer and how to minimize them?
                                                                        (06 Marks)
   c. Define regulation of a transformer.   (04 Marks)
   d. A 600 kVA single phase transformer has an efficiency of 92% both at full load and half the
       full load at UPf. Determine its η at 75% of full load at 0.9 pf lag. (06 Marks)

7 a. Choose your answers for the following :
   i)   The stator of an alternator is identical to that of a
        A) DC generator   B) Three phase induction motor
        C) Single phase induction motor   D) Rosenberg generator
   ii) The a.c. armature winding of an armature is
        A) Always star connected   B) Generally delta connected
        C) Star – delta connected   D) None of these
   iii) The speed at which a 6 pole alternator should be driven to generate 50 cycles per second is
        A) 1500 RPM   B) 1000 RPM
        C) 500 RPM   D) None of these
   iv) The rating of an armature is expressed in
        A) kW   B) HP
        C) KVA   D) KVAR   (04 Marks)

   b. Derive an expression for emf equation of an armature and also discuss why K_p and K_d have to be considered in the equation.   (08 Marks)

   c. A 3ϕ, λ connected alternator driven at 900 RPM is required to generate a line voltage of 460 V at 60 Hz on open circuit. The stator has 2 slots/pole/ph and 4 conductor/slot. Calculate the number of poles and the useful flux per pole if the winding factor if 0.966.
                                                                      (08 Marks)

8 a. Choose your answers for the following :
   i)   The relation among N_s, N and S of a 3ϕ induction motor is
        A) $N = (S – 1) N_s$ B) $N = (1 – S) N_s$
        C) $N = (1 + S) N_s$ D) $N = SN_s$
   ii) When the rotor of a 3ϕ induction motor is blocked to rotate, the slip is
        A) 0   B) 0.5
        C) 0.1   D) 1
   iii) The direction of rotation of field in a 3ϕ induction motor depends upon
        A) Number of poles   B) Magnitude of supply voltage
        C) Supply frequency   D) Phase sequence of supply voltage
   iv) A wound rotor is mainly used in applications where
        A) High starting torque is required B) Speed control is required
        C) Constant speed is required   D) None of these   (04 Marks)

   b. With a neat sketch, explain the working principle of a 3ϕ squirrel cage induction motor and discuss the significance of slip.   (08 Marks)

   c. A 4 pole, 50 Hz induction motor has s slip of 1% at no load. When operated at full load, the slip is 2.5 %. Find the change in speed from no load to full load.   (08 Marks)

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USN ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚ | **Question Paper Version : A**

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.

1. The study of interaction between living organisms and environment is called as
   a) Ecosystem
   b) Ecology
   c) Phytogeography
   d) Phytosociology

2. Soil erosion can be prevented by
   a) Overgrazing
   b) Removal of vegetation
   c) Afforestation
   d) Deforestation

3. Fossil fuels and metallic minerals are
   a) Renewable resources
   b) Inexhaustible resources
   c) Non-renewable resources
   d) None of these

4. The area reserved for the welfare of wildlife is called
   a) National park
   b) Botanical garden
   c) Sanctuary
   d) Forest

5. Which one of the following is an abiotio component of the ecosystem
   a) Bacteria
   b) Plant
   c) Humus
   d) Fungi

6. Acid rain is called by increase in the atmospheric concentration of
   a) Ozone and dust
   b) SO_2 and NO_2
   c) SO_3 and CO
   d) SO_2 and CO

7. Gas leaked in Bhopal tragedy was
   a) Potassium isothiocynate
   b) Sodium isothiocynate
   c) Ethyl isocynate
   d) Methyle isocyanate

- A1 -

8. Biochemical oxygen demand measures
   a) Industrial pollution
   b) Air pollutions
   c) Polluting capacity of effluent
   d) Dissolved oxygen required to decompose organic waste

9. Which of the following is not a "green house gas"
   a) Oxygen
   b) Carbon dioxide
   c) Chloroflurocarbon
   d) Methane

10. Study of trends in human population growth and prediction of future growth is called
    a) Demography   b) Biography   c) Kalography   d) Psychology

11. The ultraviolet radiation in the stratosphere are absorbed by
    a) Ozone   b) Oxygen   c) Sulphur dioxide   d) Argon

12. The maximum number of individuals that can be supported by a given environment is called
    a) Biotic potential
    b) Carrying capacity
    c) Population size
    d) Resistance

13. The world "AIDS" day is recalled on
    a) 1st July   b) 5th June   c) 1st December   d) 2nd October

14. 'ICDS' is a welfare scheme for
    a) Public   b) Women   c) Men   d) Children

15. The largest reservoir of nitrogen in our planet is
    a) Oceans   b) Atmosphere   c) Biosphere   d) Fossil fuels

16. The world population in the year 2000 was around
    a) 8 billion   b) 6.1 billion   c) 4 billion   d) 4.5 billion

17. Which of the following is the ill effect of urbanization?
    a) Decrease in agricultural land   b) Loss of greenery
    c) Loss of water bodies   d) All of these

18. Environmental (protection) Act was enacted in the year
    a) 1986   b) 1992   c) 1984   d) 1974

19. Which of the following is a biodiversity hotspot in India
    a) Gulf of Mannar   b) Western ghats   c) Pachmarhi   d) Sunderbans

20. In an aquatic ecosystem phytoplankton can be considered as
    a) Consumer   b) Producer
    c) Saprotropic organisms   d) Macro consumers

21. Which of the following devices is suitable for the removal of gaseous pollutant?
    a) Cyclone separator   b) Fabric filter
    c) Electrostatic precipitator   d) Wet collector (scrubber)

22. What is the permissible range of pH for drinking water as per the Indian standard
    a) 6 to 9   b) 6.5 to 7.5   c) 6 to 8.5   d) 6.5 to 8.5

23. Minamata episode of Japan is due to the poisoning of
    a) Lead   b) Nickel   c) Mercury   d) Cadmium

24. Among fresh water availability on earth, the percentage of groundwater occurs is about
    a) 0.2%   b) 0.5%   c) 0.8%   d) 1.0%

25. Liquid waste generated from bathrooms and kitchens are called
    a) Domestic sewage   b) Runoff   c) Sullage   d) All of these

26. Eutrophication means
    a) Waste water treatment process
    b) Neutralization of waste water
    c) Enrichment of plant nutrients in water bodies
    d) Water purification techniques

27. EIA is related to
    a) Environmental and industrial activities   b) Environmental impact assessment
    c) Environmental impact activities   d) Environmental internal activities

28. Organisms who directly feed on producers are called
    a) Carnivores   b) Omnivores   c) Herbivores   d) Decomposers

29. Ozone layer thickness is measured in
    a) Millimeter   b) Centimeter   c) Decibels   d) Dobson units

30. Chernobyl nuclear disaster took place in the year
    a) 1986   b) 1982   c) 1992   d) 1996

31. Biogas is gaseous fuel composed mainly of
    a) Methane and carbon dioxide   b) Methane and hydrogen sulphide
    c) Methane and carbon monoxide   d) None of these

32. The required iron content in drinking water as specified by BIS is
    a) 300 mg/lit   b) 30 mg/lit   c) 3 mg/lit   d) 0.30 mg/lit

33. Which of the following is a water borne disease
    a) Anthrax   b) Tuberculosis   c) Cholera   d) Smallpox

34. Silent valley is located in
    a) Andhra Pradesh   b) Himachal Pradesh
    c) Kerala   d) West Bengal

35. Existing oil reserves of the earth could last for about
    a) 5000 years   b) 500 years   c) 50 years   d) 5 years

36. Water quality involves measuring the number of colonies of
    a) Colliform bacteria   b) Protozoa   c) Cells   d) Chromozomes

37. Electromagnetic radiation can cause
    a) Plague   b) Maleria   c) Cancer   d) Dengue fever

38. Physical pollution of water is due to
    a) Dissolved oxygen   b) Turbidity   c) pH   d) None of these

39. Which of the following is not a part of the hydrological cycle
    a) Precipitation   b) Infiltration   c) Transpiration   d) Perspiration

40. What would you do to prevent environmental damages
    a) Plant tree   b) Halt deforestation
    c) Control pollution   d) All of these

41. Global warming could affect
    a) Climate
    b) Increase in sea level
    c) Melting of glacier
    d) All of these

42. Air pollution from automobile can be controlled by fitting
    a) Electrostatic precipitator
    b) Wet scrubber
    c) Catalytic converter
    d) All of these

43. About ¾ of the countries coal deposits are found in
    a) Karnataka
    b) Tamil Nadu
    c) Kashmir
    d) Bihar and Orissa

44. The water (prevention and control of pollution) act was enacted in the year
    a) 1986
    b) 1974
    c) 1994
    d) 2004

45. World Environment day is on
    a) 5th May
    b) 5th June
    c) 18th July
    d) 16th August

46. A chronic disease called 'silicosis' involves
    a) Heart
    b) Lungs
    c) Liver
    d) Kidney

47. Nuclear power plant in Karnataka is located at
    a) Bhadravathi
    b) Sandur
    c) Raichur
    d) Kaiga

48. Khetri (Rajasthan) is famous for
    a) Gold mines
    b) Copper mines
    c) Granite stone
    d) Marble stones

49. Vasectomy is the method of sterilization in
    a) Man
    b) Women
    c) Both man and women
    d) None of these

50. Which of the following is not an ideal solution for tackling the water crisis
    a) Drilling large numbers of deep bore well
    b) Population growth control
    c) Water conservation in irrigation
    d) Water pollution control

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐

Question Paper Version : B

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. Fundamental duties were added to Part IV of the constitution under the _____ Amendment
   a) 42nd   b) 44th   c) 73rd   d) 86th

2. 'Cooking' means _____
   a) boiling under pressure   b) retaining results which fit the theory
   c) making false statements   d) misusing the truth

3. Right to property is _____
   a) An ordinary right   b) A moral right
   c) A fundamental right   d) A social right

4. If a licensing officer fails to give a license to an applicant, inspite of fulfilling all requirements, which writ can he invoke?
   a) Writ of Habeas corpus   b) Writ of Mandamus
   c) Writ of Prohibition   d) Writ of Certiorari

5. Based on the number of M.L.A's, the Karnataka ministry shall comprise of not more than _____ ministers.
   a) 43   b) 39   c) 34   d) 40

6. The number of members nominated to the Rajya Sabha by the President is _____
   a) 12   b) 2   c) 10   d) 4

7. Part IV of the Indian Constitution contains _____
   a) Fundamental Rights   b) Emergency provisions
   c) Powers of the Union Executive   d) Directive principles of state Policy

8. Providing free and compulsory education to children below the age of 14 is a _____
   a) Fundamental Rights
   b) Directive principles of state Policy
   c) Fundamental Duty
   d) All of these

9. In order to avoid corruption, the judges of the Supreme Court, after retirement _____
   a) Can practice only before the Supreme Court
   b) Can practice before Supreme Court and High Court
   c) Cannot practice anywhere
   d) Cannot practice before the Supreme Court.

10. The duration of financial emergency is _____
    a) 6 months
    b) 2 months
    c) 3 months
    d) 1 year

11. The word 'social' and 'secular' were added to the preamble in the _____ amendment.
    a) 44th
    b) 77th
    c) 42nd
    d) 86th

12. The religious freedom given under the constitution does not permit a person to _____
    a) Propogate his religion
    b) Profess his religion
    c) Practice his religion
    d) Purchase his religion

13. The expanded form of 'TADA' is _____
    a) Trade of Alcohol and Drug (Prevention) Act.
    b) Terrorist and Disruptive Acticities (Prevention) Act.
    c) Testing of Arms and Deadly weapons (Prevention) Act.
    d) Terrorist, Atrocities and Dacoity (Prevention) Act.

14. The formula of 'Colgate Toothpaste' is an example of _____
    a) patent
    b) trade mark
    c) trade secret
    d) copyright

15. The use of intellectual property of others without their permission is referred to as _____
    a) plagiarism
    b) trimming
    c) cooking
    d) forging

16. State emergency is also called as _____
    a) Governor's rule
    b) President's rule
    c) People's rule
    d) Prime Minister's rule

17. The words 'internal disturbance' under National emergency were replaced by 'armed rebellion in the year _____
    a) 1976
    b) 1975
    c) 1978
    d) 1979

18. The Union council of Minister refers to _____
    a) Cabinet rank ministers
    b) State rank ministers
    c) Deputy rank ministers
    d) All of three

19. In 2007, a sixth state joined the list of states which have a legislative council. Which state is it
    a) Kerala
    b) Andhra Pradesh
    c) Karnataka
    d) Assam

20. Writ jurisdiction of the Supreme court can be invoked under Article _____
    a) 46
    b) 32
    c) 36
    d) 42

21. The Attorney General of India is appointed by _____
    a) Chief Justice of India
    b) The Prime Minister
    c) The Law Minister
    d) The President

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22. The number of M.L.C's elected from the teacher's constituency are _____
    a) 1/3 of the total M.L.C's
    b) 1/12 of total M.L.C's
    c) 1/6 of total M.L.C's
    d) 1/2 of total M.L.C's

23. Article _____ abolishes titles other than military and educational
    a) 14
    b) 16
    c) 18
    d) 19

24. The right against exploitation does not include _____
    a) Traffic in human beings
    b) begar
    c) child labour
    d) criminal prosecution

25. The present speaker of the Lok Sabha is _____
    a) Somnath Chaterjee
    b) Md. Hameed Ansari
    c) Meira Kumar
    d) Jaypal Reddy

26. PIL means _____
    a) Public Individual Litigation
    b) Private Interest Litigation
    c) Public Interest Litigation
    d) None of these

27. This is not dishonesty in engineering
    a) Forging
    b) Blending
    c) Trimming
    d) Cooking

28. Risk estimation can be done by using _____
    a) Riskometer
    b) Event tree
    c) 'R' Tree
    d) Evaluator

29. Begar means _____
    a) a person who begs
    b) forced work without payment
    c) difficult work
    d) art of begging

30. Uniform Civil code means
    a) Code for Civil Uniform
    b) Code for civil servants
    c) Uniform for civil servants
    d) Common Civil law for all citizens

31. Courage, self – discipline, integrity are examples of _____
    a) Self – direction vitues
    b) Public spirited virtues
    c) team work virtues
    d) Proficiency virtues

32. The President of India is removed by _____
    a) No confidence motion
    b) Impeachment
    c) Order of Dismissal
    d) Order of Removal

33. The owner of the 'Patent right' retains his patent for _____ years.
    a) 50
    b) 100
    c) 20
    d) 10

34. Risk of harm equal to probability of producing benefit is _____
    a) Inevitable risk
    b) Acceptable risk
    c) Immaterial risk
    d) Material risk

35. The Directive Principles of State Policy
    a) can be enforced in any court
    b) can be enforced only in the Supreme Court
    c) can be enforced only in the High Court
    d) cannot be enforced in any Court

06CIP18/28

36. The present monthly salary of the President is _____
    a) Rs 1.5 lakhs   b) Rs 90,000/-   c) Rs One Lakh   d) Rs 60,000/-

37. The minimum age for a person to be appointed as Governor of a state is _____
    a) 25   b) 30   c) 35   d) 21

38. The Judges of the High Court are appointed by
    a) The Chief Minister   b) The Governor
    c) The President   d) None of these

39. Cultural and Educational Rights under Article 29 and 30 are also called as _____
    a) Minority Rights   b) Majority Rights   c) Legal Rights   d) Moral Rights

40. The head of the State executive is _____
    a) The Chief Minister   b) The Prime Minister
    c) The Governor   d) The President

41. Right to get pollution free water and air is _____
    a) Right to Equality   b) Right to life and personal liberty
    c) Freedom of basic necessities   d) Right to free supplies.

42. The term of office of the Chief Election Commissioner is _____
    a) 5 years   b) 3 years   c) 4 years   d) 6 years

43. The 74th Amendment of 1993 deals with _____
    a) Establishment of Muncipalities   b) Anti – defection law
    c) Providing free and compulsory education
    d) Lowering the voting age from 21 to 18.

44. The number of days provided for campaigning for an election is _____
    a) 15 days   b) 30 days   c) 12 days   d) 20 days

45. Trade mark does not include _____
    a) Designs   b) Sounds   c) Symbols   d) Goodwill

46. Copyright can be retained by the author, after his or her death for _____
    a) 20 years   b) 100 years   c) 50 years   d) None of these

47. Who discharges the duties of the President, in the absence of the President and Vice – President?
    a) The Prime Minister   b) The Chief Justice of the India
    c) The Speaker of the Lok Sabha   d) The Law Minister

48. _____ is not a machinery which safeguards constitutional and civil rights of SC/ST's
    a) Supreme Court   b) High Court
    c) Family Court   d) National Human Right Commission

49. Which one is not an impediment to responsibility?
    a) Trade mark   b) Copy right   c) Patent   d) All of these

50. The number of methods for amending the Constitution of India are _____
    a) 3   b) 4   c) 2   d) 1

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