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10MAT11

First Semester B.E. Degree Examination, Dec.2014/Jan.2015
Engineering Mathematics – I

Time: 3 hrs. Max. Marks:100

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

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) If $y = x^2e^x$, then y_n is

A) $(x^2 + 2nx + n^2 - n)e^x$ B) $(x^2 - 2nx - n^2 - n)e^x$

C) $(2nx + n^2 - n)e^x$ D) $(x^2 + 2nx - n)e^x$

ii) The expansion of 3^x is

A) $1 - x\log 3 - \frac{(x\log 5)^2}{2!} + ----$ B) $1 + 3\log x + \frac{x\log 5}{2!} + ---$

C) $1 + 3\log x + \frac{(3\log x)^2}{2!} + \frac{(3\log x)^3}{3!} + --$ D) $1 + x\log 3 + \frac{1}{2!}(x\log 3)^2 + ---$

iii) The point on the curve $y = \log x$, tangent at which point is parallel to the chord joining the points (1, 0) and (e, 1) is

A) e B) e^2 C) e + 1 D) e – 1

iv) For n = 1 the Taylor's theorem reduces to

A) Rolle's theorem B) Lagrange's mean value theorem

C) Cauchy's mean value theorem D) None of these

b. If $x = \sin t$ and $y = \sin pt$, prove that $(1 - x^2)\, y_{n+2} - (2n + 1)x\, y_{n+1} + (p^2 - n^2)\, y_n = 0$. **(04 Marks)**

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

d. Using Macluarin's series, expand $\log(1 + e^x)$ up to the term containing x^4. **(06 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) The value of $\lim_{x \to 0}\left(\frac{b^x - a^x}{x}\right)$ is

A) b/a B) $\log\left(\frac{b}{a}\right)$ C) $\frac{a}{b}$ D) $\log\left(\frac{a}{b}\right)$

ii) The length of the perpendicular from the pole on the tangent in the polar form is

A) $p = r\cos\phi$ B) $p = r\sin\theta$ C) $p = r\sin\phi$ D) $p = r\cos\theta$

iii) Two polar curves are said to be orthogonal if and only if $\tan\phi_1 \cdot \tan\phi_2 =$

A) 1 B) 0 C) 2 D) –1

iv) The radius of curvature of a straight line at every point on it is

A) 0 B) ∞ C) 1 D) –1

b. Evaluate : $\lim_{x \to a}\left(2 - \frac{x}{a}\right)^{\tan(\pi x/2a)}$ **(04 Marks)**

c. For the curve $\theta = \frac{1}{a}\sqrt{r^2 - a^2} - \cos^{-1}\left(\frac{a}{r}\right)$, prove that $p^2 = r^2 - a^2$. **(06 Marks)**

d. For the curve $y = \frac{ax}{(a + x)}$, where a is constant, prove that $\left(\frac{2\rho}{a}\right)^{2/3} = \left(\frac{y}{x}\right)^2 + \left(\frac{x}{y}\right)^2$. **(06 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) If $u = y e^{x^2} \sin x$ then $\frac{\partial^3 u}{\partial x \partial y^2}$ is

A) $e^{x^2} \sin x$ B) $y e^{x^2}$ C) 0 D) 1

ii) If $u = x + y + 1, v = y - z$ and $w = z$ then the Jacobian of u, v, w with reference to x, y, z is

A) 0 B) 1 C) 2 D) 3

iii) The Taylor's series of $f(x, y) = x^2y + 3y - 2$ about the point $(1, -2)$ is

A) $10 + 4\{(x - 1) + (y - 2)\}$ B) $-4(x - 1) + (y + 2)$

C) $(x - 1) + 4(y - 2)$ D) $-10 - 4(x - 1) + 4(y + 2)$

iv) If 1% error is made in measuring its base as well as height then the percentage error in measuring the area of a triangle is :

A) 2 B) 1 C) 3 D) 0.

b. Find the percentage error in calculating the volume and surface area of a sphere due to an error of x% in the radius. **(04 Marks)**

c. If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, prove the following :

i) $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{3}{x + y + z}$

ii) $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = -\frac{9}{(x + y + z)^2}$. **(06 Marks)**

d. A rectangular box, open at the top, is to have a volume of 32 cubic units, find the dimensions of the box requiring least material for its construction. **(06 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ then $\nabla \times \vec{r} =$

A) xyz B) 0 C) 4 D) 3

ii) If n is a non – zero constant, then $\nabla^2 r^n$ is

A) r^{n-2} B) nr^{n-2} C) $n(n + 1)r^n$ D) $n(n + 1)r^{n-2}$

iii) If $\vec{f}$ and $\vec{g}$ are irrotational vectors then $\vec{f} \times \vec{g}$ is

A) irrotational B) Solenoidal

C) both solenoidal and irrotational D) none of these

iv) In orthogonal curvilinear co-ordinates, the value of $\frac{\partial(x, y, z)}{\partial(u, v, w)}$ is

A) $h_1h_2h_3$ B) $\frac{1}{h_1h_2h_3}$ C) $\frac{h_1}{h_2h_3}$ D) $\frac{h_1h_2}{h_3}$

b. Find the directional derivative of $4xz^3 - 3x^2y^2z$ at (2, -1, 2) along $2\hat{i} - 3\hat{j} + 6\hat{k}$. **(04 Marks)**

c. Prove that $\text{Curl}(\phi \vec{A}) = \phi(\text{Curl}\, \vec{A}) + g\,\text{rad}\,\phi \times \vec{A}$. **(06 Marks)**

d. Show that the spherical co-ordinate system is orthogonal. **(06 Marks)**

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PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) If f(x, α) α being the parameter and $\frac{\partial f}{\partial \alpha}(x,\alpha)$ are continuous functions and $\phi(\alpha) = \int_a^b f(x,\alpha)dx$ where a and b are constants then $\phi'(\alpha)$ is

A) $\int_a^b \frac{\partial f}{\partial x} dx$ B) $\int_a^b \frac{\partial f}{\partial x} d\alpha$ C) $\int_a^b \frac{\partial f}{\partial \alpha} d\alpha$ D) $\int_a^b \frac{\partial f}{\partial \alpha} dx$.

ii) The value of the integral $\int_0^{\pi} \sin^5\left(\frac{x}{2}\right)dx$ is

A) 1/15 B) 1/16 C) 16/15 D) 0

iii) For the Cartesian curves if f(x, y) = f(y, x)dy then the curve is symmetrical about

A) a line y = x B) the origin C) x – axis D) y –axis

iv) The perimeter of the astroid $x^{2/3} + y^{2/3} = a^{2/3}$ is

A) 4a B) 8a C) 6a D) 3a

b. Evaluate : $\int_0^{\infty} e^{-ax} \frac{\sin x}{x} dx$ by differentiating under the integral sign. **(04 Marks)**

c. Obtain the reduction formula for $\int_0^{\pi/2} \cos^n x\, dx$. **(06 Marks)**

d. Find the perimeter of the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$. **(06 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) A differential equation of the form M(x, y)dx + N(x, y)dy = 0 is said to be homogeneous differential equation if both M(x, y) and N(x, y) are :

A) homogeneous functions of the same degree B) functions with different degree
C) relatively prime D) none of the these.

ii) The general solution of the differential equation of the form $\frac{dy}{dx} + py = Q$, where P and Q are functions of x, is

A) $y e^{\int Q dx} = \int p\, e^{\int p dx} dx + c$ B) $x e^{\int p dx} = \int Q e^{\int p dx} dx + c$

C) $y e^{\int p dx} = \int Q e^{\int p dx} dx + c$ D) $x e^{\int p dy} = \int Q e^{\int p dy} dy + c$

iii) The differential equation of the form Mdx + Ndy = 0, for which $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right) = \frac{2}{x}$ then the integrating factor is

A) 2x B) x^2 C) 2 log x D) e^{x^2}

iv) To obtain the orthogonal trajectories of the differential equation $f\left[r, \theta, \frac{dr}{d\theta}\right] = 0$, the term $\frac{dr}{d\theta}$ must be replaced by

A) $-\frac{d\theta}{dr}$ B) $-r^2\frac{dr}{d\theta}$ C) $r^2\frac{d\theta}{dr}$ D) $-r^2\frac{d\theta}{dr}$

b. Solve $(y^3 - 3x^2y)\,dx - (x^3 - 3xy^2)\,dy = 0$. **(04 Marks)**

c. Solve $\sqrt{1-y^2}\,dx = (\sin^{-1}y - x)dy$. **(06 Marks)**

d. Show that the family of parabolas $y^2 = 4a(x + a)$ is self orthogonal. **(06 Marks)**

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7 a. Choose the correct answers for the following : **(04 Marks)**

i) Let A be a matrix of order 3×5 and B be a matrix of order 5×3 then $\rho(BA)$ is

A) < 4 B) ≤ 4 C) ≤ 5 D) > 5

ii) The system of equations $5x - 7y = 0$ and $x + ay = 0$ has only trivial solution if

A) $a = \frac{5}{7}$ B) $a = -\frac{7}{5}$ C) $a \neq \frac{7}{5}$ D) $a = -\frac{5}{7}$

iii) In Gauss – Elimination method , the augmented matrix reduces to ____ matrix

A) diagonal B) unit C) triangular D) none of these

iv) The rank of the matrix : $\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 12 & 2 & 6 & 16 \\ 30 & 5 & 15 & 40 \end{bmatrix}$ is equal to

A) 2 B) 3 C) 4 D) 1

b. Find the rank of the matrix by reducing it to the echelon form: $\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$. **(04 Marks)**

c. Find the values of λ for which the system $x + y + z = 1$; $x + 2y + 4z = \lambda$; $x + 4y + 10z = \lambda^2$ has solution. Solve the system in each possible case. **(06 Marks)**

d. Solve the following system of equations by using the Gauss – Jordan method : $2x + y + z = 10$; $3x + 2y + 3z = 18$; $x + 4y + 9z = 16$. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The eigen values of $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ are :

A) 1, 3, 7 B) 0, 2, 10 C) 0, 3, 15 D) none of these

ii) Two square matrices A and B are similar if

A) $A = B$ B) $B = P^{-1} AP$ C) $A^1 = B^1$ D) $A^{-1} = B^{-1}$

iii) The matrix of the quadratic form $x^2 + 2xy - y^2$ is

A) $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ B) $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$ C) $\begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$ D) $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

iv) A matrix A is said to be orthogonal if

A) $A = A^1$ B) $A/A^1 = I$ C) $AA^1 = 0$ D) $\frac{A^1}{A} = I$

b. If $\alpha = x \cos\theta - y \sin\theta$ and $\beta = x \sin\theta + y \cos\theta$, write the matrix A of this transformation and prove that $A^{-1} = A^1$. **(04 Marks)**

c. Reduce the matrix $A = \begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$ into a diagonal matrix. **(06 Marks)**

d. Find the rank, index, signature of the following quadratic form $2x^2 - 2y^2 + 2z^2 - 2xy - 8yz + 6zx$. **(06 Marks)**

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10PHY12/22

First/Second Semester B.E. Degree Examination, Dec.2014/Jan.2015
Engineering Physics

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
2. ***Answer all objective type questions only in OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***
4. ***Physical constants : $h = 6.625\times10^{-34}$ JS, $c = 3\times10^{8}$ ms^{-1}, $m_e = 9.1\times10^{-31}$ kg, $e = 1.6\times10^{-19}$ c $\epsilon_0 = 8.854\times10^{-12}$ Fm^{-1}.***

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PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) The law which failed to account for shorter wavelength region of blackbody radiation spectrum is
A) Planck's law B) Wien's law
C) Rayleigh – Jeans law D) Newton's law

ii) The group velocity of a particle is 3×10^{6} m/s, its phase velocity is,
A) 3×10^{10} m/s B) 1×10^{10} m/s
C) 3×10^{6} m/s D) 9×10^{22} m/s

iii) Photoelectric effect establishes
A) wave nature of light B) particle nature of light
C) dual nature of light D) wave nature of particle

iv) The Compton wavelength is given by,
A) $\frac{h}{m_0c}$ B) $\frac{h^2}{m_0c}$ C) $\frac{m_0c}{h}$ D) $\frac{m_0c}{h^2}$.

b. Describe Davisson and Germer experiment for confirmation of de Broglie hypothesis. **(08 Marks)**

c. Show that group velocity is equal to particle velocity. **(04 Marks)**

d. Compare the energy of a photon with that of an electron when both are associated with wavelength 0.2 nm. **(04 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) If the wave packet is narrow then there is,
A) large uncertainty in momentum B) small uncertainty in momentum
C) no uncertainty in momentum D) large uncertainty in position

ii) For electron to exist within the nucleus its energy must be of the order of
A) 20 J B) 20 eV C) 20 KeV D) 20 MeV

iii) In the first excited state of a particle in a potential well, the probability of finding it is maximum at
A) $x = \frac{a}{2}$ B) only $x = \frac{a}{4}$ C) only $x = \frac{3a}{4}$ D) both $x = \frac{a}{4}$ and $x = \frac{3a}{4}$

iv) The probability of finding a particle with in an element of volume $d\tau$ is
A) $\int|\psi|\,d\tau$ B) $\int|\psi^*|\,d\tau$ C) $\int|\psi|^2\,d\tau$ D) zero

b. Find the energy eigen value and eigen function for a particle in one dimensional potential well of infinite height. **(08 Marks)**

c. State and explain Heisenberg's uncertainty principle. **(04 Marks)**

d. Explain any four properties of wave function. **(04 Marks)**

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3 a. Choose the more correct answers for the following : **(04 Marks)**

i) The mobility of electrons is given by μ = _____

A) $\frac{U_d}{E}$ B) $\frac{e\tau}{m}$ C) $\frac{\sigma}{ne}$ D) all the three

ii) Probability of occupation for $E > E_f$ at $T = 0$ is,

A) infinite B) 0.5 C) zero D) one

iii) The Fermi temperature T_F = _____

A) $\frac{E_F}{k}$ B) $\frac{k}{E_F}$ C) kE_F D) $\frac{1}{2}mv^2$

iv) As per quantum free electron theory the resistivity of metal is ρ = _____

A) $\frac{V_F}{ne^2\lambda}$ B) $\frac{m^*}{ne^2\lambda}$ C) $\frac{ne^2\lambda}{m^*V_F}$ D) $\frac{m^*V_F}{ne^2\lambda}$

b. Using the classical free electron theory derive an expression for electrical conductivity in metals. **(06 Marks)**

c. Show that the occupation probability at $E = E_F + \Delta E$ is equal to the non – occupation probability at $E = E_F - \Delta E$. **(06 Marks)**

d. Find the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-8} ohm – m, if the metal has 5.8×10^{28} conduction electrons per m^3. **(04 Marks)**

4 a. Choose the more correct answers for the following : **(04 Marks)**

i) The correct relation among the following is,

A) $E = \epsilon_0(\epsilon_r - 1)P$ B) $P = \epsilon_0(\epsilon_r - 1)E$ C) $\epsilon_r = \chi - 1$ D) $D = \epsilon_0(\epsilon_r - 1)E$

ii) The polarization that occurs in the frequency range 10^{12} Hz is

A) ionic B) electronic C) orientation D) space charge

iii) The magnetic susceptibility is negative for,

A) paramagnetic B) ferromagnetic C) diamagnetic D) none of these

iv) Which of the following is necessarily a piezoelectric material?

A) lead B) mica C) iron D) quartz

b. Define dielectric polarization and explain three different polarization mechanisms. **(07 Marks)**

c. Explain ferroelectric hysteresis. **(05 Marks)**

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

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The life time of an atom in a metastable state is of the order of few

A) seconds B) nano seconds C) milliseconds D) unlimited

ii) In He-Ne laser, the laser emission takes place from

A) He atoms only B) Ne atoms only

C) both He and Ne atoms D) 50% each from He and Ne

iii) The pumping mechanism used in semiconductor laser is

A) optical pumping B) electric discharge C) forward bias D)chemical reaction

iv) Emission of photons by an excited atom due to interaction of external energy is

A) spontaneous emission B) stimulated emission

C) induced absorption D) photoelectric effect.

b. Describe the construction and working of He- Ne gas laser with energy level diagram. **(07 Marks)**

c. Obtain the expression for energy density of radiation under thermal equilibrium condition in terms of Einsteins coefficients. **(06 Marks)**

d. Find the number of modes of standing waves in the resonator cavity of length 1m in He – Ne laser operating at wavelength 632.8 nm. **(03 Marks)**

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6 a. Choose the more correct answers for the following : **(04 Marks)**

i) If light travels from a medium of refractive index 1.5 into air, total internal reflection will take place if angle of incidence is,

A) 10° B) 20° C) 30° D) 50°

ii) The number of modes in an optical fibre is expressed in terms of V number as,

A) $n = \frac{v}{2}$ B) $n = \frac{v^2}{2}$ C) $n = \frac{2}{v}$ D) $n = \frac{2}{v^2}$

iii) High temperature superconductors bear the crystal structure of,

A) cubic B) orthorhombic C) perovskite D) diamond

iv) Superconductor behave like a perfect

A) Diamagnet B) paramagnet C) ferromagnet D) antiferromagnet

b. With suitable diagrams, explain different types of optical fibers based on wave propagation through it. **(06 Marks)**

c. Describe type – I and type – II superconductors. **(06 Marks)**

d. A fiber with an input power of 9 μW has a loss of 1.5 dB/km. If the fiber is 3000 m long, calculate the output power. **(04 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) The crystal with lattices $a \neq b \neq c$ and angles $\alpha = \beta = \gamma = 90°$ represents,

A) cubic B) tetragonal C) orthorhombic D) monoclinic

ii) Miller indices of a plane parallel to x and z axes are,

A) (0 0 1) B) (0 1 0) C) (1 0 0) D) (1 0 1)

iii) Number of atoms per unit cell of diamond crystal is,

A) 4 B) 2 C) 6 D) 8

iv) In a Bragg x –ray spectrometer, for every rotation θ of the turn table, the ionization chamber turns by an angle,

A) θ B) 2θ C) 3θ D) θ/2

b. Derive an expression for interplanar spacing of a cubic crystal lattice in terms of Miller indices. **(06 Marks)**

c. Explain the crystal structure of sodium chloride (NaCℓ). **(06 Marks)**

d. Copper has fcc structure with atomic radius 0.127 nm. Calculate the interplanar spacing for (3 2 1) plane. **(04 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The bulk material reduced in two dimensions is known as,

A) quantum dot B) quantum wire C) film D) none of these

ii) The state of matter around nano size is know as,

A) Solid state B) liquid state C) plasma state D) mesoscopic state

iii) The velocity of ultrasonic waves through a liquid is proportional to,

A) bulk modulus B) density C) volume D) rigidity modulus

iv) The ultrasonic waves are detected by,

A) Electromagnetic induction B) tuning fork

C) piezo electric effect D) inverse piezoelectric effect.

b. Write a descriptive note on carbon nano tubes. **(08 Marks)**

c. What is non destructive testing? Explain the pulse echo method used for NDT and mention any two applications of it. **(08 Marks)**

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10CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2014/Jan.2015

Engineering Chemistry

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, choosing at least two from each part.***
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PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) In a Daniel cell, Zn electrode is coupled with the electrode
A) Ag B) Pt C) Pb D) Cu

ii) At laboratory temperature, the potential of calomel electrode depends on the concentration of
A) Hg^{2+} ions B) Hg_2^+ ions C) $Hg_2C\ell_2$ D) Chloride ions

iii) The standard reduction potential of Mn and Fe are -1.18 V and -0.44 V respectively. The standard EMF of cell formed by combining these two electrodes will be
A) +0.74 V B) -0.74 V C) +1.62 V D) -1.62 V

iv) For a spontaneous reaction in galvanic cell, E_{cell} is assigned
A) positive B) negative C) zero D) none of these

b. Define single electrode potential. Derive Nernst equation. **(06 Marks)**

c. What are concentration cells? A concentration cell was constructed by immersing two silver electrodes in 0.05 M and 0.1 M $AgNO_3$ solution. Write cell representation, cell reactions and calculate the emf of the concentration cell. **(05 Marks)**

d. What are ion selective electrodes? Discuss the construction and working of glass electrode. **(05 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of the following is not a rechargeable battery?
A) Pb-H_2SO_4 B) Ni-MH C) Ni-Cd D) Zn-MnO_2

ii) In methanol – O_2 fuel cell, which of the following electrolyte is used?
A) $NaC\ell$ B) H_2SO_4 C) NH_4OH D) CH3 - COOH

iii) In which of the battery, a key component is separated from rest of the components prior to activation?
A) primary battery B) secondary battery C) reserve battery D) none of these

iv) The reaction that takes place at anode of a battery is
A) reduction B) oxidation C) neutralization D) addition

b. Explain the following characteristics of battery:
i) Capacity ii) Energy efficiency iii) Cycle life **(06 Marks)**

c. Describe the construction and working of lead acid battery. Give the reactions involved in it. **(05 Marks)**

d. What are fuel cells? Describe the construction of H_2-O_2 fuel cell with reactions. **(05 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) In galvanic corrosion the less active metal always acts as
A) anode B) cathode
C) both anode and cathode D) none of these

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ii) In corrosion, the gas which is produced in acidic medium is
A) nitrogen B) oxygen C) hydrogen D) carbon dioxide

iii) At low hydrogen over voltage, the rate of corrosion
A) increases B) decreases
C) unchanged D) increases and then decreases

iv) The process of coating of metal Zinc on Iron is
A) anodic coating B) cathodic coating
C) inorganic coating D) painting

b. What is wet corrosion? Explain the electrochemical theory of corrosion. **(06 Marks)**

c. What is cathodic protection? Explain the sacrificial and impressed current techniques. **(06 Marks)**

d. Explain the effect of the following factors on the corrosion rate:
i) Nature of corrosion product
ii) Anodic and cathodic areas **(04 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) When the metal structure to be plated is irregular, the technique employed is
A) polarization B) electroless plating C) electro plating D) none of these

ii) Pickling process is carried out in an electroplating, in order to
A) remove the grease B) remove the oxide scale
C) increase the rate of plating D) get a bright deposit

iii) In chromium plating, the anode of the metal used is
A) Pb B) Cu C) Au D) Pb-Sb

iv) The electrode with lowest hydrogen over voltage is
A) Pt B) Hg C) Ni D) Zn

b. Discuss the influence of the following in electro plating bath solution:
i) Current density ii) Complexing agents iii) Wetting agents **(06 Marks)**

c. What is metal finishing? Explain the process of electroplating of gold? **(05 Marks)**

d. What is electroless plating? Explain the electroless plating of copper. **(05 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) If the percentage of hydrogen in a fuel is high, its NCV is
A) high B) low C) constant D) equal to HCV

ii) In order to increase the anti-knocking value of gasoline, which of the following process is carried out?
A) cracking B) knocking C) reforming D) reduction

iii) Cetane number of diesel is determined by mixing hexadecane with
A) n-heptane B) α - methyl naphthalene
C) phenolphthalein D) octane

iv) Blending agent added to the power alcohol is
A) Benzene B) Ethanol C) Ether D) Aldehyde

b. Define C.V. of a fuel. Explain the determination of C.V. of a solid fuel by Bomb Calorimetric method. **(06 Marks)**

c. Explain the construction and working of solar cell. **(05 Marks)**

d. What is reforming of gasoline? Give any four reactions. **(05 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) The two thermodynamic variable needed to explain condensed phase rule are
A) mass and temperature B) temperature and composition
C) volume and composition D) composition and pressure

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ii) The equilibrium between $H_2O_{(\ell)} \leftrightarrow H_2O_{(g)}$ phases in one component water system is
A) invariant B) univariant C) bivariant D) all of these

iii) 620 nm filter is used in copper estimation by colorimetry because
A) it filters out $CuSO_4$ particles B) maximum absorbance is observed
C) minimum absorbance is observed D) no effect is observed

iv) In potentiometric redox titrations platinum electrode is used in combination with
A) SHE B) calomel electrode C) NHE D) none of these

b. State the phase rule and explain the terms phase, component and degree of freedom with suitable examples. **(06 Marks)**

c. Discuss the phase diagram of lead-silver system. **(05 Marks)**

d. Write a note on the estimation of copper by colorimetric method. **(05 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) Polymer obtained from an addition polymerization is
A) phenol formaldehyde B) polyethylene
C) nylon D) Bakelite

ii) Chemical resistance of a polymer increases with
A) increase in crystalinity B) increase in cross-linking
C) increase in molecular mass D) all of these

iii) Tetrafluro ethylene is the monomer of
A) PMMA B) Teflon C) Polyurethane D) Polyethylene

iv) Generally high glass transition temperature of a polymer will have
A) low molecular mass B) high molecular mass
C) moderate molecular mass D) no change in molecular mass

b. Distinguish between the following with an example to each:
i) Addition and condensation polymerization
ii) Thermoplastics and thermo settings **(06 Marks)**

c. What are epoxy resins? Give the synthesis and applications of epoxy resins. **(05 Marks)**

d. What are conducting polymers? Discuss the mechanism of conduction in polyacetylene. **(05 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The buffer solution used in the determination of total hardness is
A) $NH_4OH + NaOH$ B) $NaC\ell + NH_4C\ell$
C) $CaC\ell_2 + NH_4OH$ D) $NH_4C\ell + NH_4OH$

ii) Barium chloride reagent is used in the estimation of
A) alkalinity B) nitrate C) sulphate D) fluoride

iii) The amount of oxygen (in mg/L) required by bacteria to oxidize the organic molecules aerobically is known as
A) COD B) TDS C) DO D) BOD

iv) The amount of dissolved oxygen of water sample
A) increase with temperature B) decrease with temperature
C) no effect of temperature D) none of these

b. Discuss the types of impurities present in water with examples. **(05 Marks)**

c. Discuss the argentometric estimation chloride in water sample with chemical reactions. **(05 Marks)**

d. What is a domestic sewage? Discuss the activated sludge process of treatment of sewage. **(06 Marks)**

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10CCP13/23

First/Second Semester B.E. Degree Examination, Dec.14/Jan.2015
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 on OMR sheet page 5 of the answer booklet.***
3. ***Answer to objective type questions on sheets other than OMR will not be valued.***

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) A word contains _____ number of bits.
A) 8 B) 16 C) 4 D) 32

ii) Which of the following is a input device?
A) Printer B) CRT screen C) Plotter D) Keyboard

iii) The term dots per inch refers to a printer
A) Speed B) Output C) Color D) Resolution

iv) Which is the main part of computer?
A) Input B) Output C) CPU D) Memory

b. What types of computers are used by the organizations? Explain. **(08 Marks)**

c. Explain the functional organization of a digital computer. **(08 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of these is not a network topology?
A) BUS B) RING C) STAR D) SQUARE

ii) Which of these is not a type of translator?
A) Assembler B) Interpreter C) Compiler D) Integrator

iii) Which is a secondary memory device?
A) CPU B) ALU C) Floppy disk D) Mouse

iv) A translator which reads a line and converts it into machine language code is
A) Assembler B) Interpreter C) System software D) Compiler

b. Explain the components of a computer network. **(04 Marks)**

c. Mention types of storage devices. Explain in brief. **(06 Marks)**

d. What is the need for networking? **(06 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of the following is an input function?
A) getc( ) B) puts( ) C) printf( ) D) putch( )

ii) The size of character data type is
A) 1 byte B) 2 bytes C) 3 bytes D) 4 bytes

iii) Which of these is a keyword?
A) PI B) add C) Sum D) while

iv) Which of these is a valid identifier?
A) int B) $roll no C) _name1 D) I class

b. Explain the parts of a C program. **(06 Marks)**

c. Explain the secondary data types in detail. **(06 Marks)**

d. Explain any two "C" tokens. **(04 Marks)**

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4 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of the following is an equal operator:

A) > = B) = C) = = D) ! =

ii) Which of the following is a ternary operator in C?

A) + + B) + C) ? : D) > =

iii) x = 5 > 3 && 5 > 2. What is the value of x?

A) 3 B) 1 C) 2 D) 0

iv) Which is not a bitwise operator?

A) & B) ¦ C) - - D) ~

b. Evaluate the expression a + 2 > b && !c ¦ ¦ a! = d && a – 2 < = e where a = 11, b = 6, c = 0, d = 7, e = 5. **(06 Marks)**

c. Explain logical operators with syntax and example. **(06 Marks)**

d. Explain special operators with an example. **(04 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The getch( ) is defined in ____ library

A) stdio.h B) math.h C) conio.h D) lib.h

ii) Parameters used in function call are called

A) Formal parameters B) Actual parameters

C) No parameter D) None of these

iii) The function which is called by itself is

A) Built in function B) User-defined function

B) Recursive function D) Conditional function

iv) The function which is written in the compiler

A) Recursive function B) User-defined function

C) Built-in function D) Backward function

b. Mention types of functions. Explain anyone type with syntax and example. **(06 Marks)**

c. Write a program to find the GCD of two numbers using function. **(04 Marks)**

d. Explain types of functions depending on parameter. **(06 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of the following is a jump statement?

A) for B) goto C) while D) do-while

ii) Which of the following executes atleast once?

A) while B) do-while C) for D) if

iii) Find out how many times the following loop is executed?

```
i = 10; j = 100;
while (i < = j)
{
  printf("%d", i);
  i = i + 10;
}
```

A) 9 B) 8 C) 10 D) 7

iv) Break statement is used in the following:

A) while B) for C) switch D) all the above

b. Differentiate between while and do while. **(04 Marks)**

c. Compare if statement and switch statement. **(06 Marks)**

d. Write a program in 'C' to print multiplication table upto 20. **(06 Marks)**

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7 a. Choose correct answers for the following : **(04 Marks)**

i) In a string name [5] = {'A', 'm', 'a', 'r'}; the character 'a' is designated as
A) name [0] B) name [2] C) name [3] D) name [4]

ii) In an array int a [2] [2] = {10, 30, 50, 70}; the a[1][1] element is
A) 70 B) 50 C) 30 D) 10

iii) Which of the following string handling function is used to combine two strings?
A) strcat( ) B) strcmp( ) C) strlen( ) D) strcpy( )

iv) String is ended with
A) 0 B) '\0' C) NULL D) ;

b. Mention the types of array. Explain any two with syntax and example. **(07 Marks)**

c. Write a program to multiple two arrays of given order a[m × n] and b[p × q]. **(09 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) Which of these OpenMP directives doesn't help in synchronization of tasks?
A) Barrier directive B) for directive
C) ordered directive D) flush directive

ii) _____ environment variable specifies the number of threads in parallel region.
A) OMP_DYNAMIC B) OMP_NESTED
C) OMP_SCHEDULE D) OMP_NUM_THREADS

iii) OpenMP stands for
A) Open multi-parallelism B) Organized multi-programming
C) Open multi-processing D) Organized multi-programming

iv) The part of the program where the shared memory is accessed is called
A) Executable section B) Critical section
C) Run-time section D) Memory section

b. How synchronization is achieved between various tasks in OpenMP? **(10 Marks)**

c. What are the functions that are supported by OpenMP to control the number of threads and processors? **(06 Marks)**

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10CIV13/23

First/Second Semester B.E. Degree Examination, Dec.2014/Jan.2015

Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs. Max. Marks:100

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

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) The branch of civil engineering which deals with used water and solid waste is called _____.
A) sanitary engineering B) water supply engineering
C) geotechnical engineering D) construction engineering

ii) Long span bridges are generally made up of _____.
A) PCC B) RCC C) PSC D) RMC

iii) Which of the following is not a term related to "bridge"?
A) pier B) abutment C) approach D) impervious core

iv) Kerbs are the components of _____.
A) roads B) dams C) bridges D) airports

b. Explain with a neat sketch the pipe culvert. **(04 Marks)**

c. Distinguish between: (i) Earthen dam and gravity dam; (ii) Temporary bridges and permanent bridges. **(06 Marks)**

d. With the help of a neat sketch, explain the important parts of bridge. **(06 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) Couple means two forces acting parallel, _____
A) equal in magnitude and in the same direction
B) not equal in magnitude and in the opposite direction
C) equal in magnitude and in the opposite direction
D) not equal in magnitude and in same direction

ii) A 250 N force makes an angle of 30° with the y-axis in first quadrant. Its x-component is _____.
A) +125 N B) –125 N C) +216.5 N D) –216.5 N

iii) The magnitude of the moment is maximum when a force applied _____ to the lever.
A) parallel B) inclined C) perpendicular D) all of these

iv) The physical quantity that produces translational motion is _____.
A) force B) moment C) energy D) momentum

b. Explain: i) Resolution and composition of forces
ii) Moment of a force and couple. **(06 Marks)**

c. Find the x and y components of the three forces shown in Fig.Q2(c). **(06 Marks)**

d. Determine the moment of 100 N force shown in Fig.Q2(d) about A and B. **(04 Marks)**

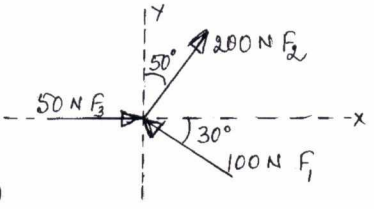

Fig.Q2(c)

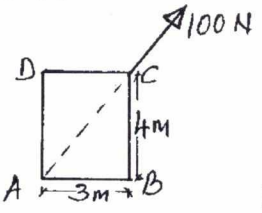

Fig.Q2(d)

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3 a. Choose the correct answers for the following : **(04 Marks)**

i) In a coplanar concurrent force system if $\sum V = 0$, then the resultant is _____.
A) horizontal B) vertical C) zero D) inclined

ii) The angle between two forces of magnitude 100 N each is 120°. The magnitude of their resultant is _____.
A) 0 N B) 200 N C) 100 N D) 120 N

iii) The mathematical statement of triangle law is known as _____.
A) parallelogram law B) law of sines
C) law of cosines D) law of tangents

iv) The angle between two forces to make their resultant a minimum and a maximum respectively are _____.
A) 0° and 90° B) 180° and 90° C) 90° and 180° D) 180° and 0°

b. State: (i) Verignon's theorem; (ii) Parallelogram law of forces. **(04 Marks)**

c. Determine the resultant for the system of forces shown in Fig.Q3(c) completely with respect to the point A. **(06 Marks)**

d. Find the resultant and its point of application on y-axis from A for the force system shown in Fig.Q3(d). **(06 Marks)**

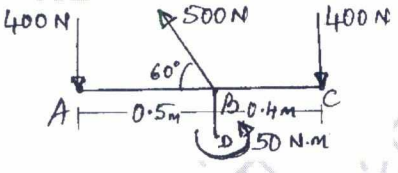

Fig.Q3(c)

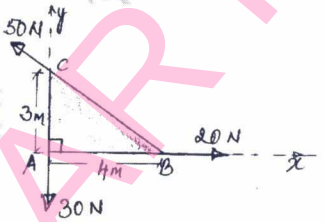

Fig.Q3(d)

4 a. Choose the correct answers for the following : **(04 Marks)**

i) An axis over which one half of the plane figure is just mirror image of the other half is _____.
A) neutral axis B) horizontal axis
C) axis of symmetry D) axis of unsymmetry

ii) The centroid of a triangular lamina of height 'h' is situated at a distance of _____ from its apex.
A) $\frac{h}{3}$ B) $\frac{h}{2}$ C) $\frac{2}{3}h$ D) $\frac{3}{2}h$

iii) Centroid of a quarter circular lamina lies from diameter line at a distance of _____.
A) $\frac{2R}{3\pi}$ B) $\frac{3R}{3\pi}$ C) $\frac{4R}{3\pi}$ D) $\frac{5R}{3\pi}$

iv) $\bar{X}$ is the distance of centroid from _____.
A) x-axis B) y-axis
C) z-axis D) centroidal axis

b. Explain centroid and centroidal axis. **(03 Marks)**

c. By method of moments determine the position of centroid for semicircular lamina having radius 'R'. **(05 Marks)**

d. Locate the centroid of the shaded area shown in Fig.Q4(d) with respect to the axis shown.

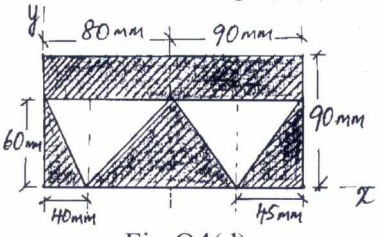

Fig.Q4(d) **(08 Marks)**

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PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The force which is equal and opposite to the resultant is _____.
A) resultant force B) force C) moment D) equilibrant

ii) Three forces acting on a body can keep it in equilibrium only when they are _____.
A) collinear B) coplanar and concurrent
C) coplanar and non concurrent D) coplanar and parallel

iii) If forces F_1 and F_2 acts along a straight line and F_3 is inclined at angle θ with F_1, then for equilibrium _____.
A) $F_3 = 0$ B) $F_3 = F_1 \cos\theta$ C) $F_3 = F_1 \sin\theta$ D) $F_3 = F_2 \cos\theta$

iv) Lami's theorem is valid for _____ forces in equilibrium.
A) 3 B) 2 C) 4 D) 6

b. Two cylinders A and B of diameters 80 mm and 120 mm respectively are held in equilibrium by separate strings as shown in Fig.Q5(b). Cylinder B rests against vertical wall. If the weights of cylinder A and B are 20 N and 40 N respectively, determine tension in strings and reactions at all points of contacts. **(08 Marks)**

c. Determine the support reactions at B and C for the beam loaded as shown in Fig.Q5(c). **(08 Marks)**

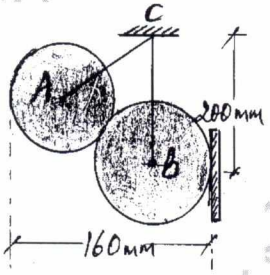

Fig.Q5(b)

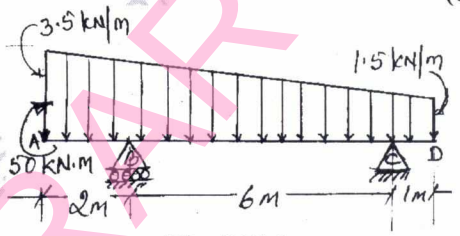

Fig.Q5(c)

6 a. Choose the correct answers for the following : **(04 Marks)**

i) The support which is neither permit to move in any direction nor allowed to rotate is known as _____.
A) hinged B) simple C) roller D) fixed

ii) When rate of loading increases or decreases at a constant rate over a given length of beam is called _____ load.
A) point B) concentrated
C) uniformly varying D) uniformly distributed

iii) The number of equations for equilibrium of a cantilever beam subjected to only vertical forces and moment is _____.
A) 1 B) 2 C) 3 D) 4

iv) If one end of a beam is fixed and the other is supported by a roller, it is known as _____ beam.
A) cantilever B) fixed
C) propped cantilever D) overhanging

b. A 1 kN roller resting on a smooth incline as shown in Fig.Q6(b) is held by a cable. If the tension in the cable is limited to 0.52 kN, determine the maximum inclination to which the plane can be raised. **(06 Marks)**

c. For the beam loaded as shown in Fig.Q6(c), determine the reactions that develops at supports A and B completely. **(10 Marks)**

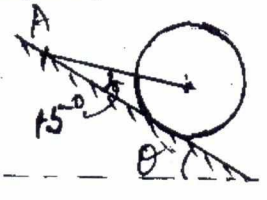

Fig.Q6(b)

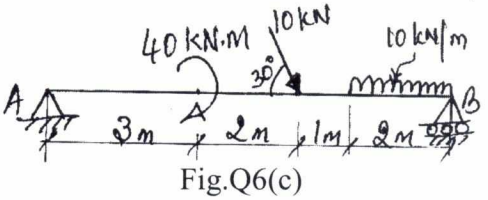

Fig.Q6(c)

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7 a. Choose the correct answers for the following : **(04 Marks)**

i) Compared to static friction, kinetic friction is _____.

A) greater B) smaller C) cheaper D) zero

ii) Force of friction developed at contact surface is _____.

A) zero

B) opposite to the direction of motion

C) along the direction of motion

D) perpendicular to the direction of motion

iii) Impending motion of a body refers to a _____.

A) state of rest B) state of uniform acceleration

C) state of uniform speed D) state of about to move

iv) The unit of coefficient of friction is _____.

A) Newton B) Radian C) dimensionless D) meter

b. Explain the terms: (i) Angle of repose; (ii) Cone of friction. **(04 Marks)**

c. Find the minimum value of horizontal force 'P' applied to the lower block that will hold the system in equilibrium. Take coefficient of friction as 0.25 at the floor, 0.3 at the wall and 0.2 between the blocks. Refer Fig.Q7(c). **(06 Marks)**

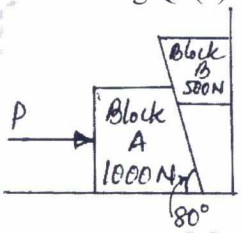

Fig.Q7(c)

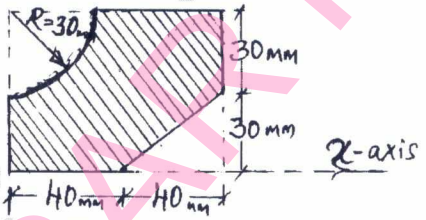

Fig.Q8(c)

d. A weightless ladder of length 8 m is resting against a smooth vertical wall and rough horizontal floor making an angle of 30° with vertical wall. The coefficient of friction between the ground and the ladder is 0.25. A man weighing 500 N wants to climb up the ladder. Find how much distance along the ladder the man can climb without slip. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) MI of a triangular section having base 'B' and height 'H' about its centroidal axis parallel to its base is _____.

A) $\frac{BH^3}{12}$ B) $\frac{HB^3}{12}$ C) $\frac{BH^3}{36}$ D) $\frac{HB^3}{36}$

ii) The radius of gyration of a circular area having radius R about the centroidal axis in its plane is _____.

A) R B) $\frac{R}{4}$ C) $\frac{R}{2}$ D) $\frac{4R}{3\pi}$

iii) MI of a square of side 'a' about an axis through its centroid is _____.

A) $\frac{a^4}{4}$ B) $\frac{a^4}{8}$ C) $\frac{a^4}{12}$ D) $\frac{a^4}{16}$

iv) Radius of gyration is given by the relation _____.

A) $\sqrt{\frac{I}{A}}$ B) $\sqrt{\frac{A}{I}}$ C) AK^2 D) $\sqrt{AK^2}$

b. Derive an expression for MI of a triangle about the base using method of integration. **(06 Marks)**

c. Calculate the MI and radius of gyration about the x-axis for the shaded area shown in Fig.Q8(c). **(10 Marks)**

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10EME14/24

First/Second Semester B.E. Degree Examination, Dec.14/Jan.2015
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 on OMR sheet page 5 of the answer booklet.*
3. *Answer to objective type questions on sheets other than OMR will not be valued.*

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) Superheating of steam is done at:
A) Constant volume B) Constant temperature
C) Constant pressure D) Constant entropy

ii) Lancashire boiler is of:
A) Stationary fire tube type B) Horizontal type
C) Internally fired type D) All of the above

iii) In nuclear power plant, heavy water is used as:
A) Coolant B) Moderator C) Shield D) All the above

iv) The mounting used to prevent the overheating of low water level is known as:
A) Safety valve B) Blow-off cock C) Fusible plug D) Injector

b. Determine the specific volume and density of 1kg of steam at 7bar, when the condition of steam is: i) Wet, having dryness fraction of 0.9; ii) Dry; iii) Superheated to 250°C. For P_{abs} = 7 bar, assume T_{sat} = 437.92K and v_g (specific volume of steam) = 0.273341 m^3/kg. **(06 Marks)**

c. With a neat sketch, explain the working of a Bab cock and Wilcox boiler. **(10 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) In a Parson's turbine, the relative velocity at outlet as compared to that at inlet is:
A) Greater B) Lesser C) Same D) Unpredictable

ii) In velocity compounding, the velocity of steam, when it passes through stationary blade is:
A) Increasing B) Decreasing C) Constant D) None

iii) Wicket gates are used in:
A) Water wheel B) Pelton wheel C) Francis turbine D) Kaplan turbine

iv) The working fluid used in a closed gas turbine is:
A) Water B) CO_2 C) Freon D) Helium

b. With a neat diagram, explain the working of a closed cycle gas turbine. **(06 Marks)**

c. Neatly sketch and explain the working of a Pelton wheel. **(10 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) The tendency of a Pelton wheel to knock, increases by:
A) Super charging B) Reducing spark advance
C) Scavenging D) Increasing cetane number of fuel

ii) A stoichiometric fuel-air ratio is:
A) Chemically correct mixture B) Lean mixture
C) Rich mixture D) Ratio used at full rated parameter

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iii) If the compression ratio in petrol engines is kept very high, then:
A) Pre-ignition of fuel will occur B) Detonation will occur
C) Ignition of fuel will be delayed D) None of the above

iv) Diesel as compared to petrol is:
A) less difficult to ignite B) Just about same to ignite
C) difficult to ignite D) Highly ignitable

b. Give four important comparisons between petrol engine and diesel engine. **(04 Marks)**

c. With the help of P-V diagram, explain the four strokes of a 4S spark ignition engine. **(06 Marks)**

d. The following observations were made during a test on a 4S engine. Bore = 250mm; stroke = 400mm; crank speed = 250rpm; net load on brake drum = 700N; diameter of brake drum = 2m; indicated m.e.p = 6 bar; fuel consumption = 0.0013 kg/sec; sp. Gravity of fuel = 0.78; CV = 43900 kJ/kg. Find: i) BP; ii) IP; iii) FP; iv) Mechanical efficiency; v) Indicated thermal efficiency; vi) Brake thermal efficiency. **(06 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) In vapour compression refrigeration, the condition of refrigerant is high pressure saturated liquid:
A) After passing through condenser B) Before passing through condenser
C) After passing through expansion valve D) Before entering expansion valve

ii) Pick the wrong statement. A refrigerant should have:
A) Low specific heat of liquid B) High boiling point
C) High latent heat of vapourization D) Low specific volume of vapour

iii) Domestic refrigerator working on vapour compression refrigeration uses the following expansion device:
A) Electrically operated B) Manually operated
C) Thermostatic type D) Capillary type

iv) Air conditioning means:
A) Cooling B) Heating
C) De-humidfying D) All the above

b. Define: i) Ton of refrigeration; ii) COP. **(04 Marks)**

c. With a neat sketch, explain the working of a vapour compression refrigeration system. **(06 Marks)**

d. Distinguish between vapour compression refrigeration and vapour absorption refrigeration systems. **(06 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) Lathe bed is made of:
A) Mild steel B) Stainless steel C) Cast iron D) Machined steel

ii) In order to turn taper on length (l) with two end diameters (d_1 and d_2), the tail stock set-over required is:
A) $d_1 - d_2$ B) $\frac{d_1 - d_2}{2}$ C) $\frac{d_1 - d_2}{2l}$ D) $\frac{d_1 - d_2}{l}$

iii) Twist drills are usually made of:
A) High speed steel B) Cast iron C) Mild steel D) Stainless steel

iv) The tool used to withdraw a drill from its sleeve is known as:
A) Drift B) Key C) Drill puller D) Lever

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b. With a neat sketch, explain the taper turning operation on lathe by swiveling of compound rest method. **(06 Marks)**

c. Briefly explain any five types of drilling machines. **(10 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) A grinding wheel gets glazed due to:
A) Wear of abrasive grains B) Wear of bond
C) Cracks on grinding wheel D) Embedding of metal powder

ii) The cutter in a horizontal milling machine is mounted on:
A) Spindle B) Arbor C) Holder D) Saddle

iii) The rotation of cutter and feed are in the same direction in:
A) Up-milling B) Conventional milling
C) Down milling D) Vertical milling

iv) Grinding operation is used for:
A) Shaping B) Dressing C) Forming D) Finishing

b. Distinguish between horizontal milling machine and vertical milling machine. **(06 Marks)**

c. With a neat sketch, explain in detail, the process of external cylindrical centreless grinding. Also mention its any two advantages. **(10 Marks)**

7 a. Choose correct answers for the following : **(04 Marks)**

i) The flux material used in brazing is:
A) Resin B) Tin C) Borax D) Lead

ii) One among the following is a solid lubricant:
A) Grease B) Graphite C) Mineral oil D) Synthetic oil

iii) In a journal bearing, the load acts:
A) Normal to the shaft axis B) Parallel to the shaft axis
C) Along the shaft axis D) None

iv) Anti friction bearing is:
A) Thin lubricated bearing B) Bushed bearing
C) Foot step bearing D) Ball bearing

b. Explain any four properties of a good lubricant. **(04 Marks)**

c. With neat sketches, explain the three types of flames used in welding. **(06 Marks)**

d. With neat sketches explain any two types of lubricators. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The gears used for intersecting shafts are:
A) Bevel B) Spiral C) Helical D) Worm

ii) Dedendum circle passes through:
A) Bottom of teeth B) Top of teeth C) Centre of teeth D) None

iii) High speed ratio can be obtained by using:
A) Bevel gear B) Spiral gear C) Helical gear D) Worm gear

iv) Ratio of driver gear speed to driven gear speed is called as:
A) Train value B) Velocity ratio C) Contact ratio D) None

b. Distinguish between open belt drive and closed belt drive. **(04 Marks)**

c. Briefly explain the following: i) Spur gear; ii) Rack and pinion; iii) Bevel gear. **(06 Marks)**

d. The sum of diameters of two pulleys (P_1 and P_2) connected by flat belt is 600mm. If they run at 2100 rpm and 1400 rpm respectively, determine the diameter of each pulley. Also find the length of open belt, if the centre distance between the two pulleys is 3m. **(06 Marks)**

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10CED14/24

First/Second Semester B.E. Degree Examination, November 2014

COMPUTER AIDED ENGINEERING DRAWING

Time: 3 Hours **(COMMON TO ALL BRANCHES)** Max. Marks: 100

Note: 1. Answer three full questions. 2. Use A4 sheets supplied.
3. Draw to actual scale. 4. Missing data may be assumed.

1. a. A point G is 25 mm below HP & is situated in the third quadrant. Its shortest distance from the intersection of XY and X_1Y_1 is 45 mm . Draw its projections and find its distance from VP. (10 Marks)

   b. The top view ab of a straight line AB is 60 mm long and makes an angle of 30^0 with the XY line. The end A is in VP and 30 mm above HP. The end B is 65 mm above HP. Draw the projections of the line AB and determine i) length of the front view ii) its true length and true inclinations with the reference planes. (20 Marks)

or

1. Draw the projections of a circular plate of negligible thickness of 50mm diameter resting on HP on a point A on the circumference, with its plane inclined at 45° to HP and the top view of the diameter passing through the resting point makes 60° with VP. (30 Marks)

2. A pentagonal pyramid 25 mm sides of base and 50 mm axis length rests on HP on one of its corners of the base such that the two base edges containing the corner on which it rests make equal inclinations with HP. Draw the projections of the pyramid when the axis of the pyramid is inclined to HP at 40° and appears to be inclined to VP at 45°. (40 Marks)

3. A square pyramid of 25mm base edge and 50mm height rests with its base on HP with all of its base edges equally inclined to VP. It is cut by a plane perpendicular to VP and inclined to HP at 60^0, passing through the extreme right corner of base. Draw the development of the lateral surface of the pyramid. (30 Marks)

or

3 Draw isometric projection of a hexagonal prism of side of base 40mm and height 60mm with a right circular cone of base 40mm as diameter and altitude 50mm, resting on its top such that the axes of both the solids are collinear. (30 Marks)

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10ELE15/25

First/Second Semester B.E. Degree Examination, Dec.2014/Jan.2015

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.***

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) If 110 V is applied across a 220 V, 100 W bulb, the power consumed by it will be
A) 100 W B) 50 W C) 25 W D) 12.5 W

ii) Three resistors of 4Ω, 6Ω and 9Ω are connected in parallel in a network. Maximum power will be consumed by
A) 4Ω B) 6Ω C) 9Ω D) all resistors

iii) If an emf of 8V is induced in a coil of inductance 4H, the rate of change of current through it must be
A) 32 A/sec B) 0.5 A/sec C) 2 A/sec D) 12 A/sec

iv) The principle of statically induced emf is utilized in
A) transformer B) motor C) generator D) battery

b. Obtain the potential difference V_{xy} in the circuit of Fig.Q1(b).

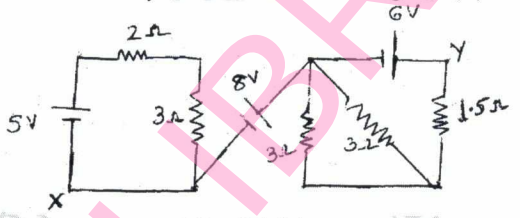

Fig.Q1(b) **(08 Marks)**

c. Prove that the coefficient of mutual inductance M between two coils of self inductances L_1 and L_2 is given by $M = K\sqrt{L_1 L_2}$, where K is the coefficient of coupling between the two coils. **(04 Marks)**

d. Two coils have a mutual inductance of 0.3 H. If the current in one coil is varied from 5A to 2A in 0.4 sec, calculate: i) The average emf induced in the second coil, ii) The change of flux linked with the second coil assuming that it is wound with 200 turns. **(04 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) In an ac circuit, if the active and apparent power are equal in magnitude, then the power factor of the circuit is
A) 1 B) 0.8 C) 0.6 D) zero

ii) If a 10Ω resistance is connected to an ac supply $v = 100\sin(314t + 39^\circ)V$, the power dissipated by the resistance is
A) 10000 W B) 1000 W C) 500 W D) 250 W

iii) The impedance of an RL circuit is 25Ω at a frequency of 50 Hz. At a frequency of 60 Hz, its impedance will be
A) greater than 25 Ω B) exactly 25 Ω
C) less than 25 Ω D) 0 Ω

iv) The maximum and minimum values of power factor in an ac circuit can be
A) 1 and 0 B) 0 and 1 C) -1 and -2 D) +10 and -10

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b. In case of a pure inductive circuit, obtain the phasor relationship between current and voltage. **(04 Marks)**

c. Obtain an expression for power in a series RLC circuit. **(06 Marks)**

d. For the circuit shown in Fig.Q2(d), find: i) The currents in each branch; ii) The source currents and iii) The power factor.

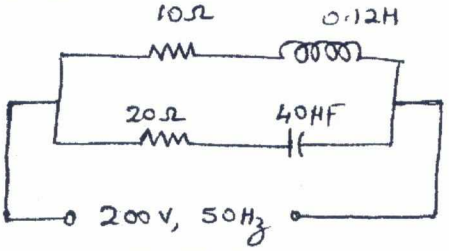

Fig.Q2(d) **(06 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) In a 3 phase, 4 wire system, the current in each phase is 15 A. The current in the neutral wire will be
A) 15 A B) 30 A C) 45 A D) zero

ii) If P is the total power consumed when three equal impedances are connected in star, then the total power consumed when the same three impedances are connected in delta is
A) P B) 3P C) P/3 D) zero

iii) In a three-phase system, the emfs in each phase are
A) 30° apart B) 60° apart C) 90° apart D) 120° apart

iv) In a three phase power measurement by two Wattmeter method, both Wattmeters read the same value the power factor of the load must be
A) unity B) 0.707 lagging C) 0.707 leading D) zero

b. With neat circuit diagram and phasor diagram, show that two Wattmeters are sufficient to measure power in 3-phase balanced, star connected circuits. **(08 Marks)**

c. A balanced 3-phase, star connected load of 100 KW takes a leading current of 80 A when connected to a 3-phase, 1.1 KV, 50 Hz supply. Find the resistance, impedance and capacitance per phase. Also calculate power factor. **(08 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) The electric energy meter installed near the mains switch in a home is
A) an indicating instrument B) an integrating instrument
C) a recording instrument D) an absolute instrument

ii) In a dynamometer Wattmeter; the fixed coil is
A) current coil B) potential coil
C) current or potential coil D) none of these

iii) What type of switch is used as the main switch near the energy meter in residential buildings?
A) DPST B) SPST C) DPDT D) none of these

iv) In case of three-way control of a lamp, how many switches are used?
A) 3 B) 2 C) 1 D) none of these

b. With a neat diagram, explain the working of a 1 phase induction type energy meter. **(08 Marks)**

c. Explain the necessity of earthing. Explain pipe earthing with a neat diagram. **(08 Marks)**

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PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The emf induced in each conductor of the armature in a dc machine is
A) alternating in nature B) direct in nature
C) pulsating in nature D) none of these

ii) A 220 V, DC machine has an armature resistance of 1 Ω. If the full-load current is 20 A, the difference in the induced emf when the machine is running as a generator and as a motor is
A) zero B) 20 V C) 40 V D) 220 V

iii) In a dc motor, the torque developed is 20 N-m at a current of 20 A. If the current is doubled, the torque developed becomes
A) 20 Nm B) 40 Nm C) 80 Nm D) 160 Nm

iv) Which dc motor will be preferred for constant speed?
A) compound motor B) series motor C) shunt motor D) none of these

b. Derive an expression for torque in a DC motor. **(06 Marks)**

c. Explain why starters are necessary for staring a DC motor. **(02 Marks)**

d. A 4-pole, 500 V, DC shunt motor has 720 wave connected conductors on its armature. The full load armature current is 60 A and the flux per pole is 0.03 wb. The armature resistance is 0.2 Ω and the contact drop is 1 Volt per brush. Calculate the full load speed of the motor. **(08 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) If an ammeter in the primary of a 100V/10V transformer reads 1A, the current in the secondary would be
A) 10 A B) 2 A C) 1 A D) 100 A

ii) The core of a transformer is laminated so as to
A) reduce hysteresis loss B) reduce eddy current loss
C) reduce copper loss D) reduce friction loss

iii) If the full load copper loss of a transformer is 100 W, its copper loss at half load will be
A) 200 W B) 100 W C) 50 W D) 25 W

iv) If the supply frequency changes from 50 Hz to 60 Hz, then the transformation ratio E_1/E_2
A) remains the same B) increases C) decreases D) equal to zero

b. With a neat sketch, explain the construction of core type and shell type transformers. **(06 Marks)**

c. Obtain the condition for maximum efficiency. **(04 Marks)**

d. In a 50 KVA, 11 KV/400 V single phase transformer, the iron and copper losses are 500 W and 600 W respectively under rated conditions. Calculate: i) Efficiency at unity power factor at full load, ii) The load for maximum efficiency and iii) The copper loss for this load. **(06 Marks)**

7 a. Choose the correct answers for the following : **(04 Marks)**

i) The stator core of a synchronous machine is built of laminations of
A) stainless steel B) silicon steel C) cast steel D) iron

ii) The machine that supplies DC power to the rotor of a synchronous machine is called
A) rectifier B) inverter C) converter D) exciter

iii) The maximum possible speed at which an alternator can be driven to generate an emf of 50 Hz is
A) 1500 rpm B) 3000 rpm C) 3600 rpm D) 4000 rpm

iv) The salient pole type rotors have
A) smaller diameter B) larger diameter
C) smaller axial length D) both B and C

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b. Derive an emf equation of ac generator. **(06 Marks)**

c. State the advantages of having rotating field system rather than a rotating armature system in a synchronous machine. **(04 Marks)**

d. A 4 pole, 3 phase, 50 Hz, star connected alternator has a single layer winding in 36 slots with 30 conductors per slot. The flux per pole is 0.05 wb and the winding is full pitched. Find the synchronous speed and the line voltage on No load. Assume winding factor as 0.96. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The rotor circuit of a three-phase induction motor under running condition is

A) always closed B) always open

C) sometimes closed and sometimes open D) none of these

ii) When an induction motor is standstill, its slip is

A) zero B) 0.5 C) 1 D) infinity

iii) Synchronous speed of a three phase induction motor is given by

A) $N_S = \frac{120f}{P}$ B) $N_S = 120\ fP$ C) $N_S = \frac{120P}{f}$ D) $N_S = \frac{fP}{120}$

iv) An induction motor works with

A) DC only B) AC only

C) both AC and DC D) none of these

b. Explain the principle of operation of a 3 phase induction motor. **(04 Marks)**

c. Define slip. Derive an expression for frequency of rotor current. **(06 Marks)**

d. A 3 phase, 12 pole alternator is driven by an engine running at 500 rpm. The alternator supplies an induction motor which has a full load speed of 1455 rpm. Find the slip and the number of poles of the motor. **(06 Marks)**

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10ELN15/25

First/Second Semester B.E. Degree Examination, Dec.14/Jan.2015
Basic Electronics

Time: 3 hrs. Max. Marks:100

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

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) The PIV for full wave bridge rectifier is

A) V_m B) $V_{m/2}$ C) $2V_m$ D) $V_m/\sqrt{2}$

ii) The capacitance of a reverse biased PN junction is called

A) Diffusion B) Conventional C) Drift D) Transition

iii) Zener diode regulates only where it is connected in

A) Forward bias B) Open C) Reverse bias D) Short

iv) The maximum rectification efficiency of full wave rectifier is

A) 40.6% B) 60.4% C) 78.5% D) 81.2%

b. With the neat diagram and relevant waveforms explain the working principle of centre tapped full wave rectifier. **(06 Marks)**

c. A half wave rectifier uses a diode whose internal resistance is 30Ω to supply power to 1.1KΩ load from 110V (rms) source of supply. Calculate: i) DC load voltage; ii) DC load current; iii) AC load current; iv) Percentage regulation. **(05 Marks)**

d. Explain the function of zener diode voltage regulator with neat circuit diagram and relevant equations for zener current. **(05 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) When the transistor is operated in the cut-off region both the junctions are ____

A) Forward biased B) Reverse biased

C) No bias D) Input forward biased and o/p reverse biased

ii) The doping of the emitter region of a transistor is ____ the base region.

A) greater B) lesser C) equal D) normal

iii) The transistor operating point is along the ____

A) load line B) x axis C) y axis D) cut off region

iv) In a transistor the current condition is due to _____ carriers.

A) Majority B) Minority C) both a and b D) none of these

b. Draw and explain the input and output characteristics of a PNP transistor in CE configuration. **(08 Marks)**

c. Derive the relation α_{dc} and β_{dc}. Given I_c = 3mA and I_E = 3.03 mA. If the transistor is replaced with another transistor that has β_{dc} = 75, calculate the new values of I_C and I_E, assuming I_B remains same in both the cases. **(08 Marks)**

3 a. Choose the correct answers for the following : **(04 Marks)**

i) _____ bias gives best biasing stability

A) fixed bias B) voltage divider bias

C) Base bias D) a and c

ii) For an emitter follower, the voltage gain is

A) unity B) greater than unity C) less than unity D) zero

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iii) The stability factor is given by

A) $\frac{dI_{CO}}{dI_E}$ B) $\frac{dI_B}{dI_{CO}}$ C) $\frac{dI_E}{dI_{CO}}$ D) $\frac{dI_C}{dI_{CO}}$

iv) The operating point must be _____ for the proper operation of transistor

A) Stable B) High C) Increasing D) Decreasing

b. Draw the load line and the Q point for the circuit of collector to base bias given $R_B = 100K\Omega$, $R_C = 10K\Omega$, $V_{CC} = 12V$ and $\beta_{dc} = 100$. **(08 Marks)**

c. Discuss the causes for bias instability in transistors. **(04 Marks)**

d. Derive the stability factor S for base bias circuit. **(04 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) The SCR is a _____ device

A) NPN B) PNP C) PNPN D) PNN

ii) A relaxation oscillator uses _____

A) MOSFET B) SCR C) UJT D) BJT

iii) The FET is a _____ controlled device

A) Current B) Voltage C) Power D) None of these

iv) The minimum point in VI characteristics of UJT is known as

A) Negative point B) Valley point

C) Latching point D) Conducting point

b. Explain the construction of n channel JFET and write its symbol. **(08 Marks)**

c. Draw and explain relaxation oscillator using UJT. **(08 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) The total phase shift around a loop must be _____ for sustained oscillations

A) 180° B) 360° C) 90° D) 270°

ii) The frequency of Hartley oscillator is

A) $\frac{1}{2\pi\sqrt{Le}}$ B) $\frac{1}{2\pi\sqrt{RC}}$ C) $\frac{1}{2\pi\sqrt{C}}$ D) $\frac{1}{2\pi LC}$

iii) Oscillator uses _____ type of feedback

A) Positive B) Negative C) Reverse D) None of these

iv) A phase shift oscillator has

A) Three RC circuits B) Three LG circuits C) T-type circuits D) π type circuits

b. Explain Hartley oscillator with a help of neat diagram **(08 Marks)**

c. Explain Barkhausen criterion for oscillations. **(04 Marks)**

d. Give four advantages of negative FB (feedback) in amplifier. **(04 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) Ideally open loop gain of op-amp is

A) 0 B) 1 C) ∞ D) Negative

ii) The gain of the voltage follower is

A) zero B) infinite C) negative D) unity

iii) The screen of CRT is coated with

A) chromium B) phosphor C) carbon D) germanium

iv) When op-amp used as integrator with input as square wave the output will be

A) Ramp B) triangular wave C) cosine wave D) step wave

b. Show how an op-amp can be used as an differentiator. Derive expression for output voltage. **(10 Marks)**

c. Explain the ideal op-amp characteristics. **(06 Marks)**

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7 a. Choose correct answers for the following : **(04 Marks)**

i) 75 in binary contains for the following

A) 4 B) 6 C) 2 D) 5

ii) The given $(8BF)_{16}$ what is the positional weight of 8.

A) 16 B) 256 C) 4096 D) 8192

iii) The modulating frequencies is ____ carrier frequency

A) lower than B) higher than C) equal to D) none of these

iv) The modulation done in

A) Transmitter B) Receiver C) None of the above D) a and b

b. Explain super heterodyne receiver with neat diagram. **(08 Marks)**

c. Perform the following operations:

i) $(34.22)_8 - (417.54)_8$ using 8's complement method.

ii) $(CAD.F1)_{16} + (BE1.54)_{16}$. **(08 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) The output is high when both the inputs are zero to the gate. The gate is

A) NOR B) NAND C) NOT D) AND

ii) Demorgous theorem states that $\overline{A+B}$ is

A) $\overline{A}+\overline{B}$ B) $\overline{A}.\overline{B}$ C) $\overline{AB}$ D) $\overline{A}+B$

iii) Example of universal gate is

A) NOT B) OR C) NOR D) AND

iv) An half adder has two inputs and outputs.

A) One B) Two C) Three D) None of these

b. Simplify $P = xy + xyz + xy\bar{z} + \bar{x}yz$ using 2 input NAND gates. **(06 Marks)**

c. Show that NAND gate is an universal gate (Realize basic gates). **(06 Marks)**

d. Implement full adder using two half adders and one OR gate. Write the equations for sum and C_{out}. **(04 Marks)**

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Question Paper Version : A

First/Second Semester B.E Degree Examination, Dec. 2014 / Jan. 2015
Environmental Studies
(COMMON TO ALL BRANCHES)

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

INSTRUCTIONS TO THE CANDIDATES

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

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1. The word 'ecology' is derived from
   A) Greek B) French C) Spanish D) English.

2. The largest portion of atmospheric gases by weight is
   A) Oxygen B) Nitrogen C) Sulphur D) Ozone

3. The atmosphere is divided into spherical layers band upon the
   A) density of each layer B) concentration of ozone in each layer
   C) temperature changes from variations in absorption of solar energy
   D) concentration of oxygen in each layer.

4. The largest unit of living organism on earth is
   A) Ecosystem B) Atmosphere C) Biome D) Biosphere.

5. Weather patterns are largely dependent on
   A) microsphere B) stratosphere C) troposphere D) thermosphere

6. Stratospheric ozone is responsible for all of the following, except
   A) Screening out ultraviolet radiation B) Allowing the evolution of life on land.
   C) Preventing ozone formation in the troposphere
   D) Lowering atmospheric water vapour.

7. What is the largest cause of soil erosion?
   A) moving water B) still water C) wind D) sink holes

8. A typical productive soil consists of approximately _____ organic matter.
   A) 5% B) 10% C) 20% D) 50%

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9. Excessive mineral salt accumulation in soil termed as _____
A) water logging B) Salinization C) over grazing D) None of these

10. Major purpose of most of the dams around the world is
A) power generation B) drinking water supply C) flood control D) irrigation

11. Examine application/usage of NPK fertilizers leads to the reduction of _____ in plants
A) protein B) pigmentation C) evapotranspiration D) chlorophyll

12. Formation of water layer on land is called
A) Water logging B) desertification C) salinization D) None of these

13. Afforestation can aid in minimizing _____
A) earthquakes B) landslides C) tsunamis D) None of these

14. Pathogenic bacteria enter wastewater, primarily from
A) Industrial waste B) Domestic waste
C) Both industrial and domestic D) Infilteration from surrounding

15. _____is an index of water pollution
A) BOD B) COD C) Turbidity D) Nitrates

16. The following disease is not caused by water pollution
A) Jaundice B) Dysentery C) Malaria D) Typhoid

17. The liquid waste from bath and kitchen is called
A) sulluge B) domestic sewage C) storm waste D) run – off

18. An important water contaminant is
A) Heavy metals B) Nitrogen oxides C) Carbon monoxide D) NO and SO_2

19. India has the largest share of which of the following
A) Manganese B) Mica C) Copper D) Diamond

20. Out of the following nutrients in fertilizers, which one causes minimum water pollution
A) Nitrogen B) Phosphorous C) Potassium D) Organic matter

21. Conversion of nitrates into gases of nitrogen is called.
A) Nitrification B) Nitrogen fixing C) Reduction D) Dentrification

22. Forest rich land in Karnataka is found in
A) Western ghats B) Bandipur C) Nagar hole D) Mangalore

23. Natural resource that occur at specific places are termed as _____ resources
A) Ubiquitous B) localized C) non renewable D) exhaustive

24. Which of the following would not be considered part of the direct input of energy from the sun?
A) solar energy B) hydropower C) biomass D) geothermal

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25. The maximum reserves of natural gas is in
A) Russia B) UK C) Iran D) USA

26. Wind energy generation depends on
A) velocity of wind B) humidity C) precipitation D) None of these

27. The world's largest wind farm is located in
A) California B) Scotland C) India D) Texas

28. Nuclear power plant in Karnataka is located at
A) Sandur B) Bellary C) Kaiga D) Raichur

29. Biogas is produced by
A) Microbial activity B) Harvesting crop
C) Both (A) and (B) D) None of these

30. Which place in India the tidal energy has been experimented.
A) Goa B) Karnataka C) Kerala D) Tamilnadu

31. The maximum contribution of green house gases to the atmosphere is from _____sector.
A) Transportation fuels B) Power stations
C) Agricultural by products D) Wash treatment

32. Smog is a combination of the words
A) Smoke and fog B) Snow and fog
C) Smoke and snow D) All of the above

33. The most important indoor air pollution is
A) SO_2 B) CO_2 C) NO_2 D) Radon gas

34. Which of the following is a non – point source of pollution?
A) Industries B) Sewage treatment plants
C) Agricultural lands D) All of the above

35. Noise pollution limits in Industrial area
A) 45dB B) 80dB C) 65dB D) 90dB

36. "Minamata Disease" is caused due to
A) Lead B) Arsenic C) Mercury D) Cadmium

37. Neem is a
A) Biopesticide B) Biofertilizer C) Herbicide D) Fugidicide

38. Demography is the study of
A) Animals behaviour B) Population growth C) River D) None of these

39. The first of the major environmental protection act to be promulgated in India was
A) Water act B) Air act
C) Environmental act D) Noise pollution rules

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40. The International protocol to protect the ozone layer is
A) Vienna protocol B) Kyoto protocol
C) Carotene protocol D) Montreal protocol

41. Major compound responsible for the distraction of stratospheric ozone layer is
A) Oxygen B) CFC C) Carbon dioxide D) Methane

42. The chief chemical compound responsible for Ozone hole is
A) Chlrofluoro carbon B) Chloride C) Methane D) Nitrous oxide

43. Acid rain can be controlled by
A) Reducing SO_2 and NO_2 emissions B) Reducing particulates in air
C) Increasing the forest cover D) Curtailing the emission of GHGs.

44. Normal average thickness of stratospheric ozone layer across the globe is around
A) 200 DU B) 300 DU C) 400 DU D) 500 DU

45. Animal husbandry results in
A) Global warming B) Acid rain C) Ozone depletion D) None of these

46. The wild life protection act was enacted in the year
A) 1986 B) 1974 C) 1994 D) 1972

47. In our country, Vana Mohotsav day is celebrated on
A) October 2 B) July 1 C) June 5 D) September 16

48. Which state is having highest women literacy role in India
A) Karnataka B) Punjab C) Rajasthan D) Kerala

49. Narmada Bachao Andolan was lead by
A) Sunderlal Bahuguna B) Medha patkar
C) Vandana Shiva D) Suresh Heblikar.

50. Which of the following is the authority to monitor industrial effluents
A) Center for science and environment B) State pollution Control Board
C) Indian Environmental Association D) None of these

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Question Paper Version : A

I / II Semester B.E Degree Examination, Dec.2014 / Jan.2015
CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS
(COMMON TO ALL BRANCHES)

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

INSTRUCTIONS TO THE CANDIDATES

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

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1. By which fundamental Right our all the other fundamental Rights are protected?
   a) Equality before law b) Right against exploitation
   c) Right to constitutional remedy d) Right to life
2. Under which category of Amendment Procedure the 29th state like 'Telengana' can be created.
   a) Amendment through simple majority b) Amendment through special majority
   c) Amendment through special majority with ratification of half of the states
   d) All the above
3. An ordinary Bill can be initiated in either house of the parliament by _____
   a) A minister only b) An MP if he is a minister
   c) An ordinary citizen with the support from minister
   d) Any ordinary person OR an MP OR by any minister.
4. Find out the wrong statement for the state Legislative council. In a Bi-Cameral state legislature, 'Legislative Council's power is limited to _____
   a) To assent the Bill passed in Vidhan Sabha b) Delay the Bill max. for three months.
   c) End of life of the bill with negative votes d) Delay the Money Bill for fourteen days
5. National commission for women was set up in the year _____ and it also _____.
   a) 1951 4th July; includes minorities b) 31st Jan 1992; enjoys the status of civil court
   c) 6th June 1976; enjoys the status of an NGO d) May 1st 2005; is a self governing body
6. Art 164 provides special provision of a Minister-in-charge for tribal welfare in the states of _____
   a) Andhra Pradesh, Madhya Pradesh, Uttaranchal b) West Bengal, Andaman Islands, Goa
   c) Bihar, Madhya Pradesh, Orissa d) Jammu & Kashmir & Maharashtra
7. The schedule castes and schedule tribes are to be identified by the _____
   a) Ruling political parties b) Governors of the respective states
   c) President in consultation with Government
   d) President in consultation with the Governors of the respective states.
8. Seats are reserved in Lok Sabha and Vidhan Sabha as ordained by Art ___ and Art ___.
   a) Art 330 & Art 332 b) Art 340 & Art 340 c) Art 350 & Art 352 d) Art 320 & Art 322

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9. Under what circumstances the life of Lok Sabha can be extended by one year?
   a) In the exercise of President's special power
   b) If the opposition political parties unwilling to contest in the election
   c) When national emergency is proclaimed under Art 352
   d) No such provision in the constitution

10. Election commission is a _____Body and the term of election commissioner is _____years OR _____ years of age whichever earlier.
   a) Uni-member body; 4 years OR 62 years
   b) Bi-member body; 5 years OR 64 years
   c) Multi-member body; 6 years OR 65 years
   d) Constitutional body; 5 years OR 60 years

11. The subject-matter of legislation is divided between the centre and state under '_____' heads. They are _____.
   a) 2 heads ; List of Supreme Court and High Court.
   b) 2 heads ; Sarkaria Commission and Human Resource Dept.
   c) 3 heads ; Union list, State List and Concurrent List.
   d) 4 heads ; Union Parliament, State Legislature, SC and HC.

12. Revealing confidential information / sharing proprietery information of one company with others, amounts to _____.
   a) Violation of patent right b) Misusing the truth c) Breach of trust d) Criminal breach of trust

13. Because of Engineers _____ they cannot raise their eyes from their perfect world of science and technical expertise and fail to look around to understand the larger implication of what they are doing.
   a) Ignorance b) Ego Centric Tendencies c) Microscopic vision d) Self interest

14. Reasonable care view of responsibility is concerned with _____
   a) The concept of doing work above and beyond the call of duty
   b) Doing work to avoid blame and stay out of trouble
   c) A strong we feeling
   d) The people who are at the risk of being harmed.

15. An event tree diagram is used to find out logically _____
   a) The relationship between pipe break and to what extent the safety system can be affected in a nuclear plant.
   b) Why the automobile did not take the start.
   c) The number of deviances in safely approach.
   d) What leads to Engineer's dishonesty

16. Engineering code of Ethics holds paramount _____
   a) The liability of Engineers
   b) The risk factors of the engineers
   c) The safety, health and welfare of public
   d) The moral imagination of engineers

17. An engineer can abuse client-professional confidentiality in two ways. First, " breaking confidentially when not warranted" The other one is '_____'.
   a) Giving expert testimony with poor knowledge
   b) Refuse to break confidentiality when higher obligation to public requires it.
   c) If engineers take risk
   d) By conflicting interest

18. Using others intellectual property and passing it off as if it is his own is called '_____' in professional ethics.
   a) Plagiarizing b) Forging c) Cooking d) Trimming

19. Aims of studying engineering ethics is to _____
   a) Recognizing ethical issues
   b) Learn to shift responsibility
   c) Establish professional relationship
   d) All the above

20. Which of the following WRITS can be issued to inferion courts:
   a) Writ of PROHIBITION b) Writ of Mandamus c) Writ of CERTIORARI d) All the above

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21. The Guwahati High Court has territorial jurisdiction over '_____' states.
a) 2 states b) 6 states c) 7 states d) 3 states

22. The judicial power as per Indian constitution is divided between,
a) Indian Union and States of India. b) Common / Unified judiciary for the entire country.
c) Divided between Supreme Court & High Court d) Union Parliament, Union Territories and States.

23. Supreme Court of India was established by Art _____ of the constitution. The power to prescribe the no. of judges is vested with the _____.
a) Art 124 ; Union parliament b) Art one ; President
c) Art 133 ; Union of India d) Art 333 ; Lok Sabha and Vidhan Sabha

24. The Chief Justice of India '_____' a retired Supreme Court / High Court judge to sit and act as a judge of Supreme Court.
a) Cannot request b) This is unconstitutional
c) Can request with a prior consent of the president
d) Can request with a prior approval from the parliament.

25. The administration of the Union Territories is carried on in the name of '_____'.
a) The Governor of Union Territory b) President of India
c) Administrative officer through the Governor of the UT. d) Parliament through the Vice-President

26. The portfolios of the ministers are allocated by the '_____' for central Govt. and by the '_____' for state Govt.
a) Prime Minister and Chief Minister b) President and Governor
c) Vice President and President d) Parliament and Vidhan Sabha

27. The highest Law officer for the Govt. of India is _____,
a) Union Law minister b) Chief Justice of India
c) Advocate General of India d) Attorney General of India.

28. Under which Article No the speaker can cast vote?
a) Art 201 during emergency b) Art 100 when there is a tie
c) Art 101 when Quorun is incomplete d) Art 200 when there is joint sitting

29. The president does not have the power to _____
a) Veto a Bill b) Dissolve Rajya Sabha c) Adjourn Lok Sabha d) (b) and (c)

30. President's judicial power includes___, which absolves the offender from all convictions.
a) Respite b) Respect c) Pardon d) Commutation

31. Which one among the followings has the constitutional authority to make ordinance?
a) President and Vice President b) President and Governor
c) President and PM d) PM and Chief Minister

32. Proportional Representation by means of single transferable vote is applicable in '____'
a) The Appointment of a Governor b) General Election c) Presidential election
d) The nomination of members in Lok Sabha and Rajya Sabha

33. The Governor can nominate max____ members of the total no MLCs in the Upper House of the state.
a) One-fourth b) One fifth c) One-Sixth d) One-Twelfth

34. The Governor's pardoning power is not applicable in case of '_____'.
a) Court Martial b) Court Martial and Death Penalty
c) Life imprisonment d) Conviction of Infanticide

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35. Tick out the incorrect statement about the directive principles of state policy,
a) It is enforceable through court b) It is the duty of the Govt. to apply DPSP in making law.
c) DPSPs impose certain obligation on the union and state Govt.
d) DPSPs constitute a very comprehensive social, economic and political programme for modern economic state.

36. Which one of the followings comes under Gandhian Principle?
a) Organizing village Panchayat b) Prohibition of Liquor consumption
c) Organizing agriculture and animal husbandry d) All the above

37. Promotion of International peace and security comes under '_____'.
a) Fundamental Duty b) DPSPs
c) Fundamental Rights d) The control of President

38. Which Article of the constitution prohibits cow slaughter?
a) Art 38 b) Art 42 c) Art 48 d) Art 49

39. The constitution of India was adopted on '_____' and enforced on '_____'
a) 26–1–1947 And 26–11–1949 b) 16–8–1940 And 26–1–1952
c) 26–11–1949 And 26–1–1950 d) 31–12–1949 And 26–1–1949

40. Preamble is a faithful '_____'.
a) Reflection of Nehruji's objective resolution b) Statement of Mahatma Gandhi
c) Creation of 1st constitutional Amendment d) All the above

41. The territory of India is defined in Art '_____'.
a) Art 1 b) Art 2 c) Art 3 d) Art 4

42. A person arrested should be produced before the Magistrate within '_____' of arrest.
a) 48 hours b) One week c) 72 hours d) 24 hours

43. To uphold and protect the Sovereignty, Unity and Integrity of India is a '_____'.
a) A fundamental duty b) A Principle in DPSP
c) A fundamental right d) An objective of the preamble

44. Under which fundamental right, right to speech and expression is ensured?
a) Right to equality b) Right to Freedom c) Right to life d) Right against Exploitation

45. Which articles of the constitution protect the rights of the convicted?
a) Art 14 & Art 16 b) Art 16 & Art 18 c) Art 18 & Art 20 d) Art 20 & Art 22

46. "Compelling a person to live in sub-human condition" amounts to violation of '_____'
a) Right against exploitation b) Violation of Art 21
c) Right to life d) Prohibition of Discrimination

47. Reasonable restriction can be imposed on our freedom of movement on the ground of '_____'.
a) In the interest of Gen Public b) Sovereignty and Integrity of the nation
c) Public Morality d) In the interest of general public and protection of scheduled tribe.

48. A foreign tourist in India '_____'.
a) Cannot move anywhere in India b) Has right to religion
c) Has equal protection of law d) All the above.

49. Parliament holds the right to remove _____
a) President b) Election commissioner c) Judges of Supreme Court d) All the above

50. The MPs of Raya Sabha are elected by the '_____' for a fixed period of '_____' years.
a) MPs of Lok Sabha ; 5 years b) MLAs of Vidhan Sabha ; 6 years
c) Elected MPs of Lok Sabha; 5 years d) Elected MLAs of Vidhan Sabha ; 3 years

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10MAT21

Second Semester B.E. Degree Examination, Dec.2014/Jan.2015
Engineering Mathematics – II

Time: 3 hrs. Max. Marks:100

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

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

PART – A

1 a. Choose the correct answers for the following : **(04 Marks)**

i) A differential equation of the first order but of higher degree, solvable for x, has the solution as:

A) $F(y, p, c) = 0$ B) $F(x, p, c)$ C) $F(x, y, c) = 0$ D) $F(y, C_1, C_2) = 0$

ii) If $xy + C = C^2x$ is the general solution of a differential equation then its singular solution is,

A) $y = x$ B) $y = -x$ C) $4x^2y + 1 = 0$ D) $4x^2y - 1 = 0$

iii) The general solution of Clairant's equation is,

A) $y = Cf(x) + f(C)$ B) $y = Cx + f(C)$ C) $x = Cf(y) + f(C)$ D) $x = Cy + g(C)$

iv) The general solution of $p^2 - 7p + 12 = 0$ is,

A) $(y - 3x - c)(y - 4x - c) = 0$ B) $(y - c)(x - c) = 0$

C) $(3x - c)(4x - c) = 0$ D) $(y + 3x + c)(y - 4x - c) = 0$

b. Solve : $xp^2 - (2x + 3y)p + 6y = 0$. **(05 Marks)**

c. Solve : $y = 3x + \log p$ **(05 Marks)**

d. Obtain the general solution and the singular solution of the equation $xp^3 - yp^2 + 1 = 0$ as Clairant's equation. **(06 Marks)**

2 a. Choose the correct answers for the following : **(04 Marks)**

i) The particular integral of $(D^2 + a^2)y = \sin ax$ is,

A) $\frac{-x\cos ax}{2a}$ B) $\frac{x\cos ax}{2a}$ C) $\frac{x\sin ax}{2a}$ D) $\frac{-x\sin ax}{2a}$

ii) The solution of the differential equation $(D^4 - 5D^2 + 4)y = 0$ is,

A) $y = C_1e^x + C_2e^{-x} + C_3e^{2x} + C_4e^{-2x}$

B) $y = (C_1 + C_2x + C_3x^2 + C_4x^3)e^{2x}$

C) $y = C_1\cos x + C_2\sin x + C_3\cos 2x + C_4\sin 2x$

D) None of these

iii) The particular integral of $(D - 1)^2y = 3e^x$ is,

A) $-\frac{3}{2}xe^x$ B) $-\frac{3}{2}x^2e^x$ C) $\frac{3}{2}x^2e^x$ D) $\frac{2}{3}x^2e^x$

iv) The roots of auxillary equation of $D^2(D^2 + 2D)^2y = 0$ are:

A) 0,0,0,0,2,2 B) 0,0,0,0,-2,-2 C) 0,0,2,2,-2,-2 D) 2,2,2,2,0,0

b. Solve : $(D^2 - 2D + 1)y = xe^x + x$. **(05 Marks)**

c. Solve : $(D^2 - 4D + 4)y = e^{2x} + \cos 2x + 4$. **(05 Marks)**

d. Solve : $\frac{dx}{dt} - 7x + y = 0$, $\frac{dy}{dt} - 2x - 5y = 0$. **(06 Marks)**

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3 a. Choose the correct answers for the following : **(04 Marks)**

i) The complementary function of $x^2y'' - 3xy' + 4y = x$ is:

A) $(C_1 + C_2 \log x)x^2$ B) $(C_1 + C_2 x)e^{2x}$

C) $C_1 + C_2 x$ D) $\frac{C_1}{x} + \frac{C_2}{x^2}$

ii) By the method of variation parameters, the value of 'W' is called,

A) Euler's function B) Wronskian of the function

C) Demorgan's function D) Cauchy's function

iii) The equation $(2x+1)^2y'' - 6(2x+1)y' + 16y = 8(2x+1)^2$ by putting $z = \log(2x+1)$ with $D = \frac{d}{dz}$ reduces to,

A) $(D^2 + 4D + 4)y = 3e^{2z}$ B) $(D^2 - 4D + 4)y = 2e^{2z}$

C) $(D^2 - 4D + 4)y = 0$ D) None of these

iv) To find the series solution for the equation $2x^2y'' - xy' + (1 - x^2)y = 0$, we assume the solution as,

A) $y = \sum_{r=0}^{\infty} a_r x^r$ B) $y = \sum_{r=0}^{\infty} a_{r+1} x^{r+1}$ C) $y = \sum_{r=0}^{\infty} a_{r-1} x^{r-1}$ D) $y = \sum_{r=0}^{\infty} a_r x^{K+r}$

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

c. Solve : $(3x+2)^2y'' + 3(3x+2)y' - 36y = 8x^2 + 4x + 1$ **(05 Marks)**

d. Solve : $y'' + xy' + y = 0$ in series solution. **(06 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**

i) $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$, a and b are arbitrary constants, is a solution of:

A) $2z = p^2x + qy$ B) $2z = px + q^2y$ C) $2z = px + qy$ D) None of these

ii) The auxiliary equations of Lagrange's linear equation $Pp + Qq = R$ are:

A) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ B) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{R}$ C) $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ D) $\frac{dx}{x} + \frac{dy}{y} + \frac{dz}{z} = 0$

iii) General solution of the equation $\frac{\partial^2 z}{\partial x^2} = x + y$ is,

A) $\frac{x^3}{6} + \frac{x^2y}{2} + f(y) + g(y)$ B) $\frac{x^3}{6} + \frac{x^2y}{2} + f(y) + yg(y)$

C) $\frac{x^3}{6} + \frac{x^2y}{2} + xf(y) + g(y)$ D) $\frac{x^3}{6} + \frac{x^2y}{2} + xf(y) + yg(y)$

iv) Suitable set of multipliers to solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ is,

A) (0, 1, 1) B) (x, y, z) C) $\left(0, \frac{1}{x}, \frac{1}{y}\right)$ D) $\left(\frac{1}{x}, \frac{1}{y}, \frac{1}{z}\right)$

b. Form a partial differential equation by eliminating arbitrary function from the relation, $\phi(xy + z^2, x + y + z) = 0$ **(05 Marks)**

c. Solve : $(y^2 + z^2)p + x(yq - z) = 0$ **(05 Marks)**

d. Solve by the method of separation of variables $\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$ **(06 Marks)**

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PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**

i) $\int_0^2 \int_0^x (x+y)dydx =$

A) 3 B) 4 C) 5 D) 6

ii) $\int_0^2 \int_1^3 \int_1^2 xy^2 zdzdydx =$

A) 36 B) 16 C) 26 D) 46

iii) The integral $2\int_0^\infty e^{-x^2}dx$ is,

A) $\Gamma\left(\frac{1}{2}\right)$ B) $\Gamma\left(-\frac{1}{2}\right)$ C) $\Gamma\left(\frac{3}{2}\right)$ D) $\Gamma\left(-\frac{3}{2}\right)$

iv) The value of $\beta(5,3)+\beta(3,5)$ is:

A) $\frac{2}{35}$ B) $\frac{35}{4}$ C) $\frac{3}{35}$ D) $\frac{4}{35}$

b. Evaluate $\iint xy(x+y)dydx$ taken over the area between $y=x^2$ and $y=x$. **(05 Marks)**

c. Evaluate : $\int_{-1}^{1} \int_0^z \int_{x-z}^{x+z} (x+y+z)dydxdz$ **(05 Marks)**

d. Show that $\int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin\theta}} \times \int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}d\theta = \pi$ **(06 Marks)**

6 a. Choose the correct answers for the following : **(04 Marks)**

i) 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

ii) $\oint_C Mdx+Ndy$ is also equal to,

A) $\iint_R \left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)dxdy$ B) $\iint_R \left(\frac{\partial M}{\partial y}+\frac{\partial N}{\partial x}\right)dxdy$

C) $\iint_R \left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)dxdy$ D) $\iint_R \left(\frac{\partial N}{\partial x}+\frac{\partial M}{\partial y}\right)dxdy$

iii) Using the following integral, work done by a force $\vec{F}$ can be calculated:

A) Surface integral B) Volume integral C) Both (A) and (B) D) Line integral

iv) If $\vec{F}=x^2\hat{i}+xy\hat{j}$ then the value of $\int_C \vec{F}.\vec{dr}$ from (0, 0) to (1, 1) along the line $y=x$ is,

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

b. Find the area between the parabolae, $y^2=4x$ and $x^2=4y$ with the help of Green's theorem in a plane. **(05 Marks)**

c. Evaluate $\int_C xydx+xy^2dy$ by Stoke's theorem where C is the square in the x-y plane with vertices (1, 0), (-1, 0), (0, 1) and (0, -1) **(05 Marks)**

d. Evaluate $\iint_S \vec{F}.\hat{n}ds$ given $\vec{F}=x\hat{i}+y\hat{j}+z\hat{k}$ over the sphere $x^2+y^2+z^2=a^2$ by using Gauss divergence theorem. **(06 Marks)**

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7 a. Choose the correct answers for the following : **(04 Marks)**

i) If $L\{f(t)\} = F(s)$ then $L\left\{\frac{f(t)}{t}\right\}$ is,

A) $\int_0^s F(s)ds$ B) $\int_0^t F(s)ds$ C) $\int_0^\infty F(s)ds$ D) $\int_s^\infty F(s)ds$

ii) If $L\left\{\frac{\cos at - \cos bt}{t}\right\} = \frac{1}{2}\log\left(\frac{s^2+b^2}{s^2+a^2}\right)$ then $L\left\{\frac{\sin^2 t}{t}\right\} =$

A) $\frac{1}{4}\log\left(\frac{s^2+4}{s^2}\right)$ B) $\frac{1}{2}\log\left(\frac{s^2+4}{s^2}\right)$ C) $\frac{1}{4}\log\left(\frac{s^2}{s^2+4}\right)$ D) $\frac{1}{2}\log\left(\frac{s^2}{s^2+4}\right)$

iii) $L\{e^{3t}H(t-4)\} =$

A) $\frac{e^{12-4s}}{s+3}$ B) $\frac{e^{12-4s}}{s-3}$ C) $\frac{e^{12+4s}}{s+3}$ D) $\frac{e^{-4s}}{s-3}$

iv) $L\{t^n\delta(t-a)\} =$

A) $(-a)^n e^{-as}$ B) $a^n e^{as}$ C) $a^n e^{-as}$ D) e^{-as}

b. Find the Laplace transform of $t^5 e^{4t}\cosh 3t$. **(05 Marks)**

c. Find $L\left\{e^{-4t}\int_0^t t\sin 3t\right\}$. **(05 Marks)**

d. Given $f(t) = \begin{cases} E, & 0 < t < \frac{a}{2} \\ -E, & \frac{a}{2} < t < a \end{cases}$ where f(t+a) = f(t), show that $L\{f(t)\} = \frac{E}{s}\tanh\left(\frac{as}{4}\right)$. **(06 Marks)**

8 a. Choose the correct answers for the following : **(04 Marks)**

i) $L^{-1}\left\{\frac{s}{(s-1)^4}\right\} =$

A) $t^2e^t\left(\frac{1}{2}+\frac{t}{6}\right)$ B) $e^t\left(\frac{1}{2}+\frac{t}{6}\right)$ C) $t^2\left(\frac{1}{2}+\frac{t}{6}\right)$ D) $t^2e^{-t}\left(\frac{1}{2}+\frac{t}{6}\right)$

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

A) $\frac{1-e^{-3t}}{t}$ B) $\frac{1-e^{4t}}{t}$ C) $\frac{e^{4t}-e^{-3t}}{t}$ D) $\frac{e^{-4t}-e^{-3t}}{t}$

iii) $L^{-1}\left\{\frac{s}{s^2+5}\right\} =$

A) $\sin\sqrt{5}\,t$ B) $\frac{1}{\sqrt{5}}\cos\sqrt{5}\,t$ C) $\frac{1}{5}\cos 5t$ D) $\cos\sqrt{5}\,t$

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

A) $t\sin at$ B) $t\cos at/2a$ C) $t\sin at/2a$ D) $t\cos at$

b. Find $L^{-1}\left\{\frac{s^2+4}{s(s+4)(s-4)}\right\}$. **(05 Marks)**

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

d. Solve by using Laplace transform $y''(t) + y(t) = 0$; $y(0) = 2$, $y(\pi/2) = 1$ **(06 Marks)**

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