USN

First Semester B.E. Degree Examination, December 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 $y = 4^{3x}$ then y_n is
       A) $4^{3x}(4 \log 3)^n$ B) $(3 \log 4)^n$ C) $3^{4x}(3 \log 4)^n$ D) $4^{3x}(3 \log 4)^n$

   ii)   If u and v are functions of x then $[vu]_n$ is
       A) $u_n v + nc_1 u_{n-1} v_1 + \ldots\ldots + u v_n$ B) $u_n v_n + \ldots\ldots + u_{n-m} v_{n-m}$
       C) $v_n u + nc_1 v_{n-1} u_1 + \ldots\ldots + v u_n$ D) $u_n + nc_1 u_{n-1} v_1 + \ldots\ldots + v_n$

   iii)   For $r = ae^\theta$, then the angle between radius vector and the tangent is
       A) $\pi/2$ B) $\pi/6$ C) $\pi/4$ D) $\pi/3$

   iv)   The pedal equation of $r = a\sin\theta$ is
       A) $p^2 a = r$ B) $pa^2 = r$ C) $pa = r$ D) $pa = r^2$.   **(04 Marks)**

   b.   Find the nth derivative of $y = e^{2x} \sin x \cos^2 x$.   **(04 Marks)**

   c.   If $\cos^{-1}\left(\dfrac{y}{b}\right) = \log\left(\dfrac{x}{n}\right)^n$, then prove that $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$.   **(06 Marks)**

   d.   Find the pedal equation of the curve $r^m = a^m (\cos m\theta + \sin m\theta)$.   **(06 Marks)**

2   a.   Select the correct answer :
   i)   For $z = x\sin y + y\sin x$, $\dfrac{\partial^2 z}{\partial x \partial y} - (\cos y + \cos x) = \ldots\ldots$

       A) $\sin x$ B) $\cos x$ C) $\sin x \cos x$ D) 0

   ii)   If $u = \log\left(\dfrac{x^4 + y^4}{x+y}\right)$, then the value $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y}$ is

       A) 3   B) e^u C) e^{3u} D) 0

   iii)   If u and v are the functions of x and y and x, y are the functions of s and t then
       $\dfrac{\partial(u,v)}{\partial(x,y)} \times \dfrac{\partial(x,y)}{\partial(s,t)}$ is

       A) $\dfrac{\partial(u,v)}{\partial(x,y)}$ B) $\dfrac{\partial(x,y)}{\partial(u,v)}$ C) $\dfrac{\partial(u,v)}{\partial(s,t)}$ D) $\dfrac{\partial(s,t)}{\partial(u,v)}$

   iv)   For $z = f(x, y)$, if dz, dx and dy are the errors, then $\dfrac{\partial z}{\partial x}dx + \dfrac{\partial z}{\partial y}dy$ is

       A) dx   B) dy   C) df   D) dz.   **(04 Marks)**

   b.   Define the homogeneous function f(x, y), with two examples. If u(x, y) is a homogeneous function of degree 'n' then prove that
   $$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = nu.$$
                  (04 Marks)

c. If $u = f\left(\dfrac{y-x}{xy}, \dfrac{z-x}{xz}\right)$, then prove that $x^2 \dfrac{\partial u}{\partial x} + y^2 \dfrac{\partial u}{\partial y} + z^2 \dfrac{\partial u}{\partial z} = 0$. **(06 Marks)**

d. If $x + y + z = u$, $y + z = v$ and $z = uvw$, find the value of $J\left(\dfrac{x, y, z}{u, v, w}\right)$ **(06 Marks)**

3 a. Select the correct answer :

i) The value of $\displaystyle\int_0^{\pi/2} \sin^6 x \cos^5 x\, dx$ is

    A) 6/115   B) 7/693   C) 3/512   D) 8/693

ii) The value of $\displaystyle\int_0^a \dfrac{dx}{\sqrt{a-x^2}}$ is

    A) $\pi/3$ B) $\pi/4$ C) π D) 2π

iii) For $y^2(a-x)x^3$, asymptote parallel to y-axis is

    A) $x = 0$ B) $x = 1/a$ C) $x = a$ D) $x = \sqrt{a}$.

iv) The curve $r = a(1 + \cos\theta)$ is symmetrical about the

    A) origin   B) initial line   C) x-axis   D) y-axis   **(04 Marks)**

b. Obtain the reduction formula for $\int \sin^m x \cos^n x\, dx$. **(04 Marks)**

c. If $I_n = \displaystyle\int_0^{\pi/4} \tan^n x\, dx$, then evaluate I_6. **(06 Marks)**

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

4 a. Select the correct answer :

i) If P and Q be any two points on a curve $y = f(x)$ then $\displaystyle\lim_{Q \to P} \dfrac{\text{arc PQ}}{\text{chord PQ}}$ is

    A) 1   B) > 1 C) < 1 D) 0

ii) For $y = c\cosh(x/c)$, the value of ds/dx is

    A) $\cosh x/c$ B) $\sinh x/c$ C) $\cos x/c$ D) $\sin x/c$.

iii) The volume of the solid generated by revolving about x-axis of the area bounded by $x = f(y)$ at $x = a$, $x \le b$ is

    A) $\displaystyle\int_a^b \pi y^2 dx$ B) $\displaystyle\int_a^b y^2 dx$ C) $\displaystyle\int_a^b \pi x^2 dy$ D) $\displaystyle\int_a^b \pi y^2 dy$

iv) The length of the arc of the curve $\theta = f(r)$ at $r = a$ and $r = b$ is

    A) $\displaystyle\int_a^b \sqrt{r^2 + (dr/d\theta)^2}\, d\theta$ B) $\displaystyle\int_a^b \sqrt{1 + (dr/d\theta)^2}\, d\theta$

    C) $\displaystyle\int_a^b \sqrt{1 + r(d\theta/dr)^2}\, d\theta$ D) $\displaystyle\int_a^b r(dr/d\theta)^2\, d\theta$ **(04 Marks)**

b. Find the length of one arc of the cycloid $x = a(t - \sin t)$, $y = a(1 - \cos t)$. **(04 Marks)**

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

d. Evaluate $\displaystyle\int_0^\infty \dfrac{\tan^{-1}(ax)}{x(1+x^2)} dx$, using the differentiation under integral sign. **(06 Marks)**

PART – B

5 a. Select the correct answer :
   i) For $dy/dx = (4x + 3y + 2)^2$, dt/dx is
   A) $t^2 + 4$ B) $3t^2 + 4$ C) $4t^2 + 3$ D) $t^2 + 3$

   ii) If $M(x, y)dx + N(x, y)dy = 0$, which is non exact, then $\dfrac{1}{M}\left[\dfrac{\partial M}{\partial y} - \dfrac{\partial N}{\partial x}\right]$ is a function of

   A) y B) xy C) x/y D) x.

   iii) The integrating factor of $dy/dx + y\tan x = \cos x$ is
   A) cosec x   B) sin x   C) cos x   D) sec x

   iv) In polar coordinate form $r = f(\theta)$, for the differential of orthogonal trajectory, the derivative $dr/d\theta$ is replaced by

   A) $-r\dfrac{d\theta}{dr}$ B) $r^2\dfrac{d\theta}{dr}$ C) $-r^2\dfrac{d\theta}{dr}$ D) $-r^2\dfrac{dr}{d\theta}$ (04 Marks)

   b. Solve $(x^2 + y^3 + 6x)dx + y^2x\,dy = 0$ (04 Marks)

   c. Solve $dy/dx + y\tan x = y^3\sec x$.   (06 Marks)

   d. Find the orthogonal trajectory of $r^n \sin n\theta = a^n$, with a-parameter and solve.   (06 Marks)

6 a. Select the correct answer :
   i) If $\sum_{1}^{\infty} u_n$ is a series given and if $\underset{n \to \infty}{\text{Lim}}\, S_n$ tends to finite or infinite, then the series is

   A) divergent   B) convergent   C) oscillatory   D) p-series

   ii) If $\sum u_n = \sum \dfrac{2^n}{n}$, then the value of $\underset{n \to \infty}{\text{Lim}}\, \dfrac{u_{n+1}}{u_n}$ is

   A) 1/2   B) 2   C) $\sqrt{2}$ D) 1/3.

   iii) If the value of $\underset{n \to \infty}{\text{Lim}}\, \sqrt[n]{u_n}$ for $\sum (3/2)^n n^5$ is

   A) 3/2   B) 2/3   C) ½   D) 1/3.

   iv) One of the conditions for an alternating series to be convergent, if $\underset{n \to \infty}{\text{Lim}}\, u_n$ is

   A) 1   B) < 0 C) > 0 D) $= 0$ (04 Marks)

   b. Test for convergence of $\dfrac{x}{3} + \dfrac{1\times 2}{3\times 5}x^2 + \dfrac{1\times 2\times 3}{3\times 5\times 7}x^3 + \ldots\ldots$ (04 Marks)

   c. Examine the convergence of $\sum_{n=1}^{\infty} \dfrac{1}{n(\log n)^2}$.   (06 Marks)

   d. State the Leibnitz theorem for absolute and conditional convergence. Discuss the convergence of the series $1 - \dfrac{1}{2\sqrt{2}} + \dfrac{1}{3\sqrt{3}} - \dfrac{1}{4\sqrt{4}} + \ldots\ldots$ for absolute and conditional convergence.   (06 Marks)

7 a. Select the correct answer :
   i) Direction cosines of z-axis are
       A) (1, 1, 1)   B) (1, 0, 1)   C) (0, 1, 0)   D) (0, 0, 1)
   ii) If l_1, m_1, n_1 and l_2, m_2, n_2 are the dc's of two lines which are perpendicular then $l_1l_2 + m_1m_2 + n_1n_2$ is
       A) $\pi/2$ B) −1   C) 1   D) 0
   iii) The angle between the two planes $2x − 3y + z + 5 = 0$ and $x + 2y + 7z − 3 = 0$ is $\cos\theta =$
       A) 9.165   B) 8.265   C) 7.875   D) 5.5
   iv) The minimum perpendicular length between the two _____ lines is the shortest distance.
       A) parallel   B) perpendicular   C) skew   D) intersecting **(04 Marks)**

   b. Prove that the lines whose DC's are given by the relations al + bm + cn = 0 and mn + ln + lm = 0 are perpendicular, if $\dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{c} = 0$. **(04 Marks)**

   c. Find the equation of the plane through the point (1, −1, 2) and perpendicular to the plane $x + 2y − 3z = 8$ and $2x + 3y − 2z = 5$. **(06 Marks)**

   d. Find the shortest distance between the lines $\dfrac{x-3}{3} = \dfrac{y-8}{-1} = \dfrac{z-3}{1}$ and $\dfrac{x+3}{-3} = \dfrac{y+7}{2} = \dfrac{z-6}{4}$.
       Also find the equation of the line of shortest distance. **(06 Marks)**

8 a. Select the correct answer :
   i) Vector differential operator ∇ is defined as
       A) $\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} + \dfrac{\partial}{\partial z}$ B) $i\dfrac{d}{dx} + j\dfrac{d}{dy} + k\dfrac{d}{dz}$ C) $x\dfrac{\partial}{\partial x} + y\dfrac{\partial}{\partial y} + z\dfrac{\partial}{\partial z}$ D) $i\dfrac{\partial}{\partial x} + j\dfrac{\partial}{\partial y} + k\dfrac{\partial}{\partial z}$
   ii) The gradient of a constant is
       A) constant   B) 1   C) 0   D) x + y + z
   iii) $\nabla \cdot F$ is _____ when F is vector point function
       A) vector point function of t   B) solenoidal
       C) irrotational   D) scalar point function.
   iv) Curl(grad ϕ) is
       A) 0   B) $\nabla\phi$ C) $\nabla^2\phi$ D) 1. **(04 Marks)**

   b. Find the directional derivative of x^2yz^3 at (1, 1, 1) in the direction of $i + j + 2k$. **(04 Marks)**

   c. Find the constants a, b and c such that the vector
       $\vec{F} = (x + y + az)i + (x + cy + 2z)k + (bx + 2y − z)j$ is irrotational. **(06 Marks)**

   d. Prove that $\nabla \cdot (\nabla\phi) = \nabla^2\phi$. Given $\phi = xy + yz + zx$. **(06 Marks)**

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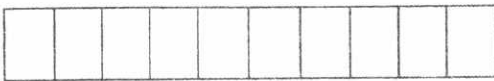
Second Semester B.E. Degree Examination, December 2011
Engineering Mathematics - II

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) For the curve $r = a(a + \cos \theta)$, ρ^2 / r is
    A) r B) $\theta^3 / 9$ C) 8a/9 D) $8/a^3$

  ii) The value of c of the Rolle's theorem for $F'(x) = x^2 - 6x + 8$ in [2, 4] is
    A) 3 B) – 3 C) – 2 D) – 1

  iii) The Maclaurin's series expansion of cosx is
    A) $1 - \dfrac{x^2}{2!} + \dfrac{x^4}{4!} - \dfrac{x^6}{6!} + \ldots\ldots$ B) $x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!} - \ldots\ldots$
    C) $1 + \dfrac{x^2}{2!} + \dfrac{x^3}{3!} + \dfrac{x^4}{4!} + \ldots\ldots$ D) None of these.

  iv) The Lagrange's mean value theorem is a special case of
    A) Rolle's theorem B) Cauchy's mean value theorem
    C) Taylor's theorem D) Maclaurin's series. **(04 Marks)**

  b. Derive an expression for radius of curvature in case of polar curves $r = f(\theta)$. **(06 Marks)**

  c. Verify the Rolle's theorem for $f(x) = (x - a)^m (x - b)^n$ in [a, b]. Given m and n are +ve integers. **(04 Marks)**

  d. Using the Maclaurin's series, prove that $\sqrt{1 + \sin 2x} = 1 + x - \dfrac{x^2}{2} - \dfrac{x^3}{6} + \dfrac{x^4}{24} - \ldots\ldots$ **(06 Marks)**

2 a. Select the correct answer :
  i) The value of $\displaystyle\lim_{n \to \infty} (1+x)^{1/x}$ is

    A) e B) 1 C) 1/e D) ∞

  ii) If $e^x \cos y = \dfrac{e}{\sqrt{2}}\left[1 + (x-1) - (y - \dfrac{\pi}{4}) + \dfrac{(x-1)^2}{2} - (x-1)(y - \dfrac{\pi}{4}) - \ldots\ldots\right]$ is the Taylor's expansion about the point
    A) (0, 0) B) (1, 1) C) (1, π/4) D) (π/4, 1)

  iii) If $rt - s^2 > 0$, r < 0 then f(a, b) is the
    A) maximum value of f(x, y) B) minimum value of f(x, y)
    C) saddle point D) None of these.

  iv) The rectangular box of maximum volume and a given surface area is a
    A) triangle B) rectangle C) cube D) None of these. **(04 Marks)**

  b. Evaluate $\displaystyle\lim_{x \to 0}\left(\dfrac{a^x + b^x + c^x + d^x}{4}\right)^{1/x}$ **(04 Marks)**

c. Expand $\tan^{-1}(y/x)$ about the point $(1, 1)$ upto the third degree term. **(06 Marks)**

d. The temperature T at any point (x, y, z) in space is $T = 40xyz^2$. Find the highest temperature on the surface of the unit sphere $x^2 + y^2 + z^2 = 1$. **(06 Marks)**

3 a. Select the correct answer :

i) Value of $\int\limits_{1}^{2}\int\limits_{1}^{3}xy^2\,dxdy$ is

   A) 10   B) 8   C) 13   D) - 13

ii) Value of $\int\limits_{-c}^{c}\int\limits_{-b}^{b}\int\limits_{-a}^{a}(x^2 + y^2 + z^2)\,dxdydz$ is

   A) 8π B) 1   C) $\dfrac{8}{3}abc(a^2 + b^2 + c^2)$ D) $\dfrac{3}{8}abc(a^2 + b^2 + c^2)$

iii) For $\int\limits_{0}^{\infty}\int\limits_{x}^{\infty}f(x, y)\,dxdy$, the change of order is

   A) $\int\limits_{x}^{\infty}\int\limits_{0}^{\infty}f(x, y)\,dxdy$ B) $\int\limits_{0}^{\infty}\int\limits_{y}^{\infty}f(x, y)\,dxdy$ C) $\int\limits_{0}^{\infty}\int\limits_{0}^{y}f(x, y)\,dxdy$ D) $\int\limits_{0}^{\infty}\int\limits_{0}^{x}f(x, y)\,dxdy$

iv) The value of $\Gamma(n + 1)$ is

   A) 2   B) $n + 1$ C) $(n + 1)!$ D) $n!$ **(04 Marks)**

b. Evaluate $\int\limits_{0}^{\infty}\int\limits_{0}^{\sqrt{1-y^2}}x^3y\,dxdy$ **(04 Marks)**

c. Evaluate $\int\limits_{0}^{1}\int\limits_{0}^{\sqrt{1-x^2}}\int\limits_{0}^{\sqrt{1-x^2-y^2}}\dfrac{dzdydx}{\sqrt{1-x^2-y^2-z^2}}$ **(06 Marks)**

d. Prove that $\int\limits_{0}^{\infty}\dfrac{dx}{1+x^4} = \dfrac{\pi}{2\sqrt{2}}$ **(06 Marks)**

4 a. Select the correct answer :

i) For a vector function $\bar{F}$, there exists a scalar potential, only when
   A) div $\bar{F} = 0$ B) grad(div $\bar{F}$) $= 0$ C) curl $\bar{F} = 0$ D) $\bar{F}$ curl $\bar{F} = 0$

ii) If the vector functions $\bar{F}$ and $\bar{G}$ are irrotational, then $\bar{F} \times \bar{G}$ is
   A) irrotational   B) solenoidal
   C) both irrotational & solenoidal   D) None of these.

iii) The Gauss divergence theorem is a relation between
   A) a line integral and a surface integral   B) a surface integral and a volume integral
   C) a line integral and a volume integral   D) two volume integrals

iv) A force field $\bar{F}$ is said to be conservative if
   A) curl $\bar{F} = 0$ B) grad $\bar{F} = 0$ C) div $\bar{F} = 0$ D) curl(grad $\bar{F}$) $= 0$

                                                      (04 Marks)

b. Use divergence theorem to evaluate $\int\limits_{S}\bar{A}\cdot\hat{n}\,ds$, where $\bar{A} = x^3i + y^3j + z^3k$ and s is the surface of the sphere $x^2 + y^2 + z^2 = a^2$. **(04 Marks)**

c. Verify the Green's theorem for $\int_c (xy + y^2)dx + x^2dy$, where c is bounded by $y = x$ and $y = x^2$.

(06 Marks)

d. Prove that $\overline{A} = \dfrac{\cos\theta}{r^3}\left[\dfrac{\hat{e}_r}{\sin\theta} + \dfrac{\hat{e}_\theta}{\cos\theta} + r^4 e_\phi\right]$ is solenoidal ($\overline{A}$ is spherical polar system.)

(06 Marks)

PART – B

5 a. Select the correct answer :

i) The complementary function of $\dfrac{d^2y}{dx^2} + 4y = 5$ is

    A) $c_1 \sin 2x + c_2 \sin 3x$ B) $c_1 \cos 2x + c_2 \sin 2x$

    C) $c_1 \cos 2x - c_2 \sin 2x$ D) None of these.

ii) The particular integral of $(D^2 - 4)y = \sin 2x$ is

    A) $\dfrac{x}{2}\sin 2x$ B) $\dfrac{-x}{4}\cos 2x$ C) $\dfrac{x}{2}\cos 2x$ D) None of these.

iii) The solution of the differential equation $(D^2 - 2D + 1)y = 0$ is

    A) $c_1e^x + c_2e^{-x}$ B) $c_1 + c_2x)e^x$ C) c_1e^{-x} D) $c_1 + c_2e^{-2x}$

iv) The solution of a differential equation which is not obtained from the general solution is known as

    A) Particular solution   B) Singular solution

    C) Complete solution   D) Auxiliary solution.   **(04 Marks)**

b. Solve $(D^4 + 4D^3 - 5D^2 - 36D - 36)y = 0$ **(04 Marks)**

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

d. Solve $(D^2 + 3D + 2)y = 1 + 3x + x^2$.   **(06 Marks)**

6 a. Select the correct answer :

i) The Wronskian of $\cos 2x$ and $\sin 2x$ is

    A) $w = 4$ B) $w = 1$ C) $w = 2$ D) $w = 3/2$

ii) To transform $(1+x)^2 \dfrac{d^2y}{dx^2} + (1+x)\dfrac{dy}{dx} + y = \sin 2[\log(1+x)]$ into a linear differential equation with constant coefficient, we put $1 + x =$

    A) $\log x$ B) e^x C) e^z D) z.

iii) By the method of variation of parameters, the formula for A' is

    A) $\dfrac{y_1\phi(x)}{w}$ B) $\dfrac{y_2\phi(x)}{w}$ C) $\dfrac{-y_2\phi(x)}{w}$ D) None of these.

iv) The initial value of problem $\dfrac{d^2x}{dt^2} + 5\dfrac{dx}{dt} + 6x = 0$; $x(0) = 0$ is

    A) $c_1 - c_2 = 0$ B) $c_1 + c_2 = 0$ C) $c_1 = 0$ D) $c_2 = 0$ **(04 Marks)**

b. Solve by the method of variation of parameters $\dfrac{d^2y}{dx^2} + 4y = \tan 2x$.   **(04 Marks)**

c. Solve $x^2\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} + 9y = 3x^2 + \sin(3\log x)$ **(06 Marks)**

d. Solve $\dfrac{d^2x}{dt^2} - 4\dfrac{dx}{dt} + 13x = 0$, with $x(0) = 0$ and $dx(0)/dt = 2$.   **(06 Marks)**

7 a. Select the correct answer :

i) The Laplace transform of f(t), $t \geq 0$ is defined by

A) $\int\limits_{0}^{\infty} e^{-st} f(t) dt$ B) $\int\limits_{0}^{\infty} e^{st} f(t) dt$ C) $\int\limits_{t}^{\pi} e^{-st} f(t) dt$ D) $\int\limits_{-\infty}^{\infty} e^{-st} f(t) dt$

ii) The Laplace transform of cos2t is

A) $\dfrac{1}{s^2 + 2^2}$ B) $\dfrac{s}{s^2 + 2^2}$ C) $\dfrac{2}{s^2 + 2^2}$ D) $\dfrac{s^2}{s^2 + 2^2}$

iii) The Laplace transform of f(t)/t is

A) $\int\limits_{S}^{\infty} F(s) ds$ B) $\int\limits_{0}^{\infty} F(s) ds$ C) $\int\limits_{1}^{\infty} \dfrac{1}{s} F(s) ds$ D) $\int\limits_{-\infty}^{\infty} \dfrac{F(s)}{s} ds$

iv) The Laplace transform of $e^{(t-1)} H(t-1)$ is

A) $\dfrac{e^{-S}}{s-1}$ B) $\dfrac{e^{S}}{s+1}$ C) $\dfrac{1}{s+1}$ D) e^{-S} (04 Marks)

b. Find the Laplace transform of $e^{-3t} \sin 5t \sin 3t$ (04 Marks)

c. Find the Laplace transform of the full wave rectifier f(t) = E sinwt, where $0 < t < \pi/w$, having the period (π/w). (06 Marks)

d. If $f(t) = \begin{cases} t^2, & \text{if } 0 < t \leq 3 \\ 4, & \text{if } t > 3 \end{cases}$,

express the f(t) in terms of unit step function and hence find its Laplace transform. (06 Marks)

8 a. Select the correct answer :

i) The inverse Laplace transform of $\dfrac{s^3 + s^2 + 6}{s^4}$ is

A) $1 + t + t^3$ B) $2 + 3t + t^4$ C) $\dfrac{1+t^3}{t}$ D) $t + t^2 + 3t^3$

ii) The inverse Laplace transform of $\dfrac{s}{(s^4 + a^2)^2}$ is

A) sinat − atcosat B) $\dfrac{1}{2a} \cos at$ C) $\dfrac{1}{2a} t \sin at$ D) t cos at

iii) The inverse Laplace transform of $\dfrac{s+b}{s+a}$ is

A) $\dfrac{1-e^{at}}{t}$ B) $\dfrac{e^{-at} - e^{-bt}}{t}$ C) $\dfrac{e^{at} + e^{bt}}{t}$ D) $\dfrac{1-\cos at}{t}$

iv) The inverse Laplace transform of unit step function H(t − a) is

A) e^{-at} B) F(s) C) $\dfrac{1}{s} e^{-as}$ D) $\dfrac{1}{s}$ (04 Marks)

b. Find the inverse Laplace transform of $\dfrac{2s-1}{s^2 + 2s + 17}$. (04 Marks)

c. Find $L^{-1} \left[\dfrac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6} \right]$ (06 Marks)

d. Using the Laplace transform technique, solve $\dfrac{d^2 y}{dt^2} + 4\dfrac{dy}{dt} + 3y = e^{-t}$. Given y(0) = y'(0) = 1.

(06 Marks)

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

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. Choose the correct answer :   (04 Marks)
   i)   Which of the following is a fossil fule?
       (A) Wood   (B) Wind   (C) Tides   (D) Petrol
   ii) A photovoltaic device, by which, high voltage current can be produced
       (A) cell   (B) module   (C) pannel   (D) none of these
   iii) The efficiency of an IC engine increases as compression ratio
       (A) increases   (B) decreases   (C) remains constant   (D) none of these
   iv) The petrol fuel is
       (A) solid   (B) liquid   (C) gas   (D) both B & C
   b. Define the terms : i) Octane number   ii) Cetane number   iii) Knocking.   (06 Marks)
   c. What is meant by doping of silicon? Illustrate the vapour phase technique of doping of silicon. (05 Marks)
   d. Calculate the mass of air required for complete combustion of 1kg of coal which has the following % composition : $C - 78.5\%$; $H - 7.5\%$; $S - 1.0\%$ and remaining is ash. [Atomic mass of C = 12, H = 1, S = 32 and O = 16]. (05 Marks)

2 a. Choose the correct answer :   (04 Marks)
   i)   Voltameter in an electrochemical cell is used to measure
       (A) concentration (B) voltage   (C) current   (D) none of these
   ii) Calomel electrode produces a potential of ± 0.2422 volt when filled with
       (A) Sat.Kel   (B) 1NKel   (C) 1MKel   (D) 0.1NKel
   iii) The electrical sign of anode of concentration cell is :
       (A) + ve   (B) - ve   (C) Neutral   (D) none of these
   iv) A uniform fixed electrical double layer is known as
       (A) Guoy–Chapman (B) Helmholtz   (C) Both A & B   (D) None of these
   b. Differentiate electrode potential and cell potential, with a suitable example.   (04 Marks)
   c. How is the potential of Fe determined experimentally, using calomel electrode?   (06 Marks)
   d. Two copper electrodes placed in $CuSO_4$ solution of equal concentration are connected to form a concentration cell. Write the cell scheme, reaction and calculate the cell voltage. One of the solutions is diluted until the concentration of Cu^{2+} ions is $1/5^{th}$ of its original volume. What will be the voltage after dilution? (06 Marks)

3 a. Choose the correct answer :   (04 Marks)
   i)   Lead – acid battery is
       (A) Reserve   (B) Re - chargeable (C) Non - chargeable (D) Both A & B
   ii) The electrolyte used in the $H_2 - O_2$ fuel cell is
       (A) Alcoholic KOH (B) Warm KOH soln (C) Sat KOH   (D) None of these

iii) Graphite powder in Ni – Cd battery is used to
    (A) Increase efficiency of the cell   (B) Increase the conductivity
    (C) Increase the voltage   (D) None of these

iv) In a dry battery, the graphite rod acts as
    (A) Anode   (B) Cathode   (C) Both A & B   (D) Stabilizer

b. Explain the construction, working and applications of a $Li-MnO_2$ battery. **(05 Marks)**

c. What are fuel cells? How are they classified? Outline the principle and working of any one fuel cell. **(06 Marks)**

d. Discuss the construction and working of Lead – acid battery. **(05 Marks)**

4 a. Choose the correct answer : **(04 Marks)**
i) A part of the nail inside the frame undergoes corrosion of the type
    (A) water line   (B) stress   (C) differential aeration   (D) none of these

ii) A type of corrosion occurs when two different metals are welded and exposed to corrosive environment is
    (A) chemical   (B) stress corrosion   (C) galvanic   (D) pitting

iii) Impressed current method of preventing corrosion is
    (A) Anodic protection   (B) Cathodic protection
    (C) Both A & B   (D) None of these

iv) When the ratio of anodic area to the cathodic area increases, the rate of corrosion
    (A) Decreases   (B) Increases   (C) attains constancy   (D) None of these

b. Define corrosion. Explain the type of corrosion that occurs when an Fe structure is exposed to atmospheric conditions. **(06 Marks)**

c. Account for the following :
i) Zn in contact with Ag undergoes corrosion factor than Zn in contact with Cu. **(03 Marks)**
ii) The hull of a ship suffers from severe corrosion, when partially dipped in sea water. **(04 Marks)**
iii) Galvanized sheets are more preferable than tin coated sheets. **(03 Marks)**

PART - B

5 a. Choose the correct answer : **(04 Marks)**
i) In electroplating of gold generally, platinum is used as anode because the electrode is
    (A) inert   (B) soluble   (C) reactive   (D) none of these

ii) In chromium plating, the anode of the metal used is
    (A) Pb   (B) Cu   (C) Au   (D) Cr

iii) The electrical energy produced due to decrease in free energy of a spontaneous redox reaction, under reversible conditions is
    (A) polarization   (B) decomposition   (C) overvoltage   (D) none of these

iv) The metal salt concentration in the bath must be kept
    (A) low   (B) high   (C) medium   (D) none of these

b. Define metal finishing. Mention the technological importance of metal finishing. **(05 Marks)**

c. Explain the influence of the following in electroplating :
i) current density   ii) metal ion conc.   iii) throwing power **(06 Marks)**

d. Discuss the electroplating of gold by cyanide bath. **(05 Marks)**

6 a. Choose the correct answer : **(04 Marks)**
i) Thermotropic liquid crystals are those which depend on
    (A) pressure   (B) concentration   (C) temperature   (D) none of these

ii) The nematic crystals have geometrical shape like
    (A) rod   (B) thread   (C) plane   (D) none of these

iii) In gravimetric estimation of SO_4^{2-}, one of the following is used as a precipitating agent

   (A) $Ba(NO_3)_2$ (B) $BaCO_3$ (C) $BaCl_2$ (D) $BaSO_4$

iv) The measurement of optical density of light in colorimetric determination of Nitrate involves

   (A) UV range   (B) I R range   (C) visible   (D) All of these

b. What are thermotropic liquid crystals? What are the phases in which they can exist? **(04 Marks)**

c. Explain the applications of liquid crystals in LCD. **(04 Marks)**

d. Write a brief note on the following :
   i) Colorimetric estimation of Cu   ii) Potentiometric estimation of FAS. **(08 Marks)**

                                                           (04 Marks)

7 a. Choose the correct answer :

   i) The functionality of $CH_2 = CH_2$ is

     (A) one   (B) two   (C) three   (D) four

   ii) The chemical name of natural rubber is

     (A) Isoprene   (B) Neoprene   (C) Polyisoprene   (D) None of these

   iii) Polyarutinine as a conducting polymer when doped with HCl forms

     (A) Oxidative doping (B) Productive   (C) Protonic acid   (D) None of these

   iv) A polymer containing alternate substituents / groups in the polymer chain will have the geometry called

     (A) Isotoetic   (B) Syndiotoetic   (C) Atactic   (D) None of these

b. Define the following terms : i) Monomer   ii) Polymer   iii) Functionality
   iv) Degree of polymerization and   v) Co – polymer **(05 Marks)**

c. Describe the production and uses of i) Teflon   ii) polyurethane   iii) Neoprene **(06 Marks)**

d. What are conducting polymers? Write the structure and applications of conducting polyaniline. **(05 Marks)**

                                                           (04 Marks)

8 a. Choose the correct answer :

   i) Which of the following is potable water?

     (A) Spring   (B) River   (C) Reservoir   (D) None of these

   ii) A treatment involving the removal of phosphate is

     (A) Primary   (B) Secondary   (C) Tertiary   (D) All of these

   iii) Reverse osmosis means flow of solvent molecules from a region of concentration

     (A) Higher to lower   (B) Lower to higher

     (C) Both A & B   (D) None of these

   iv) The function of $HgCl_2$ in the estimation of COD is to act as a

     (A) Catalyst   (B) Oxidizing agent

     (C) Producing agent   (D) Suppressing agent for chlorides

b. Explain the following :
   i) Determination of fluoride content in water using SPADANS reagent.
   ii) BOD determination in effluent sample by Winkler's method.
   iii) Purification of water by electrodialysis. **(12 Marks)**

c. $20cm^3$ of sewage sample for COD is reacted with $25cm^3$ of $K_2Cr_2O_7$ solution and the unreacted $K_2Cr_2O_7$ requires $9.0cm^3$ of N/4 FAS solution. Under similar conditions in blank titration $15.0cm^3$ of FAS is used up. Calculate the COD of the sample. **(04 Marks)**

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First/Second Semester B.E. Degree Examination, December 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 : Electron mass = $9.1 \times 10^{-31}kg$; Electron charge e = $1.6 \times 10^{-19}C$; Velocity of light = $C = 3 \times 10^{8}m/s$; Planck's constant h = $6.63 \times 10^{-34}JS$; Avogadro number N = $6.025 \times 10^{28}/k$ mole; Permitivity if vacuum $\epsilon_0 = 8.85 \times 10^{-12}F/M$; $k = 1.38 \times 10^{-23} J/k$.*

PART – A

1 a. Choose your correct answer for the following :
   i)   The de – Broglie wavelength of a particle at rest is

     A) Zero   B) Infinite   C) $\dfrac{h}{p}$ D) $\dfrac{h}{v}$

   ii)   The photoelectric effect is observed only if the wavelength of light is
     A) Above the threshold wavelength   B) Zero
     C) Below the threshold wavelength   D) Equal to the threshold wavelength

   iii)   Phase velocity v_{phase} is equal to

     A) $\dfrac{c^2}{v_{group}}$ B) $\dfrac{v_{group}}{c^2}$ C) $v_{group}^2 c$ D) $v_{group}^2 c^2$

   iv)   According to Wein's law, the wavelength of maximum intensity λ_m is

     A) $\lambda_m \, \alpha T$ B) $\lambda_m \alpha \dfrac{1}{T}$ C) $\lambda_m \, \alpha T^4$ D) $\lambda_m \alpha \dfrac{1}{T^4}$

         (04 Marks)

   b. What are matter waves? Explain the Davission – Germer experiment to establish the wave nature of electrons.   **(10 Marks)**

   c. Compare the momentum, the total energy and the kinetic energy of an electron with a de – Broglie wavelength of $1 \overset{\circ}{A}$, with that of a photon with the same wavelength. **(06 Marks)**

2 a. Choose your correct answer for the following :
   i)   According the Heisenberg's uncertainty principle
     A) $\Delta x \cdot \Delta P \geq \hbar / 2$ B) $\Delta x \cdot \Delta P < \hbar / 2$
     C) $\Delta x \cdot \Delta P > \hbar^2$ D) $\Delta x \cdot \Delta P < \hbar^2$

   ii)   If the uncertainty in the location of a particle is equal to its de – Broglie wavelength, the uncertainty in its velocity will be
     A) Its velocity   B) Half its velocity
     C) Twice its velocity   D) Four times its velocity

   iii)   The normalization of wave function is always possible if $\int\limits_{-\infty}^{\infty} \psi^* \psi dx$ is

     A) Finite   B) Infinite   C) Zero   D) None of these

   iv)   Zero point energy of a particle in one dimensional box is E =

     A) $\dfrac{h^2}{8mL^2}$ B) 0   C) $\dfrac{8mL^2}{h^2}$ D) $\dfrac{8m^2 L^2}{h^2}$

         (04 Marks)

b. What is wave function? Derive the one – dimensional time independent Schrodinger wave equation for an electron. **(08 Marks)**

c. A wave function is given by $\psi = A \sin [n\pi x/L]$ for the motion of a particle in a potential well of breadth L. Calculate the value of A, if x is the position of the particle along L. **(04 Marks)**

d. An electron has a speed of 6×10^5 m/s with an accuracy of 0.01 %. With what accuracy one can locate the position of an electron? **(04 Marks)**

3 a. Choose your correct answer for the following :

   i) In the free electron theory, the electric field due to ion cores is
   A) neglected
   B) not constant
   C) assumed to be constant
   D) None of these

   ii) The expression of electric resistivity ρ is

   A) $\dfrac{ne^2\tau}{m}$

   B) $\dfrac{m}{ne^2\tau}$

   C) $\sqrt{\dfrac{ne^2\tau}{m}}$

   D) $\sqrt{\dfrac{m}{ne^2\tau}}$

   iii) At high temperatures, the mean free path λ, of an electron in a metal is proportional to

   A) $\dfrac{1}{T^2}$

   B) $\dfrac{1}{T}$

   C) T^2

   D) Independent of temperature

   iv) Mobility M of an electron is

   A) $\dfrac{E}{v_d}$

   B) $\dfrac{v_d}{E}$

   C) $\dfrac{E^2}{v_d}$

   D) $\dfrac{v_d^2}{E}$ **(04 Marks)**

b. State the Matthiessen's rule. How does the electrical resistance of a metal change with impurity and temperature? **(06 Marks)**

c. Explain any three merits of quantum free electron theory of metals. **(06 Marks)**

d. Find the relaxation time of conduction electrons in a metal of resistivity 1.587×10^{-8} Ωm, if the metal has 5.85×10^{28} conduction electrons per m^3. **(04 Marks)**

4 a. Choose your correct answer for the following :

   i) The electric dipole moment per unit volume is
   A) Magnetization
   B) Dipole moment
   C) Electric polarization
   D) Electric susceptibility

   ii) If the distance between the plates of a parallel plate capacitor is doubled, the capacitance is
   A) Doubled
   B) Halved
   C) Increased four times
   D) Decreased four times

   iii) The magnetic dipole moment if measured in units of
   A) $Wb\ m^2$
   B) Wb/m^2
   C) Am^2
   D) A/m

   iv) Some crystalline solids exhibit electric polarization, when strained elastically. This is known as
   A) ferroelectric effect
   B) hysteresis
   C) piezoelectric effect
   D) loss angle **(04 Marks)**

b. Describe different mechanisms of electrical polarization. **(08 Marks)**

c. Write a note on Ferrites. **(04 Marks)**

d. What is the polarization produced in sodium chloride by an electric field of 600 V/mm if it has a dielectric constant of 6? **(04 Marks)**

PART – B

5 a. Choose your correct answer for the following :
   i) The rate of stimulated emission is
      A) Independent of the number of atoms in the exited state.
      B) Directly proportional to the energy density of the incident radiation.
      C) Inversely proportional to the energy density.
      D) None of the above.
   ii) The lifetime of the metastable is about _____ sec
      A) 10^{-3} B) 10^{-13} C) 10^2 D) 10^{-9}
   iii) Two photons are coherent when
      A) They travel at the same speed   B) Their phases are different
      C) Their wavelengths are the same   D) They obey Planck's equation
   iv) The lasers that are used in holography are _____ lasers
      A) Solid state   B) Argon pulsed
      C) Semiconductor   D) He – Ne   **(04 Marks)**

b. Discuss the three possible ways through which radiation interacts with the matter. **(06 Marks)**

c. What is holography? Explain the construction of a hologram. **(06 Marks)**

d. A He – Ne laser is emitting a laser beam with an average power of 4.5 MW. Find the number of photons emitted per second by the laser. The wavelength of the emitted radiation is 6328 Å. **(04 Marks)**

6 a. Choose your correct answer for the following :
   i) In a superconductor, critical magnetic field
      A) increases, if the temperature decreases
      B) does not depend on the temperature
      C) increases, if the temperature increases
      D) remains constant
   ii) When the electrons flows in the form of cooper pairs in materials
      A) they do not encounter any scattering
      B) the resistance factor vanishes
      C) the conductivity becomes infinity
      D) All the above
   iii) Propagation of light through optical fiber is because of
      A) Reflection   B) Polarization
      C) Interference   D) Total internal reflection
   iv) The mechanisms through which attenuation takes place in optical fiber are
      A) absorption loss   B) Scattering loss
      C) radiation loss   D) All of these   **(04 Marks)**

b. Obtain an expression for the numerical aperture in an optical fiber. **(06 Marks)**

c. Distinguish between type I and type II superconductors. **(06 Marks)**

d. The attenuation of light in an optical fiber is 3.6 dB/km. What fractional initial intensity remains after 1 km? **(04 Marks)**

7 a. Choose your correct answer for the following :
   i) A unit cell contains
      A) One lattice point   B) Two lattice points
      C) Four lattice points   D) Three lattice points
   ii) The miller indices of the plane parallel to the X and Y axes are
      A) (100)   B) (010)   C) (111)   D) (001)
   iii) The coordination number of BCC structure is
      A) 6   B) 8   C) 2   D) 4
   iv) Interplanar spacings of a cubic system d_{hkl} is equal to

   A) $\dfrac{a}{\sqrt{h^2+k^2+l^2}}$ B) $\dfrac{a^3}{\sqrt{h^2+k^2+l^2}}$ C) $\left(\dfrac{a}{\sqrt{h^2+k^2+l^2}}\right)^3$ D) $\dfrac{a^2}{\sqrt{h^2+k^2+l^2}}$

   (04 Marks)

   b. Derive Bragg's law for x-ray diffraction in crystals.   **(04 Marks)**
   c. Define atomic packing factor. Calculate the packing factor for SC and BCC structures.
                                                                               (08 Marks)

   d. Calculate the density of diamond, given that the cube edge of its unit cell is $3.57\,\mathring{A}$ and the atomic weight of carbon is 12.01.   **(04 Marks)**

8 a. Choose your correct answer for the following :
   i) The physics of nanotechnology is also called as
      A) Plasma physics   B) Nuclear physics
      C) Mesoscopic physics   D) All the above.
   ii) Quantum structure in 2 dim is called
      A) wire   B) DOT
      C) Film   D) Cluster
   iii) Nonotubes are
      A) Strong   B) Non – reactive
      C) Withstand high temperature   D) All the above
   iv) The production of ultrasonics is based on the principle of
      A) Photoelectricity   B) Peizoelectricity
      C) Compton effect   D) Thermionic emission   **(04 Marks)**

   b. What are smart materials? Explain the properties of smart materials.   **(08 Marks)**
   c. What is non – destructive testing? Explain with principle, how the flow in a solid can be detected by a non – destructive method using ultrasonics.   **(08 Marks)**

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

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 correct answer for the following :
    i)   A computer is controlled by _____.
          A) Information   B) Data   C) Instructions   D) Hardware
    ii)   Which type of computer is most likely used for weather forecasting?
          A) Super computer B) Smart phone   C) Mainframe   D) Workstation
    iii) 1 GB is equal to :
          A) 10^6 bytes   B) 10^9 bytes   C) 10^{12} bytes   D) 10^{15} bytes
    iv)   The common keyboard arrangement is called _____.
          A) QWERYT   B) QEWTYR   C) QWERTY   D) QYWERT
                                                                        (04 Marks)
    b.   What types of computers are used by the organizations? Explain.   **(06 Marks)**
    c.   How the hardware devices of a computer are classified? Explain any two types of devices in detail.   **(10 Marks)**

2   a.   Choose your correct answer for the following :
    i)   What does the term CPI stands for?
          A) Programmable Computer Interconnection.
          B) Programmable Computer Interface.
          C) Peripheral Component Interconnect.
          D) Peripheral Computer Interface.
    ii)   _____ can represent more than 4 billion different characters or symbols.
          A) Unicode   B) ASCII   C) BCD   D) EBCDIC
    iii) Different operating systems use different _____ systems.
          A) Power   B) File   C) Disk   D) Control
    iv)   Which of the following is a common drive interface standard used in PCs?
          A) AEIOU   B) ETC   C) EIDE   D) EIEIO
                                                                        (04 Marks)
    b.   Explain how do computers process the data.   **(10 Marks)**
    c.   Briefly explain any two optical storage devices.   **(06 Marks)**

3 a. Choose your correct answer for the following :
   i) DOS and some versions of UNIX are examples of _____ interfaces.
   A) Old – fashioned   B) GUI
   C) Command – line   D) Parallel
   ii) Which version of windows 2000 was intended for use on desktop computers?
   A) Professional   B) Server
   C) Enterprise edition   D) Data center server.
   iii) In a _____ network, all nodes are connected to a device called a hub and communicate through it.
   A) BUS   B) Star
   C) Ring   D) Mesh
   iv) Every webpage has a unique address called a _____.
   A) Hyperlink   B) Uniform resource locator
   C) HTTP   D) Map   (04 Marks)

   b. What do you mean by network topology? Explain different network topologies.   (10 Marks)
   c. List the most commonly used internet services. Explain the use of e – mail.   (06 Marks)

4 a. Choose your correct answer for the following :
   i) In a passage of text, individual words and punctuation marks are called _____.
   A) Variables   B) Constants
   C) Tokens   D) Keywords
   ii) Which of the following is not a valid string constant?
   A) "x"   B) 'x'
   C) "2009"   D) "5 + 10"
   iii) What is the output of the following C statements?
   x = 5 ; y = 10 ;
   y = + + x – y ;
   y = y + 10 ;
   printf("%d", y) ;
   A) 5   B) 20
   C) 6   D) None of these
   iv) Which of the following is not a bitwise operator?
   A) &   B) <<

   C) &&   D) | (04 Marks)

   b. Define an algorithm and explain the important characterics of an algorithm.   (04 Marks)
   c. Write a flow chart to find all roots of the quadratic equation $ax^2 + bx + c = 0$.   (08 Marks)
   d. With an example explain the following :
   i) Logical operators
   ii) Conditional operator.   (04 Marks)

PART – B

5 a. Choose your correct answer for the following :

    i)   Which of the following built in function can be used to erase the unwanted characters?
        A) delete   B) erase   C) fflush   D) flush

    ii)   What will be the output of the following program?
```
#include<stdio.h>
int A = 10;
void main( )
{int a = 50;
 printf("%d", a); }
```
        A) 50   B) 10   C) error   D) garbage value

    iii) Which of the following can't be checked in a "switch – case" statement?
        A) enum   B) int   C) char   D) float

    iv)   Which of the following functions is most opt for reading a multiword?
        A) puts( )   B) gets( )   C) scanf( )   D) vsscanf( )

                                          (04 Marks)

  b. Write a program to pick and print the largest of the three numbers using nested if….else statements.   **(08 Marks)**

  c. Write a C program using switch statement for computing the area of different geometrical figures, such as a circle, a square, a triangle and a rectangle. The program should display the menu of figure codes of different figures. On choosing a particular code, the corresponding parameters required by that figure code are accepted and processed. Finally the area should be printed.   **(08 Marks)**

6 a. Choose your correct answer for the following :

    i)   The _____ statement is used to skip a part of the statement in a loop.
        A) Continue   B) break   C) goto   D) switch

    ii)   Which of the following looping construct is entry controlled loop?
        A) While   B) do……while   C) for   D) None of these

    iii) What is the output of the following code segment?
```
count = 5;
while(count - - > 0)
printf("%d\t", count);
```
        A) 4 3 2 1 0   B) 4 3 2 1 0 -1
        C) 5 4 3 2 1   D) 5 4 3 2 1 0

    iv)   If the body of the loop contains only a semicolon, then it is called as _____.
        A) Infinite statement   B) Sentinal statement
        C) Null statement   D) None of these.

                                          (04 Marks)

  b. Write a C program using do.....while loop to accept an integer and reverse it. Also check whether it is palindrome or not.   **(08 Marks)**

  c. Write a program to evaluate 1! + 2! + 3! + ……… + n!   **(08 Marks)**

7 a. Choose your correct answer for the following :
   i)   An array is a _____ data type.
         A) Fundamental   B) User – defined
         C) Derived   D) None of these
   ii)   When an array is declared, array elements are initialized to _____
         A) 1   B) -1
         C) 0   D) None of these
   iii) Which of the following declarations has an error?
         A) int a[ ] = {0, 0, 0, 0, 0} ;
         B) float b[3][2] = {0, 1, 2, 3} ;
         C) char c[ ] = {'V', 'T', 'U', '|0'}
         D) int m[2, 4]={{0, 0, 0, 0}, {1, 1, 1, 1}};
   iv)   Arrays can be initialized at :
         A) Compile time   B) Run time
         C) Both A and B   D) None of these   (04 Marks)
   b. Write a program to read n integers and sort them in an ascending order. Print the original
       and sorted arrays.   (08 Marks)
   c. Define an array. How arrays are classified? How are they initialized? Explain with an
       example.   (08 Marks)

8 a. Choose your correct answer for the following :
   i)   _____ statement is required, if the return type is anything other than void.
         A) goto   B) continue
         C) return   D) break
   ii)   sqrt( ) is a _____ function
         A) user – defined function   B) library
         C) variable   D) keyword
   iii) In modular programming, modules are designed as :
         A) Single – entry systems   B) Single – exit systems
         C) Both A and B   D) None of these
   iv)   Which of the following is an illegal declaration?
         A) int sum(int a, b);   B) int sum(int a, int b) ;
         C) Both A and B   D) None of these   (04 Marks)
   b. Distinguish between the following, with an example :
   i)   Actual and formal parameters.
   ii)   Global and local variables.
   iii) Calling function and called function.   (08 Marks)
   c. Write a C function to find the factorial of a number. Use this function to evaluate the
       binomial coefficients. The formula to compute binomial coefficient is, $bc = \dfrac{n!}{r!(n-r)!}$.
                                                                           (08 Marks)

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First/Second Semester B.E. Degree Examination, December 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. Choose the correct answer :   **(04 Marks)**
   i) The discipline which deals with sub – structure is called as
     (A) Structural Engg.   (B) Environmental Engg.
     (C) Geo – technical Engg.   (D) None of these.
   ii) The minimum breadth of a national highway is
     (A) 45m   (B) 15m   (C) 30m   (D) 60m
   iii) Krishnaraja Sagar dam is an example for
     (A) Gravity dam   (B) Earth dam   (C) Arch dam   (D) None of these
   iv) The Howrah bridge and K.R. Puram bridge are the examples for
     (A) Arch bridge   (B) Hanging bridge   (C) Skew bridge   (D) Steel bridge

  b. Explain how the infrastructure development will help the growth of economy of the country.
                                     (05 Marks)

  c. Explain the following parts of a highway with a neat sketch :
   i) Kerb   ii) Camber   iii) Formation width.   **(06 Marks)**
  d. Draw a neat sketch of the cross – section of the earthen dam.   **(05 Marks)**

2 a. Choose the correct answer :   **(04 Marks)**
   i) In the SI system, the unit of force and power are respectively
     (A) Newton & Watt   (B) Newton & Joule
     (C) Newton & Pascal   (D) Newton & Hertz
   ii) The principle of transmissibility can be applied when the body is treated as
     (A) Particle   (B) Rigid body   (C) Deformable   (D) a continuum
   iii) Mathematical statement of the law of triangle of forces is
     (A) Sine law   (B) Cosine law
     (C) Law of parallelogram of forces   (D) Law of polygon of forces
   iv) The action of a given system of forces on a rigid body will no way be changed if we add
     or subtract from them another system of forces in equilibrium is called
     (A) Law of superposition   (B) Law of transmissibility
     (C) Free body diagram   (D) Law of gravitational force

  b. List and explain the concepts of Engineering Mechanics.   **(06 Marks)**
  c. In a triangle ABC, the sides AB, BC and AC are of distances 6m, 8m and 10m respectively.
    A force at 'A' produces a clockwise moment of 90kN-m at B and an anti clockwise moment
    of 45 kN-m at C. Find the magnitude and direction of the force.   **(10 Marks)**

3 a. Choose the correct answer :   **(04 Marks)**
   i) Two forces equal in magnitude act at a point. The angle between the lines of action of
    these two forces is 60^0. If the resultant of these two force is 50N, the magnitude of the force is
     (A) 25.88N   (B) 50N   (C) 28.87N   (D) 25N

ii) The angles between two forces to make their resultant a minimum and a maximum respectively are

    (A) 0 & 90   (B) 180 & 90   (C) 180 & 0   (D) 0 & 270

iii) A bar under tension is called as

    (A) Strut   (B) Tie   (C) Flexible string   (D) None of these

iv) The resultant of two forces P & Q is 'R' which acts at right angle to the force P. Then the angle between P & Q is

    (A) $Cos^{-1}(-P/Q)$ (B) $Cos^{-1}(-Q/P)$ (C) $Sin^{-1}(-P/Q)$ (D) $Sin^{-1}(-Q/P)$

b. A vehicle is pulled by means of two ropes as shown in fig. Q3(b). If the resultant pull is 1500N, find the angle θ and the force F.   **(06 Marks)**
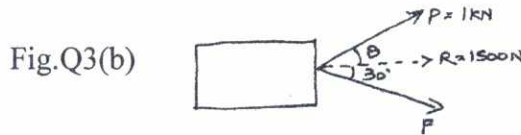
Fig.Q3(b)

c. The force 390N, is shown in fig. Q3(c), is the resultant of four forces. Out of them, 3 forces are shown in the fig.Q3(c). Find the magnitude and direction of the force and its position with respect to point A.   **(10 Marks)**

Fig.Q3(c)
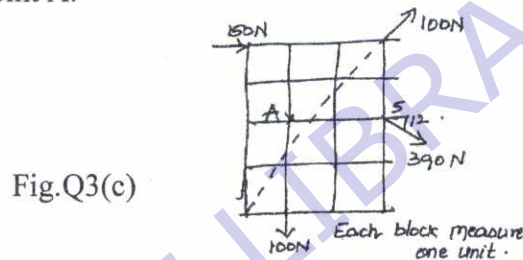
4   a. Choose the correct answer :   **(04 Marks)**

  i) Centroid refers to a figut, which has

    (A) Volume   (B) Weight   (C) Plane lamina   (D) None of these

  ii) The centroid of a equilateral triangle of side "b" from the base is

    (A) $h/3$ (B) $\dfrac{b}{2}$ (C) $\dfrac{\sqrt{3}}{6}b$ (D) $\dfrac{\sqrt{5}}{2}b$

  iii) Centroid should always lie in the

    (A) lamina   (B) outside the lamina   (C) either A or B   (D) None of these

  iv) While defining the radius of gyration the object is considered as

    (A) thin lamina   (B) irregular object

    (C) regular object of size L × B   (D) None of these

b. Derive an expression for the centroid of the semi circular lamina, when its base is placed on the ordinate.   **(06 Marks)**

c. Locate the centroid of the lamina shown in figure Q4(c).   **(10 Marks)**

Fig.Q4(c)

2 of 4
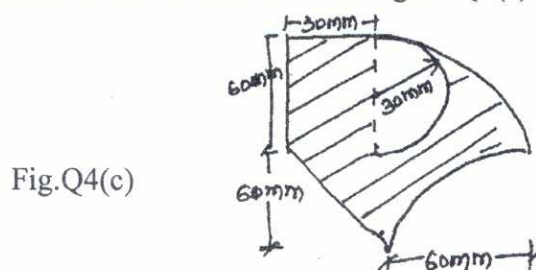
PART - B

5 Choose the correct answer :   (04 Marks)
a. i) The force which cancels the effect of the force system is known as
        (A) Resultant   (B) Neural force   (C) Balancing force (D) Equilibriant
    ii) Reaction force at the contact surface is
        (A) Internal force   (B) Applied force   (C) either A or B   (D) Neither A nor B
    iii) If the resultant of all the forces is not equal to zero, then the object will have
        (A) Rotary motion (B) Translatory motion (C) Both A & B   (D) None of these
    iv) The object is in equilibrium means
        (A) R = 0 ; moves in the opposite direction or remains at the same point.
        (B) R = 0 ; moves in the same direction or remains at the same point.
        (C) $\Sigma H = + P$ & $\Sigma V = -P$; and moves in its same direction.
        (D) None of the above.

b. In the fig. Q5(b), determine the value 'h' if W = 80N, P = 100N and d = 20cm.   (06 Marks)
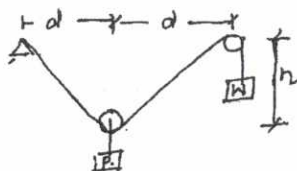
Fig.Q5(b)

c. The figs. Q5(c) (i) and (ii) show two alternatives for lifting a 80cm square box, using a sling
    7m long. The weight of the box is 200N. Which alternative would place lesser tension?
                                                                                  (10 Marks)

Fig.Q5(c)

6 Choose the correct answer :   (04 Marks)
a. i) A beam AB of length 4m supports 4kN from the left support, at a distance of 3m. Then,
        the reactions in supports A & B respectively are
        (A) 3 & 1   (B) 3.5 & 0.5   (C) 2 & 2   (D) 1 & 3
    ii) A beam has one end fixed and other end is simply supported ; then it is called as a
        (A) Fixed beam   (B) Propped cantilever (C) Simply supported (D) Overhung beam
    iii) A water tank placed on a beam produces _____ load.
        (A) UVL   (B) Point   (C) UDL   (D) None of these
    iv) The number of reactions in the roller support are
        (A) 1   (B) 2   (C) 3   (D) 0

b. Explain different type of loads applied on a beam.   (04 Marks)
c. Determine the reaction at the hinge and tension in string in the figure Q6(c).   (07 Marks)
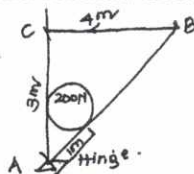
Fig.Q6(c)

d. Determine the forces exerted on the cylinder at B and C shown in figure Q6(d).   (05 Marks)
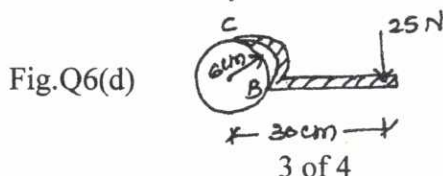
Fig.Q6(d)

7 Choose the correct answer :   (04 Marks)
a. i) Coulomb's law of friction can be applied to
    (A) Fluid friction   (B) Lubricated friction
    (C) Dry friction   (D) Fluid structure interaction
   ii) At the point of impending motion, the static friction is
    (A) zero   (B) maximum   (C) minimum   (D) infinite
  iii) Angle of friction is given as
    (A) $\sin^{-1}\mu$ (B) $\cos^{-1}\mu$ (C) $\tan^{-1}\mu$ (D) $\cot^{-1}\mu$
   iv) When a block of weight W, resting on a rough inclined plane of inclination θ does not
        slide, then the frictional force acting on it is
    (A) Wsin θ   (B) Wcos θ   (C) μ Wsin θ   (D) μ Wcos θ
b. Define i) coefficient of friction   ii) cone of friction   iii) angle of friction. (06 Marks)
c. A homogeneous bar of length 'ℓ' placed between two perpendicular rough walls AB & CD

   as shown in fig.Q7(c). Show that the angle of inclination is $\tan-1\left[\dfrac{1-\mu\mu^{1}}{2\mu}\right]$.   (10 Marks)

Fig.Q7(c)
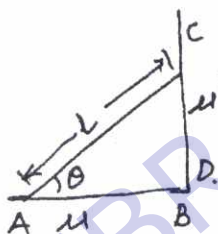
8 Choose the correct answer :   (04 Marks)
a. i) The moment of inertia of a square of side 'a' on the diagonal axis is

    (A) $\dfrac{a^{4}}{6}$ (B) $\dfrac{a^{4}}{12}$ (C) $\dfrac{a^{4}}{8}$ (D) $\dfrac{a^{4}}{10}$

   ii) Which of the following physical quantities can be positive or negative?
    (A) I_{xx} (B) I_{yy} (C) I_{xy} (D) I_{p}
  iii) I_{zz} of right angle of a triangle of base 'b' and height 'h' is
    (A) $\dfrac{bh}{36}[h^{2}+b^{2}]$ (B) $\dfrac{bh}{36}[h^{2}-b^{2}]$ (C) $\dfrac{bh}{36}[h-b]^{2}$ (D) $\dfrac{bh}{36}[h+b]^{2}$
   iv) The polar moment of inertia of a circular area of diameter D is

    (A) $\dfrac{\pi D^{4}}{64}$ (B) $\dfrac{\pi D^{4}}{32}$ (C) $\dfrac{\pi D^{4}}{16}$ (D) $\dfrac{\pi D^{4}}{8}$

b. Find the moment of inertia on the symmetrical axis of the isosceles triangle.   (06 Marks)
c. Determine the distance between two plates of 2cm × 8cm, so that $I_{xx} = I_{yy}$. Refer fig.Q.8(c).
                                                                                  (10 Marks)

Fig.Q8(c)

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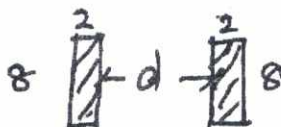
First/Second Semester B.E. Degree Examination, December 2011
Elements of Mechanical Engineering

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 your correct answer for the following :
      i)   Capacity to do work is called
          A) Heat   B) Energy   C) Temperature   D) Power
      ii) The conversion of solar energy directly into electrical energy is known as
          A) Helio electrical process   B) Mechanical process
          C) Helio thermal process   D) None of these
      iii) An adiabatic process occurs at constant
          A) Temperature   B) Pressure
          C) Heat   D) Volume
      iv) Lancashire boiler is an example of _____ boiler
          A) Fire tube   B) Water tube   C) Air tube   D) None of these
                                                   (04 Marks)

  b. Define, work, energy and power. What are the units (SI)?   **(06 Marks)**

  c. 1 kg of superhead steam at 1.5 MPa contains 3000 kJ of heat energy. Find the superheated temperature. It 500 kJ of heat energy is removed at the same pressure, what is the condition of the steam? Use following data P = 1.5 MPa = 15 bar, T_s = 198.29^{o}C, h_f = 844.6 kJ/kg, h_{f_g} = 1,945.2 kJ/kg , h_g = 2,789.9 kJ/kg.   **(10 Marks)**

2 a. Choose your correct answer for the following :
      i)   A prime mover in which the heat energy of the gas is transformed into mechanical energy directly in the form of rotary motion is called
          A) Steam turbine   B) Gas turbine
          C) Water turbine   D) None of these
      ii) Pelton wheel is a _____ turbine.
          A) Low head   B) Impulse
          C) Reaction   D) None of these
      iii) Example for impulse turbine is
          A) De Laval   B) Kaplan
          C) Reaction turbine   D) None of these
      iv) Kaplan turbine is a _____ turbine
          A) Impulse   B) Low discharge   C) Mixed   D) Reaction
                                                    (04 Marks)

  b. Briefly explain the difference between a steam turbine, gas turbine and water turbines.
                                                    (08 Marks)

  c. Define compounding and explain types of compounding of steam turbines.   **(08 Marks)**

3   a.   Choose your correct answer for the following :
    i)   Internal combustion engine is more popularly known as
         A) E.C. engine
         B) Heat engine
         C) I.C. engine
         D) None of the above
    ii) In a 4- stroke engine, the number of rotations of the crankshaft to complete a cycle.
         A) 2   B) 4
         C) 6   D) 1
    iii) The crankshaft rotates in only one direction in a
         A) 2 – stroke engine
         B) 4 –stroke engine
         C) 6 – stroke engine
         D) None of the above
    iv)   In diesel engines heat is supplied at
         A) Constant volume
         B) Constant temperature
         C) Constant area
         D) Constant pressure   (04 Marks)

    b.   Compare a petrol engine with a diesel engine   (08 Marks)
    c.   Find the indicated power of a 4 stroke petrol engine. The average piston speed is
         70 m/min. The mean effective pressure is 5.5 bar. The diameter of the piston is 150 mm.
                                                                       (08 Marks)

4   a.   Choose your correct answer for the following :
    i)   An _____ serves as a device, to reduce the pressure and the temperature of the
         liquid refrigerant, before it passes to the evaporator.
         A) Condenser   B) Radiator
         C) Expansion valve   D) Refrigerant
    ii) C.O.P. refrigeration is given by _____ with usual notations.
         A) $\dfrac{W}{Q}$ B) $\dfrac{Q}{W}$

         C) $\dfrac{T_1}{T_2}$ D) None of these
    iii) One ton of refrigeration is equal to _____ watts.
         A) 1,500   B) 2,500
         C) 3,500   D) 4,500
    iv)   Which part of the refrigerator is known as the heart of the refrigerator?
         A) Evaporator   B) Condenser
         C) Pump   D) Expansion valve   (04 Marks)

    b.   Briefly explain a refrigerant, a refrigerator, refrigeration and air – conditioning.   (08 Marks)
    c.   Explain, with a neat sketch, the working of a vapour compression refrigerator.   (08 Marks)

PART – B

5 **a.** Choose your correct answer for the following :
     i)   A _____ is a m machine tool employed generally to produce circular objects.
         A) Lathe   B) Engine
         C) Turbine   D) Generator
     ii)   The tool which makes the hole is called a _____
         A) Workpiece   B) Arbor
         C) Drill   D) Spanner
     iii)   _____ is the process of generating internal threads
         A) Knurling   B) Milling
         C) Turning   D) Tapping
     iv)   Grip to hold jobs firmly is done by means of a process called
         A) Plane turning   B) Knurling
         C) Taper turning   D) Grinding
                                                    (04 Marks)
   b. Define a machine tool. What are the functions of a lathe?   **(08 Marks)**
   c. Sketch and explain the radial drilling machine.   **(08 Marks)**

6 **a.** Choose your correct answer for the following :
     i)   When the workpiece is fed in the opposite direction to the cutter tooth at the point of contact, the process is called
         A) Down milling
         B) Up milling
         C) Cross milling
         D) None of the above
     ii)   When the workpiece is fed in the same direction as that of the cutter tooth at the point of contact, the process is called
         A) Conventional
         B) Climb
         C) Non – conventional
         D) None of the above
     iii)   The horizontal shaft used to mount the milling cutter is called
         A) Spindle
         B) Saddle
         C) Connecting rod
         D) Arbor
     iv)   Grinding is also called
         A) Abrasive machining
         B) Twisting
         C) Honning
         D) Lapping   **(04 Marks)**
   b. What is the difference between milling, drilling and turning?   **(09 Marks)**
   c. Explain various milling operations.   **(07 Marks)**

7   a.   Choose your correct answer for the following :
    i)   Metal fabrication involves joining of minimum _____ metals together
         A) One   B) Two
         C) Three   D) None of these
    ii) In _____ welding the parts to be joined are heated only upto the plastic state and then fused together by applying the external pressure
         A) Temperature   B) Volume
         C) Pressure   D) None of these
    iii) Fusion welding is also known as
         A) Pressure welding   B) Thermit welding
         C) Resistance welding   D) Non – pressure welding
    iv) _____ is the measure of internal friction of lubricating oil.
         A) Viscosity   B) Porosity
         C) Electricity   D) All of these
                                                              (04 Marks)
    b.   Distinguish amongst soldering, brazing and arc welding processes with simple diagrams.
                                                              (09 Marks)
    c.   Compare sliding contact and rolling contact bearings.   (07 Marks)

8   a.   Choose your correct answer for the following :
    i)   Ratio of a belt drive is defined as the ratio of
         A) Speed of the driving pulley to the speed of the driven pulley.
         B) Speed of the driven pulley to the speed of the driving pulley.
         C) Speed of the fast pulley to the speed of the loose pulley.
         D) None of the above.
    ii) In an open belt drive, to increase the arc of contact of the belt and driven pulley _____ is used.
         A) Cross belt   B) Stepped cone pulley
         C) Jockey pulley   D) Fast and loose pulley
    iii) _____ drive is called a positive drive
         A) Rope   B) Belt
         C) Chain   D) Gear
    iv) _____ gears are used to connect only two non – parallel, non – interesting shafts
         A) Bevel   B) Helical
         C) Spur gear   D) Spiral
                                                              (04 Marks)
    b.   Derive an expression for the ratio of tensions of a belt drive.   (08 Marks)
    c.   In an open belt drive running in the clockwise direction, the tension in the tight side is 3000 N and the arc of contact is 150°. If the coefficient of friction is 0.3, find the tension on the slack side.   (08 Marks)

OR

    c.   A gear wheel of 20 teeth drives another gear wheel having 36 teeth drive, running at 200 rpm. Find the speed of the driving wheel and the velocity ratio.   (08 Marks)

* * * * *

First/Second Semester B.E. Degree Examination, December 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.Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

1 a. Select the correct answer :
   i)   The peak inverse voltage is the peak voltage across the diode when the diode is _____ biased.
        A) forward   B) Reverse   C) Unbiased   D) All of these.
   ii) The reverse saturation current doubles at every _____ rise in temperature.
        A) 20°C   B) 40°C   C) 10°C   D) None of these.
   iii) The ripple factor of full wave rectifier without filter is about
        A) 40.6   B) 0.483   C) 1.21   D) 0.812
   iv) The average dc voltage of a full wave rectifier is
        A) V_m/π B) $V_m/2$ C) $2V_m/\pi$ D) V_m **(04 Marks)**

   b. With a neat circuit diagram and relevant waveforms, explain the operation of a full wave bridge rectifier.   **(07 Marks)**

   c. A diode with a 700 mW maximum power dissipation at 25°C has a 5 mW/°C devating factor. If the forward voltage drop remains constant at 0.7V, calculate the maximum forward current at temperatures 25°C and 65°C.   **(05 Marks)**

   d. Define line regulation and load regulation.   **(04 Marks)**

2 a. Select the correct answer :
   i)   The arrow in the graphic symbol of a transistor defines the direction of _____ current.
        A) base   B) collector   C) emitter   D) None of these.
   ii) In the cutoff region, emitter-base junction is
        A) forward biased   B) reverse biased   C) unbiased   D) None of these.
   iii) The common-base current gain (α_{dc}) of a transistor is given by
        A) I_C / I_B B) I_C / I_E C) I_E / I_C D) None of these.
   iv) In the common-emitter configuration, I_{CEO} is given by
        A) I_{CBO} B) βI_{CBO} C) $(1 + \beta) I_{CBO}$ D) None of these. **(04 Marks)**

   b. Sketch the typical transistor input and output characteristics for the CE configuration. Briefly explain the three regions of operation.   **(07 Marks)**

c. Explain the procedure for drawing the DC load line on the transistor CE output characteristics. In the circuit shown in Fig.Q2(c), a silicon transistor with $\beta_{dc} = 100$ is used. Draw the DC load line on output characteristics and indicate Q-point. **(09 Marks)**
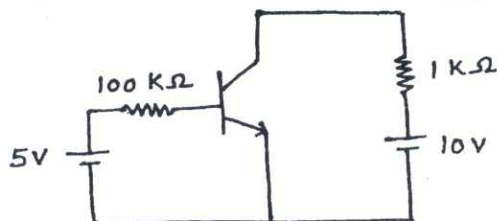
Fig.Q2(c)

3 a. Select the correct answer :
   i) The Q-point will shift if _____ changes.
      A) temperature   B) β_{dc} C) I_{CBO} D) All the these.
   ii) For the base-bias circuit, if the base current is 30 μA and β_{dc} is 100, then the value of I_C is
      A) 3 mA   B) 30 mA   C) 3 μA   D) 100 mA.
   iii) The stability factor S for the base bias circuit is
      A) β B) $1/\beta$ C) $1 + \beta$ D) None of these.
   iv) The value of R_T in voltage divider bias circuit is
      A) $R_1 + R_2$ B) $\dfrac{R_1 R_2}{R_1 + R_2}$ C) $R_1 R_2$ D) None of these. **(04 Marks)**

   b. Sketch the circuit of voltage divider bias and discuss its approximate analysis. **(08 Marks)**

   c. Calculate the maximum and minimum levels of I_C and V_{CE} for the bias circuit shown in Fig.Q3(c), when $h_{FE(min)} = 50$ and $h_{FE(max)} = 200$. Assume $V_{BE} = 0.7$. **(08 Marks)**
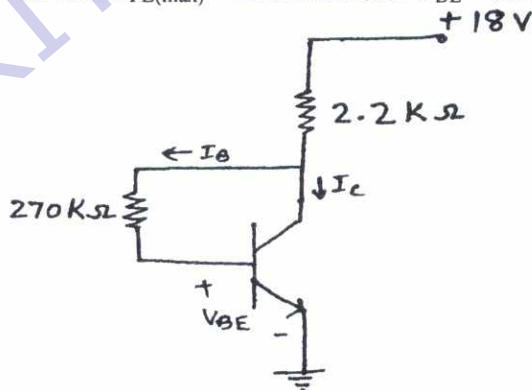
Fig.Q3(c)

4 a. Select the correct answer :
   i) SCR is a _____ device.
      A) bidirectional   B) unidirectional
      C) both unidirectional and bidirectional   D) None of these.
   ii) _____ is the minimum current that should flow through a SCR to maintain it in the ON state.
      A) Maximum RMS current   B) Gate trigger current
      C) Holding current   D) None of these.

a. iii) UJT is a three terminal device with a _____ pn-junction.
   A) double   B) single   C) three   D) None of these.

   iv) FET is a _____ controlled device.
   A) Current   B) power   C) voltage   D) None of these. **(04 Marks)**

b. Draw the circuit diagram to show how an SCR can be triggered by application of a pulse to the gate terminal. Sketch the circuit waveforms and explain it operation. **(08 Marks)**

c. Draw and explain the family of drain characteristics for a n-channel JFET. **(08 Marks)**

PART – B

5 a. Select the correct answer :
   i) Two amplifiers with voltage gains 10 and 100, are connected in cascade. The overall voltage gain is
   A) 100   B) 90   C) 1000   D) 10

   ii) To obtain the sustained oscillations in a sinusoidal oscillator, the loop gain should be equal to
   A) 1   B) ∞ C) 0   D) None of these.

   iii) For a RC phase shift oscillator, the frequency of oscillations is given by
   A) $1/2\pi RC$ B) $1/2\pi RC\sqrt{6}$ C) $1/2\pi RC\sqrt{3}$ D) None of these.

   iv) An oscillator uses _____ type of feedback.
   A) negative   B) positive   C) zero   D) None of these. **(04 Marks)**

b. Draw and explain the circuit of a two stage RC coupled common-emitter amplifier. Explain the frequency response of this amplifier. **(08 Marks)**

c. Draw the circuit of a transistor Colpitt's oscillator and explain its operation. Calculate the frequency of oscillations with $C_1 = C_2 = 400$ PF and $L = 2$ mH. **(08 Marks)**

6 a. Select the correct answer :
   i) An ideal op-amp has _____ slew rate.
   A) 0   B) ∞ C) unity   D) None of these.

   ii) The supply voltage or power supply rejection ratio of an ideal op-amp is
   A) ∞ B) 0   C) 1   D) None of these.

   iii) An op-amp can be used as
   A) adder   B) integrator   C) voltage follower   D) All of these.

   iv) In an inverting amplifier, there is _____ phase shift with input and output.
   A) 90°   B) 180°   C) 0°   D) 360° **(04 Marks)**

b. Explain how an op-amp can be used as a differentiator. **(04 Marks)**

c. For the circuit shown in Fig.Q6(c), calculate the output voltage. V_0 . **(06 Marks)**
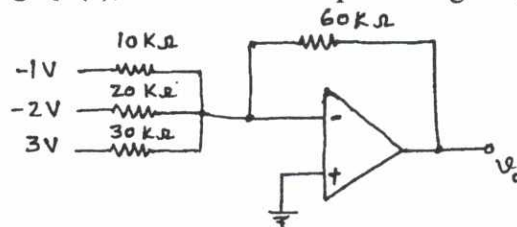
Fig.Q6(c)

d. Explain how the amplitude, frequency and time period are measured using a CRO. **(06 Marks)**

7 a. Select the correct answer :
    i) $(76.6)_8 = (\ ?\ )_2$
        A) $(111110.110)_2$ B) $(110110.110)_2$ C) $(111100.110)_2$ D) $(101100.100)_2$

    ii) $(15)_{10} = (\ ?\ )_{BCD}$
        A) $(11010110)_{BCD}$ B) $(00010101)_{BCD}$ C) $(10010101)_{BCD}$ D) $(00100101)_{BCD}$

    iii) 2's complement of binary number 10101 is
        A) 00011   B) 01010   C) 01011   D) 10010

    iv) $(39)_{10} = (\ ?\ )_2$
        A) $(100111)_2$ B) $(100110)_2$ C) $(110101)_2$ D) $(111001)_2$ **(04 Marks)**

   b. Explain the principle of amplitude modulation with the suitable waveforms. Derive the expression for AM wave.   **(08 Marks)**

   c. Compare AM and FM.   **(04 Marks)**

   d. Subtract using 2's complement:
       i) $(111001)_2 - (101011)_2$ ii) $(11010)_2 - (1010110)$ **(04 Marks)**

8 a. Select the correct answer :
    i) The basic gates are
        A) NAND and NOR   B) NOT, AND and OR
        C) EXOR and EXNOR   D) None of these.

    ii) $A + \overline{A}$ is
        A) A   B) 0   C) 1   D) None of these.

    iii) To add $(1010)_2$ and $(1101)_2$ binary numbers, we need _____ full adders.
        A) 1   B) 2   C) 3   D) 4

    iv) The output expression for EX-OR is
        A) $A + B$ B) $A\overline{B} + \overline{A}B$ C) $\overline{A}\ \overline{B} + AB$ D) None of these. **(04 Marks)**

   b. Simplify the following Boolean expressions:
       i) $Y = (A + \overline{B} + \overline{C})(\ A + \overline{B} + C\ )$
       ii) $Y = A\,[\ B + C\,(\overline{AB + AC})\ ]$ **(06 Marks)**

   c. Explain the operation of DTL NOR gate.   **(06 Marks)**

   d. Realize a parallel binary adder for the following binary numbers:
       i) $(1011)_2$ ii) $(1101)_2$ **(04 Marks)**

* * * * *

First/Second Semester B.E. Degree Examination, December 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 correct answer for the following :
   i)   One kWh of electrical energy is equal to
        A) 36×10^3 Joules   B) 36×10^5 Joules   C) 36×10^6 Joules   D) None of these
   ii) If resistance of a 700m long cable is 100 ohms, then the resistance of 8km of similar cable is
        A) 100 Ω B) 2186 Ω C) 8000 Ω D) 1143 Ω
   iii) When resistances R_1, R_2, R_3 are connected in parallel such that $R_1 > R_2$ and $R_2 < R_3$, the total resistance of the network is always
        A) more than R_2 B) more than R_3 C) less than R_2 D) less than R_1
   iv) When all the flux due to current in one coil links with the other coil, the mutual inductance between coils is given by
        A) $M = \sqrt{L_1 L_2}$ B) $M = K\sqrt{L_1 L_2}$ C) $M = L_1 L_2$ D) $M = L_1 L_2/2$
        (04 Marks)
   b. Define self and mutual inductance.
        (04 Marks)
   c. A lamp bulb is connected to a source through a switch. It is found that the light output is insufficient and it is decide to add a second lamp, to give more light. Give the appropriate lamp connection. Justify your answer.
        (04 Marks)
   d. Two storage batteries A and B are connected to supply a load of 0.3 Ω. The open circuit emf of battery A is 11.7 V and that of B is 12.3 V. The internal resistances are 0.06 Ω and 0.05 Ω respectively. Determine the current supplied to the load.
        (08 Marks)

2 a. Choose your correct answer for the following :
   i)   A choke coil of inductance 0.03 H when connected across 100V supply draws $10 \angle -90°$ A. The frequency of supply is
        A) 53 Hz   B) 43 Hz   C) 63 Hz   D) 60 Hz
   ii) The power factor of a load can be improved by
        A) Inductor   B) Capacitor
        C) Both inductor and capacitor   D) None of these
   iii) In a circuit $I_{ph} = 10 \angle -30°$A , $V_{ph} = 100 \angle 45°$ V. The power factor of the circuit is
        A) 0.13   B) 0.26   C) 0.39   D) 0.52
   iv) An $R – L – C$ series circuit is said to be in electrical resonance when
        A) $X_L > X_C$ B) $X_L < X_C$ C) $X_L = X_C$ D) All of these
        (04 Marks)
   b. A series $R – L – C$ circuit having R = 100 Ω, L = 0.15 H, C = 25 μF draws a current of 1.96 A from 60 Hz supply. Determine the supply voltage using i) Ohm's law ; ii) Kirchoff's law.
        (08 Marks)
   c. A coil having resistance of R ohms and inductance of L henry is connected across a variable frequency alternating current supply of 110V. An ammeter in the circuit showed 15.6 A when frequency was 80 Hz and 19.7 A when frequency was 40 Hz. Find the values of R and L.
        (08 Marks)

3 a. Choose your correct answer for the following :

   i)   The total power consumed by a 3 phase balanced load is given by

     A) $W_1 - W_2$ B) $\dfrac{W_1 + W_2}{2}$ C) $\sqrt{3}(W_1 - W_2)$ D) None of these

     where W_1 and W_2 are wattmeter readings

   ii)   Electrical displacement between different phases in a six phase system is

     A) 60° B) 120° C) 240° D) None of these

   iii)   The frequencies of 3 phase voltage in a three phase balanced system are

     A) Different   B) Same   C) Zero   D) Infinity

   iv)   Fig.Q.3(a)(iv) represents

     A) Unbalanced star convected supply.

     B) Balanced star connected load.

     C) Balanced star connected supply.

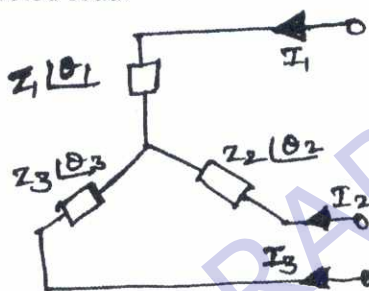   D) Unbalanced star connected load.

Fig.Q.3(a)(iv)

(04 Marks)

  b. Define the three phase system. Draw the waveform and phasor diagram. Mention four advantages of 3 phase systems over single phase systems. **(08 Marks)**

  c. An a – c generator is supplying a load of 300 kW at a power factor of 0.6 lagging. If the power factor is raised to unity, how much more power (in kilowatts) can the generator supply, for the same kilowatt – ampere loading? **(03 Marks)**

  d. A balanced three phase star connected load draws power from a 440 V supply. The two wattmeters connected indicate W_1 = 4.2 kW, W_2 = 0.8 kW. Calculate the power factor and line current. **(05 Marks)**

4 a. Choose your correct answer for the following :

   i)   In the electricity bill, the number of units consumed represents

     A) kW consumed   B) Wh consumed

     C) kWh consumed   D) Watts consumed

   ii)   Dynamometer wattmeter is basically a

     A) Integrating instrument   B) Indicating instrument

     C) Digital instrument   D) Not an instrument

   iii)   Induction type single phase energy meter can be used on

     A) AC only   B) DC only   C) both AC and DC   D) None of these

   iv)   Exact value of true quantity being measured can be obtained from measuring instruments by

     A) Cleaning the instrument frequently   B) Making proper connections

     C) Proper maintenance   D) Proper calibration. **(04 Marks)**

  b. With the help of a neat figure, explain the working of a single phase induction type energymeter. **(08 Marks)**

  c. Discuss the basic principles of earthing. Draw a neat figure for pipe earthing, mentioning all the dimensions and materials used. **(08 Marks)**

PART – B

5   a.   Choose your correct answer for the following :
    i)   Magnetic field can be obtain by
         A) Only a permanent magnet.
         B) Only a current carrying conductor.
         C) Both a permanent magnet and a current carrying conductor.
         D) None of the above.
    ii) Flemings' left hand rule is applicable to
         A) DC generator   B) Transformer   C) DC motor   D) Both A and C.
    iii) To match a motor to the load, it is necessary to know
         A) Efficiency of the motor.
         B) Torque/speed characteristics for the load.
         C) Output of the motor
         D) Load current.
    iv) In one revolution, a generator generates voltage as shown in Fig.Q.5(a)(iv). The
         number of poles of the generator is
         A) 4   B) 2   C) 8   D) 6.   **(04 Marks)**

Fig.Q.5(a)(iv).
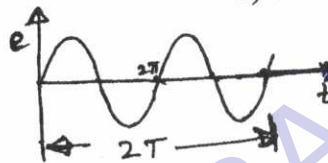
   b.   Discuss the characteristics, of Ta/Ia and N/Ia for a series motor.   **(06 Marks)**
   c.   A 220 V DC short shunt compound motor takes a current of 20 A. Determine the back emf
        induced, given $R_{sh} = 100\ \Omega$, $R_{se} = 0.2\ \Omega$, $R_a = 0.1\ \Omega$.   **(04 Marks)**
   d.   A 4 pole generator has 36 slots with 10 conductors/slot. The flux and speed are such that an
        average emf generated in each conductor is 1.7 volts. The current in each parallel path is
        10A. Determine the total power generated when the armature winding is   i) lap connected ;
        ii) wave connected.   **(06 Marks)**

6   a.   Choose your correct answer for the following :
    i)   Primary and secondary windings of a transformer are
         A) electrically connected and magnetically linked.
         B) electrically separated and magnetically separated.
         C) electrically connected and magnetically separated.
         D) electrically separated and magnetically linked.
    ii) Low voltage winding of a step down transformer is
         A) Primary winding   B) Secondary winding
         C) Neither primary nor secondary   D) Both primary and secondary winding.
    iii) Induced emf on secondary of a transformer is
         A) Dynamically induced emf   B) Self induced emf
         C) Mutually induced emf   D) None of these
    iv) Increase or decrease of voltage by the transformer depends on
         A) Size of the transformer   B) Type of the transformer
         C) Transformation ratio   D) All of these   **(04 Marks)**
   b.   Discuss the magnetizing and demagnetizing effect in a transformer.   **(06 Marks)**
   c.   Write briefly on the necessity of a transformer in power transmission and distribution.
        (04 Marks)
   d.   A 25 KVA, 2000/200V transformer has iron and copper losses of 350 W and 225 W
        respectively at 3/4th full load. Determine the efficiency of the transformer at half full load,
        0.8 p.f. What is the value of copper loss at maximum efficiency?   **(06 Marks)**

7 a. Choose your correct answer for the following :
   i)   The highest speed at which a 50 Hz AC generator can be operated is
        A) 3000 rpm   B) 1500 rpm   C) 3600 rpm   D) 1800 rpm
   ii) Turbo alternators have
        A) large diameter and short axial length.
        B) Small diameter and large axial length.
        C) Small diameter and short axial length.
        D) Large diameter and large axial length.
   iii) Frequency of supply in India is
        A) 60 Hz   B) 25 Hz   C) 50 Hz   D) 75 Hz.
   iv) Distribution factor in alternators is always
        A) equal to one   B) more than one   C) zero   D) less than one
                                                                              (04 Marks)
   b. Derive the emf equation of an alternator.   **(06 Marks)**
   c. A 100 KVA, 440V, Y connected, 3 phase, 50 Hz alternator is operating at a power factor of
       0.8 lag. Its armature resistance / ph is 0.1 Ω and field resistance is 30 Ω. Mechanical and
       core losses are equal to 1500 W. At this load, the field current is 6.25 A. Determine the
       efficiency of the alternator.
                                                                              (10 Marks)

8 a. Choose your correct answer for the following :
   i)   If ϕ_m is the maximum value of flux due to any one of the three phases in an induction
        motor, the resultant flux ϕ_r, at any instant, is
        A) $\frac{5}{2}\phi_m$ B) $\frac{3}{2}\phi_m$ C) $\frac{2}{3}\phi_m$ D) $\frac{1}{2}\phi_m$
   ii) Compared to a slip ring induction motor, the starting torque of a squirrel cage
        induction motor is
        A) Same   B) High   C) Very high   D) Medium
   iii) Normal speed of a 3 phase, 4 pole, 400V, 50Hz induction motor can be
        A) 1455 rpm   B) 1550 rpm   C) 1500 rpm   D) 1050 rpm
   iv) Induction motor works at
        A) Lagging power factor   B) Leading power factor
        C) UPF   D) Zero power factor.   **(04 Marks)**
   b. Why 3 phase induction motors are called asynchronous motors? Explain the principle of
       operation of a 3 phase induction motor.   **(04 Marks)**
   c. With the help of neat figures of stator and rotors, explain the construction of a squirrel cage
       and a slip ring induction motor.   **(06 Marks)**
   d. A 4 pole, 3 phase induction motor operates from a supply whose frequency is 50 Hz.
       Calculate :
   i)   The speed at which the magnetic field of the stator is rotating.
   ii) The speed of the rotor when the slip is 0.04.
   iii) The frequency of the rotor currents when the slip is 0.03.
   iv) The frequency of the rotor currents at standstill, with the reason behind it. **(06 Marks)**

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I / II Semester B.E Degree, Examination, December 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. President rule is imposed in a state
   a) when state legislature passes a resolution to that effect
   b) when there is a difference of opinion between the Governor and the CM
   c) when there is no clear majority
   d) when the State government doesn't follow the direction given by the PM.

2. Public interest litigation can be entertained by the High court whenever
   a) the public neglect the Governments interests
   b) the public interest is weakened
   c) the public are irresponsible
   d) the public interest becomes personal interest of the High court.

3. The judges of a High court are
   a) appointed by the Chief Minister
   b) appointed by the Governor
   c) appointed by the speaker of Vidhana Sabha
   d) appointed by the President of India.

4. To become a Chief Minister the person must have attained the age of
   a) 19   b) 21   c) 25   d) 32

5. Which of the following is not a machinery to safeguard and implement the constitutional and other civil rights of the SC and ST
   a) Supreme Court   b) Labour Court
   c) National Human Right Commission   d) Special court to try attrocities cases

6. Once approved, proclamation of emergency remains in force for
   a) 2 years   b) 3 months   c) 1 year   d) 6 months

7. During emergency, there is automatic suspension of rights guaranteed under Article _____
   a) 14   b) 18   c) 21   d) 19

8. Seats are reserved in favour of _____ in elections
   a) SC & ST   b) aged persons   c) Sick persons   d) disabled persons

9. Every citizen must have attained the minimum age of ____ years to become eligible to vote in election.
   a) 17   b) 18   c) 19   d) 20

10. The date of commencement of the Indian constitution is _____
    a) 15th August, 1947   b) 26th January, 1950
    c) 26th August, 1947   d) 26th November, 1945

11. Fundamental rights are protected by
    a) Criminal courts   b) Supreme court   c) Civil courts   d) None of these

12. State is authorized to make special provisions for
    a) Women & Children   b) Men only
    c) Men & Women   d) None of these

13. Engineers shall hold paramount the safety, wealth and welfare of _____ in the performance of their professional duties.
    a) Women & Children   b) the public   c) the ministers   d) themselves

14. Designs supplied to an engineer by the client shall not be duplicated by the engineer for others without the permission of _____
    a) High court   b) Client
    c) Chief Minister   d) Engineers Association

15. According to an engineer, acceptable risk means
    a) risk is more than benefit   b) risk is equal to benefit
    c) risk is less than benefit   d) none of these

16. With holding information which ought to have been revealed is a type of
    a) deceptive behaviour   b) normal behaviour
    c) abnormal behaviour   d) behaviour showing honesty

17. Which of the following is not an intellectual property?
    a) copy right   b) trade secrets   c) patent   d) landed property

18. Engineers shall undertake to perform engineering assignments only when
    a) qualified by education and experience in the technical field
    b) they have 10 years experience in the technical field
    c) they are adequately paid for their job
    d) none of these

19. When as a result of their studies, engineers believe that a project will not be successful
    a) they shall get compensation from their employer or client
    b) they shall go ahead with it without informing the employer or client
    c) they shall forgo the project without informing the employer or client
    d) they shall advise their employer or client.

20. ASME stands for
    a) American Society for Mechanical Engineers
    b) Asian Society for Model Engineers
    c) Atlantic Society for Model Engineers
    d) African Society for Moden Engineers

21. Which of the following words was not added by the 42nd amendment Act, to the Indian constitution?
    a) Secular   b) Flexible   c) Socialist   d) Integrity

22. There are _____ number of fundamental duties under part IV A of constitution of India.
    a) 4   b) 7   c) 6   d) 10

23. Under article 329(B) of constitution of India, only the following court has the jurisdiction over election disputes.
    a) District court   b) Consumer court   c) Supreme court   d) High court

24. The 42nd amendment to the Indian constitution came into force in the year
    a) 1976   b) 1978   c) 1960   d) 1982

25. The method of amending rigid constitution is by _____
    a) Simple majority   b) Special majority   c) Cannot be amended   d) None of these

26. The power to superintend, direct and control elections is vested in the _____
    a) Finance commission   b) Planning commission
    c) Election commission   d) None of these

27. The National emergency is proclaimed under article _____ of constitution of India.
    a) 353   b) 354   c) 350   d) None of these

28. Proclamation of emergency must be laid before _____
    a) Both the houses of parliament   b) Either house of Parliament
    c) Before the Supreme court   d) None of these

29. Who among the following can remove a chief minister from office?
    a) President   b) Governor
    c) Supreme court   d) State Legislative assembly

30. Directive principles of state policy are
    a) Political rights   b) Social rights
    c) Constitutional rights   d) Legal rights

31. What is the term of Lok Sabha?
    a) 8   b) 7   c) 6   d) 5

32. The other name for Legislative council is
    a) Vidhana Sabha   b) Vidhana Soudha   c) Vidhana Parishad   d) None of these

33. The highest court of India is
    a) Lok Adalat   b) International court   c) Supreme court   d) District court

34. Annual statement of Income and expenditure of the Government is known as
    a) Budget   b) Financial report
    c) Audit report   d) Profit & Loss account

35. How many houses are there in the Parliament?
    a) 2   b) 3   c) 4   d) 5

36. Freedom of speech and expression is contained in
    a) 19 (1)(a)   b) 19 (1)(e)   c) 19(1)(d)   d) None of these

37. Article 17 of constitution of India deals with
    a) abolition of title   b) abolition of inequality
    c) abolition of untouchability   d) abolition of association

38. Children below the age of _____ years are prohibited to be employed in hazardous employment.
    a) 14   b) 15   c) 17   d) 18

39. Right to pollution free environment includes
    a) right to assemble   b) right to move freely
    c) right to practice any religion   d) right to life

40. 'Quo – warranto' means
    a) standing in queue   b) issuing warrant
    c) what is your authority?   d) none of these

41. Right to education is contained in Article
    a) 21   b) 21A   c) 20C   d) 32

42. The term of office of the President is _____ years
    a) 4   b) 5   c) 6   d) 7

43. Equality of opportunity in public employment means
    a) all the applicants are entitled to be employed anywhere in India
    b) state cannot prescribe any condition for employment.
    c) equal opportunity to be given without discrimination in appointment
    d) none of these

44. Fundamental rights are
    a) Civil rights   b) Basic rights   c) Criminal rights   d) None of these

45. A state whose executive head is an elected representative is called
    a) The republic   b) Monarchy   c) Anarchy   d) Dictatorship

46. Equality must be among_____
    a) equals   b) inequals   c) all   d) none of these

47. Uniform civil code means
    a) a common civil law governing all the citizens   b) a common dress code for all the citizens
    c) a common language of all the citizen   d) none of these

48. Fundamental rights are directive principles are _____
    a) opposed to each other   b) unrelated and unconnected to eachother
    c) supplementary and complementary   d) none of these

49. Article 14 permits reasonable _____
    a) classification   b) discrimination   c) division   d) none of these

50. The Governor of a state is
    a) appointed by the President   b) appointed by the Parliament
    c) directly elected by people   d) elected by the State legislature

USN											Question Paper Version : A

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

Time: 2 hrs.]   [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all FIFTY questions; each question carries ONE Mark.

2. Use only **Black ball point pen** for darkening the circles.

3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**

4. Darkening two circles for the same question makes the answer invalid.

5. **Damaging/overwriting and using whiteners** on the **OMR** sheet are strictly prohibited.

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1. The major atmospheric gas layer in stratosphere is
   a) Hydrogen   b) Carbon dioxide   c) Ozone   d) Helium

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

3. Sustainable development means
   a) meeting present needs without compromising the future needs.
   b) progress in human well beings.
   c) Balance between human needs and the ability of earth to provide the resources.
   d) All of these.

4. Which of the following conceptual spheres of the environment is having the least storage capacity for matter.
   a) Atmosphere   b) Lithoshpere   c) Hydrosphere   d) Biosphere

5. Global atmospheric temperature are likely to be increased due to
   a) burning of fossil fuels   b) water pollution
   c) soil erosion   d) none of these

6. The term environment is derived from the French word which means to encircle
   a) Environ   b) Oikos   c) Geo   d) Aqua

7. Environmental pollution is due to
   a) Rapid urbanization   b) Deforestation
   c) Afforestation   d) (a) & (b)

8. Population explosion will cause
   a) biodiversity
   b) stress on Ecosystem
   c) more employment
   d) none of these

9. The protocol that reduces green house gas emissions are
   a) Kyoto protocol
   b) Cartagena protocol
   c) Montreal protocol
   d) Vienna protocol

10. The major automobile pollutants include
    a) CO, NOX, Hydrocarbons and SPM
    b) CO, NOX, Hydrocarbons and CH_4
    c) CO_2, NOX, Hydrocarbons and SPM
    d) CO, NOX, Freon's and SPM

11. The PH value of the acid rain water is
    a) 5.7
    b) 7.0
    c) 8.5
    d) 7.5

12. The oceans are the largest storage of water on earth containing
    a) 95% of Earth water
    b) 85% of Earth water
    c) 97% of Earth water
    d) 75% of Earth water

13. The largest reservoir of nitrogen on our planet is
    a) oceans
    b) atmosphere
    c) biosphere
    d) fossil fuels

14. The water (prevention and control of population) Act was enacted in the year
    a) 1986
    b) 1996
    c) 2000
    d) 1974

15. Which pyramid is always upright?
    a) Energy
    b) Biomass
    c) Numbers
    d) Food chain

16. In an ecosystem biological cycling of materials is maintained by
    a) producer
    b) consumer
    c) decomposer
    d) all of the above

17. Mining means
    a) to conserve and preserve minerals
    b) to check pollution due to minerals and resources
    c) to extract minerals and ores
    d) none of these

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

19. Eutrophication is
    a) an improved quality of water in lakes
    b) a process in carbon cycle
    c) the result to accumulation of plants nutrients in water bodies
    d) a water purification technique

20. Solar radiation consists of
    a) UV
    b) Visible light
    c) Infrared
    d) All of these

21. Which of the following is considered as an alternative fuel
    a) CNG
    b) Kerosene
    c) Coal
    d) Petrol

22. Definition of Noise is
    a) Loud sound
    b) Unwanted sound
    c) Constant sound
    d) Sound of high frequency

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

24. Blue baby syndrome is caused by the contamination of water due to
    a) Phosphates   b) Sulphur   c) Arsenic   d) Nitrates

25. Which of the following is an air pollution
    a) Nitrogen   b) Carbon monoxide   c) Carbon dioxide   d) Oxygen

26. Hydrogen energy can be tapped through
    a) Heat pumps   b) Fuel cells   c) Photovoltaic cells   d) Gasifiers

27. Which of the following are natural source of air pollution
    a) Volcanic eruption   b) Solar flair   c) Earthquake   d) All of these

28. Air pollution from automobiles can be controlled by fittings
    a) electrostatic precipitator   b) wet collector (scrubber)
    c) catalytic converter   d) all of the above

29. Reverse Osmosis is a type of
    a) dead and filtration system   b) cross flow filtration system
    c) ion exchange method   d) micro filtration

30. What is the maximum allowable concentration of fluorides in drinking water
    a) 1.0 milligram per liter   b) 1.25 milligram per liter
    c) 1.50 milligram per liter   d) 1.75 milligram per liter

31. BOD is
    a) biochemical oxygen demand
    b) a measure of the organic matter present in waste water
    c) usually less than COD
    d) all of the above

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

33. Which of the following is not a green house gas?
    a) Hydrochloro fluorcarbons   b) Methane
    c) Carbon dioxide   d) Oxygen

34. Which of the following statements about Ozone is true?
    a) Ozone is a major constituents of photochemical smog.
    b) Ozone protects us from the harmful UV radiation of sun
    c) Ozone is highly reactive
    d) All of the above

35. Global warming could affects
    a) Climate   b) Food production   c) Melting of glaciers   d) All of the above

36. Chernobyl Nuclear Disaster occurred in the year
    a) 1984   b) 1985   c) 1986   d) 1987

37. The major causes of global population growth in the 18th and 19th centuries was
    a) decrease in death rates   b) decrease in birth rates
    c) industrial revolution   d) none of these

38. Excess fluorides in drinking water is likely to cause
    a) blue babies
    b) fluorosis
    c) task and colour
    d) intestinal irritation

39. The major objectives of family welfare programmes in India is
    a) disease control
    b) population growth rate control
    c) employment generation
    d) none of these

40. The average life expectancy around the world is currently
    a) decreasing
    b) increasing
    c) not changing
    d) stabilizing

41. The objectives of the wild life (protection) Act 1972 is
    a) to preserve the biodiversity
    b) to maintain essential ecological and life supporting system
    c) protection and conservation of wild life
    d) all of the above

42. Environmental protection is the responsibility of
    a) Govt. of India
    b) NGOs
    c) Individual
    d) All of these

43. Which of the following is a waterborne disease
    a) Anthrax
    b) Tuberculosis
    c) Cholera
    d) Small pox

44. In 1960, the world population was around
    a) 2 billion
    b) 3 billion
    c) 4 billion
    d) 4.5 billion

45. About _____% of the earth's surface is covered by water
    a) 53%
    b) 19%
    c) 71%
    d) 33%

46. The objective of integrated child development services (ICDS) are
    a) Immunization
    b) Health checkup and referral services
    c) Pre – school non – formal education
    d) All of the above

47. Which of the following is not a renewable source of energy
    a) Fossil fules
    b) Solar energy
    c) Tidal wave energy
    d) Wind energy

48. Sound beyond which of the following level can be regarded as a pollutant
    a) 40 dB
    b) 80dB
    c) 120dB
    d) 150dB

49. Which of the following is a biotic component of an ecosystem?
    a) Fungi
    b) Solar light
    c) Temperature
    d) Humidity

50. Which state is having highest women literacy rate in India
    a) Karnataka
    b) Punjab
    c) Rajasthan
    d) Kerala