

Total No. of Questions : 11]

SEAT No. :

PD4034

[Total No. of Pages : 4

[6401]-2401

F.E.

BSC-101-BES : ENGINEERING MATHEMATICS - I
(2024 Credit Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Attempt Q.2 or Q.3, Q.4 or Q.5, Q.6 or Q.7, Q.8 or Q.9 Q.10 or Q.11.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.
- 5) Use of electronic pocket calculator is allowed.

Q1) Write correct option for the following multiple choice questions.

a) Stationary point for the function $x^2 + y^2 + 6x + 12$ to be minimized is _____ [2]

i) (1, 0)

ii) (3, 0)

iii) (-3, 0)

iv) (0,0)

b) In the expansion of $\log(1 + e^x)$ in ascending powers of x , the coefficient of ' x ' is _____ [2]

i) 1

ii) $\frac{1}{2}$

iii) $\frac{1}{4}$

iv) 0

c) If $u = \frac{x^2 + y^2}{x + y}$ then the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is _____ [2]

i) u

ii) $2u$

iii) 0

iv) $3u$

d) If $A = \begin{bmatrix} 2 & -1 & -1 \\ 1 & 2 & 1 \\ 4 & -7 & -5 \end{bmatrix}$ then the rank of A is _____ [2]

i) 3

ii) 2

iii) 1

iv) 0

P.T.O.

e) If A is an $n \times n$ matrix with eigen values $\lambda_1, \lambda_2, \dots, \lambda_n$ the determinant of A is given by [1]

- i) $\lambda_1 + \lambda_2 + \dots + \lambda_n$
- ii) the largest eigen value of A.
- iii) the smallest eigen value of A.
- iv) $\lambda_1, \lambda_2, \dots, \lambda_n$

f) If A is 3×3 matrix with eigen values 2, 3 and 4, which of the following matrices is a diagonal matrix D in the diagonalization of A? [1]

i) $\begin{bmatrix} 2 & 3 & 4 \\ 0 & 0 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

ii) $\begin{bmatrix} 0 & 2 & 3 \\ 4 & 0 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

iii) $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$

iv) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 2 & 3 & 4 \end{bmatrix}$

Q2) a) Verify Lagrange mean value theorem for the function $f(x) = \log x$ in the interval $[1, e]$. [4]

b) Find the fourier series for the function $f(x) = x$ in the interval $[-\pi, \pi]$.

c) Using Taylor's series expand $x^3 + 7x^2 + x - 6$ in ascending powers of $(x - 3)$. [4]

OR

Q3) a) Expand the function $\sqrt{1 + \sin x}$ up to the term containing x^4 . [4]

b) Using Lagrange mean value theorem, prove that

$$\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{1-b^2}}. \quad [4]$$

c) If $f(x) = x^2$, $0 < x < 2$ then find the half range cosine series. [4]

OR

Q4) a) If $u = \tan^{-1}\left(\frac{x}{y}\right)$ verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$. [4]

b) If $u = \sin^{-1} \sqrt{x^2 + y^2}$ then prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \tan^3 u$. [4]

c) If $z = f(x, y)$, where $x = e^u + e^{-v}$, $y = e^{-u} - e^v$, then prove that

$$\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}$$
 [4]

OR

Q5) a) If $x = r \cos \theta$, $y = r \sin \theta$ [4]

Show that $\left[x \left(\frac{\partial x}{\partial r} \right)_\theta + y \left(\frac{\partial y}{\partial r} \right)_\theta \right]^2 = x^2 + y^2$

b) If $u = \operatorname{cosec}^{-1} \sqrt{\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}}$, then show that [4]

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{12} \left(\frac{13}{12} + \frac{\tan^2 u}{12} \right).$$

c) If $u = f(x^2 - y^2, y^2 - z^2, z^2 - x^2)$, prove that $\frac{1}{x} \frac{\partial u}{\partial x} + \frac{1}{y} \frac{\partial u}{\partial y} + \frac{1}{z} \frac{\partial u}{\partial z} = 0$. [4]

Q6) a) Examine the functional dependence, if so find the relation between them

$$u = \frac{x+y}{1-xy}; \quad v = \tan^{-1} x + \tan^{-1} y$$
 [4]

b) If $x = \cos \theta - r \sin \theta$, $y = \sin \theta + r \cos \theta$ then find $\frac{\partial r}{\partial x}$. [4]

c) Discuss the maxima and minima of the function $f(x, y) = x^2 + 4y^2 - 4x - 8y + 20$. Also find the extreme value. [4]

Q7) a) Given $u = x^2 - y^2$, $v = 2xy$ where $x = r \cos \theta$, $y = r \sin \theta$. [4]

find $\frac{\partial(u, v)}{\partial(r, \theta)}$.

b) If the kinetic energy of a body is given by $T = \frac{mv^2}{2}$ and m changes from 49 to 49.5, v changes from 1600 to 1590 then find the change in kinetic energy. [4]

c) Find the points on the surface $z^2 = xy + 1$ nearest to origin, by using Lagrange's method. [4]

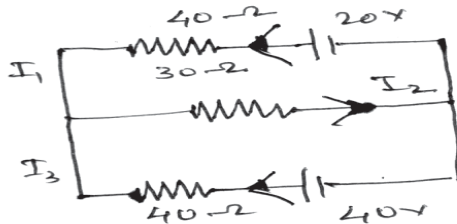
- Q8) a)** Determine values of k , for which following system have non-trivial solution $5x + 2y - 3z = 0$, $3x + y + z = 0$, $2x + y + kz = 0$. [4]
- b)** Examine for linear dependency of following set of vectors. If dependent, find relation between them $X_1 = (3, 1, 1)$, $X_2 = (2, 0, -1)$, $X_3 = (1, 1, 2)$. [4]

c) Show that $A = \begin{bmatrix} 1/\sqrt{2} & 0 & 1/\sqrt{2} \\ 0 & 1 & 0 \\ 1/\sqrt{2} & 0 & -1/\sqrt{2} \end{bmatrix}$ is orthogonal matrix and hence write A^{-1} .

[4]

OR

- Q9) a)** Examine for consistency and if consistent then solve $x + y + z = 1$, $x + 2y + 4z = 2$, $x + 4y + 10z = 4$. [4]
- b)** Examine for linear dependency of following set of vectors. If dependent find relation between them, $X_1 = (3, 1, -4)$, $X_2 = (2, 2, -3)$, $X_3 = (0, -4, 1)$. [4]
- c)** Determine the currents in the network given in the figure. [4]



- Q10)a)** Find eigen values and eigen vectors of matrix $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$ [6]
- b)** Express the quadratic form $Q(x) = 2x^2 + 9y^2 + 6z^2 + 8xy + 8yz + 6zx$ to canonical form by congruent transformation. Write the corresponding linear transformation. [6]

OR

- Q11)a)** Find modal matrix p to reduce $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ to its diagonal form. [6]

- b)** By using Cayley-Hamilton theorem, find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}, \text{ if it exists}$$

Also find A^4 .

[6]

* * *

Total No. of Questions : 11]

SEAT No. :

PD-4035

[Total No. of Pages : 4

[6401]-2402

F.E.

BSC-102-BES : ENGINEERING PHYSICS

(2024 Pattern) (Semester - I/II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Attempt Q.2 or Q.3, Q.4 or Q.5, Q.6 or Q.7, Q.8 or Q.9, and Q.10 or Q.11.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

Physical Constants :

- Mass of electron $m_e = 9.1 \times 10^{-31} \text{kg}$
- Charge on electron, $e = 1.6 \times 10^{-19} \text{ C}$
- Planck's constant, $h = 6.63 \times 10^{-34} \text{ J-sec}$

Q1) Choose the correct answer and rewrite it.

[10]

- i) Carbon dioxide laser emits wavelength in _____
 - a) Visible region
 - b) Ultraviolet region
 - c) Infrared region
 - d) None of the Above
- ii) In optical fiber, acceptance cone is _____ the acceptance angle
 - a) Equal
 - b) Double
 - c) Half
 - d) One Third
- iii) The mater waves are _____
 - a) Electromagnetic waves
 - b) Mechanical Waves
 - c) ultrasonic waves
 - d) Neither Electromagnetic nor Mechanical Waves

P.T.O.

- iv) Wave function Ψ of a particle is
 - a) a real quantity
 - b) a complex quantity
 - c) an imaginary quantity
 - d) none of these
- v) The points of constructive interference of light are,
 - a) Always bright
 - b) May be bright or dark
 - c) Always dark
 - d) Neither bright nor dark
- vi) The Plane-polarized light, vibrations of particles in medium are in the direction to direction propagation of light.
 - a) Parallel
 - b) perpendicular
 - c) Antiparallel
 - d) None
- vii) The energy band gap size for semiconductors is in the range__ eV.
 - a) 1-2
 - b) 2-3
 - c) 3-4
 - d) > 4
- viii) The Frequency range for ultrasonic is
 - a) less than 20Hz
 - b) 20 Hz to 20 KHz
 - c) Greater Than 20 KHz
 - d) None of the above
- ix) The minimum magnetic field required to destroy superconductivity is called _____
 - a) Critical magnetic field
 - b) Applied magnetic field
 - c) External magnetic field
 - d) None
- x) Nanotechnology studies for the size of particles
 - a) 100-1000 nm
 - b) more than 100 nm
 - c) 1-100 nm
 - d) None

Q2) a) With the help of an energy level diagram, explain the construction and working of CO₂ laser. **[6]**

b) Differentiate between step index and graded index fibers. (Any three points) **[3]**

c) Calculate the numerical aperture and acceptance angle of an optical fiber having $n_1 = 1.48$ and $n_2 = 1.45$ **[3]**

OR

- Q3)** a) What is attenuation in optical fibers? Discuss in brief the various internal and external factors responsible for attenuation. [6]
- b) State characteristics of a laser. Explain any one of them in brief. [3]
- c) What is stimulated emission? Explain its significance in the production of lasers. [3]

- Q4)** a) Starting from de Broglie equation, derive Schrodinger's Time Independent wave equation. [6]
- b) State de Broglie hypothesis. Derive the equation of de Broglie wavelength by analogy with radiation. [3]
- c) Lowest energy of an electron trapped in potential well is 38 eV. Calculate the width of well. [3]

OR

- Q5)** a) For a particle trapped in a one-dimensional rigid box, derive the equation for its energy. [6]
- b) Differentiate between classical and quantum computing (any three). [3]
- c) Compute the wavelength of the De Broglie waves associated with a proton moving at 5% of the velocity of light. Proton has 1856 times the mass of one electron. (Given: $m_e = 9.1 \times 10^{-31} \text{kg}$, $c = 3 \times 10^8 \text{m/s}$). [3]

- Q6)** a) Explain interference in thin parallel film in the reflected system with a neat & labelled diagram. Calculate the total path difference. Obtain the condition of maximum and minimum. [6]
- b) Differentiate between positive and negative crystal. [3]
- c) Obtain the intensity of light transmitted by the analyzer if the angle between the polarizer and analyzer is 45° . [3]

OR

- Q7)** a) What is double refraction? Explain Huygens' theory of double refraction. [6]
- b) Explain the application of interference as an antireflection coating. [3]
- c) The wedge-shaped film with a refractive index of 1.5, is illuminated by the light of wavelength $5890 \text{\AA}$. If the angle of the wedge is 30 seconds, Calculate the fringe width. [3]

- Q8)** a) With the help of a neat, labelled diagram, explain the Hall effect. Derive the equation of Hall voltage and Hall coefficient. [6]
- b) What are ultrasonic waves? State characteristics of ultrasonic wave. (any four) [3]
- c) An ultrasonic pulse is sent through a steel block, an echo is recorded after 1.512 microseconds, calculate the thickness of steel block if the velocity of ultrasonic waves is 5900 m/s. [3]

OR

- Q9)** a) What is an echo sounding technique? Using this technique explain the method for flaw detection using ultrasonic waves. [6]
- b) Define Fermi level for metal. Write the formula for Fermi-Dirac distribution function and explain terms involved in it. [3]
- c) In a semiconductor with a Hall coefficient of $145 \text{ cm}^3/\text{C}$ having a width of 2 cm and a thickness 0.2 cm with a magnetic field induction of 2T along the smaller dimension with a current of 150 mA. Calculate hall voltage. [3]

- Q10)a)** Explain the process of manufacturing nanoparticles using Physical Vapor Deposition. State advantages and limitations of this method. [6]
- b) What is Critical magnetic field? Write its equation and explain the terms involved in it. A superconductor has a critical temperature of 3.7 K. At 0 K the critical magnetic field is 0.0306 Tesla. What is the critical magnetic field at temperature 2 K. [6]

OR

- Q11)a)** Explain the Meissner effect. What is the cause of the Meissner effect? Show that superconductors exhibit perfect diamagnetism. [6]
- b) Explain electrical and optical properties of nanoparticles. [6]



Total No. of Questions : 11]

SEAT No. :

PD-4036

[Total No. of Pages : 4

[6401]-2403

F.E.

BSC-103-BES : ENGINEERING CHEMISTRY

(2024 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve Q.No.2 or Q.No.3, Q.No.4 or Q.No.5, Q.No.6 or Q.No.7, Q.No.8 or Q.No.9, Q.No.10 or Q.No.11.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) Multiple Choice Questions :

- i) Temporary hardness is also known as _____. [1]
 - a) Non Carbonate hardness
 - b) Carbonate hardness
 - c) Total hardness
 - d) None alkaline hardness
- ii) EDTA method is used to determine hardness of water by _____ titration. [1]
 - a) Precipitation
 - b) Redox
 - c) Acid base
 - d) Complexometric
- iii) The rate in decrease of intensity of radiation is directly proportional the concentration of fixed path length of solution is the statement of _____. [1]
 - a) Beer's Law
 - b) Lamberts Law
 - c) Beer-Lamberts Law
 - d) None of these
- iv) When absorption maxima shifts towards longer wavelength, known as _____ shift. [1]
 - a) Hypsochromic
 - b) Hyperchromic
 - c) Hypochromic
 - d) Bathochromic

P.T.O.

- v) Which among the following is an example of Quantum dots? [1]
 a) K b) Cdse
 c) A_5F_5 d) Se
- vi) The oxidising reagent for P-doping is _____. [1]
 a) Iodine vapours b) $FeCl_2$
 c) Lithium metal d) Sodium naphthalide
- vii) Boys gas calorimeter is used for determination of GCV of _____. [1]
 a) Solid fuel b) Non volatile liquid
 c) Gaseous fuel d) None of above
- viii) Reaction taking place on the anodic areas is _____. [1]
 a) Oxidation b) Reduction
 c) Neutralisation d) Addition
- ix) Kjeldahls method is used for determination of _____ from coal. [1]
 a) Hydrogen b) Nitrogen
 c) Sulphur d) Carbon
- x) Which of the film is protective? [1]
 a) Non porous b) Porous
 c) Volatile d) None of the above

- Q2)** a) Explain the causes of scales in boiler. Give two disadvantages and two methods of prevention. [6]
 b) Define reverse Osmosis. Give its two advantages & two limitations. [3]
 c) 25 ml of hard water sample required 11.2 ml 0.01 MEDIA to reach the end point. 25 ml of the same water sample after boiling and filtration required 7.9 ml of the same EDTA to reach the end point. Calculate total, temporary and permanent hardness of water. [3]

OR

- Q3)** a) Explain Zeolite process for softening of water with figure, process, ion exchange and regeneration reaction, two advantages. [6]
 b) State the causes of foaming when it takes place in boiler and give remedial measures for its prevention. [3]
 c) 25 ml water sample requires 3.7ml of 0.01 $NHCl$ up to phenolphthalein end point and 7.4 ml upto methyl orange end point during the titration. Calculate types and amount of alkalinity present in water. [3]

- Q4)** a) Explain pH metric titration curve between strong acid and strong base. Give the reaction, titration curve and calculations. [6]
- b) Explain any three applications of UV-visible spectroscopy. [3]
- c) Give the composition of the membrane of the ion selective electrode used to detect [3]
- i) H^+
 - ii) F^-
 - iii) Cl^-

OR

- Q5)** a) Draw block diagram of Double beam UV-visible spectrophotometer. Explain its any four components and give their function. [6]
- b) Give the construction with neat, labeled diagram and representation of calomel electrode. [3]
- c) Define : [3]
- i) Cell constant
 - ii) Specific conductance
 - iii) Equivalent conductance
- Q6)** a) What is conducting polymer? Give structural requirement for conducting polymer. Explain doping reactions and given two applications. [6]
- b) What are quantum dots? Give any two types of quantum dots and its two applications. [3]
- c) What are carbon nanotubes? Give their types and two applications. [3]

OR

- Q7)** a) Explain the structure of Graphene with diagram and mention its four properties and two applications. [6]
- b) Define Biodegradable polymer. Discuss any two factors responsible for biodegradation of polymer. [3]
- c) Give the structure of polycarbonate. Mention its two properties and two applications. [3]

- Q8)** a) What is power alcohol? Give the procedure and reaction for preparation of ethanol. Give its two advantages and two disadvantages. [6]
- b) Give any three characteristics of an ideal fuel. [3]
- c) 1.2 gm of coal sample was heated in silica crucible in an electric oven at 110°C for 1 hr. The residue weighed 1.16 gm. The crucible was ignited to a constant weight of 0.09 gm. In another experiment 1.2 gm of sample was heated in a silica crucible covered with vented lid of 950°C for 7 min. After cooling the residue weighed 0.80 gm. Calculate % m, % VM and % Ash content. [3]

OR

- Q9)** a) Describe the construction and working of Bomb calorimeter with diagram for determination of GCV of fuel. State the formula to calculate GCV. [6]
- b) Explain the production of hydrogen by steam reforming of hydrocarbon (methane) with reaction conditions. [3]
- c) 0.24 gm of coal sample on complete combustion gave 0.792 gm of CO₂ and 0.0216 gm of H₂O. Calculate carbon and hydrogen percentage. [3]
- Q10)** a) Explain the mechanism of Dry corrosion with figure give the reaction and types of oxide film formed in Mg, Cr. [6]
- b) i) Define Electroplating. Give its two application and two disadvantages. [3]
- ii) Explain the cathodic protection by sacrificial anode for corrosion control and prevention. [3]

OR

- Q11)** a) Define wet corrosion. Give conditions for wet corrosion. Explain hydrogen evolution mechanism of wet corrosion with suitable example. [6]
- b) i) Discuss any three factors affecting rate of corrosion. [3]
- ii) What are anodic and cathodic coatings? Which is more protective? [3]



Total No. of Questions : 10]

SEAT No. :

PD-4037

[Total No. of Pages : 2

[6401]-2404

F.Y (Engineering)

**ESC-101-ETC : BASIC ELECTRONICS ENGINEERING
(2024 Pattern) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right indicate full marks.*
- 3) Assume suitable data, if necessary.*
- 4) Use of electronic pocket calculator is allowed.*

- Q1)** a) Draw and Explain V-I Characteristics of PN junction Diode. [5]
b) Explain Impact of Electronics on Industry and Society. [5]
c) Write a short note on Active and Passive Components. [4]

OR

- Q2)** a) Draw & Explain Circuit diagram of Half Wave Rectifier with waveforms. [5]
b) Explain construction & operation of Light Emitting Diode (LED). [5]
c) Draw and explain Diode as a Switch. [4]

- Q3)** a) Draw and explain operation of Enhancement Type N channel MOSFET. [5]
b) Draw and Explain Output Characteristics of common emitter mode. [5]
c) Explain N-well method of VLSI CMOS manufacturing. [4]

OR

- Q4)** a) Explain with a circuit diagram a Single Stage Common Emitter Amplifier. [5]
b) Compare BJT and MOSFET. [5]
c) Determine the dc current gain β (Beta) and Calculate value of I_C for BJT, if $I_B = 20 \mu A$ and $I_E = 2mA$. [4]

P.T.O.

- Q5)** a) Draw and Explain D flip flop with the help of Truth Table. [5]
 b) State and prove De-Morgan's Theorem. [5]
 c) Solve [4]
 i) Convert $(1101.101)_2$ into Decimal
 ii) Convert $(35.567)_{10}$ into Binary

OR

- Q6)** a) Explain the full Adder with the help of Block Diagram, Truth Table & Logic Expression. [5]
 b) Draw and explain block diagram of Microprocessor. [5]
 c) Draw and Explain JK flip flop with the help of Truth Table. [4]

- Q7)** a) Draw and explain the functional block diagram of an Operational amplifier (OP-AMP)? [5]
 b) Draw and Explain Block Diagram of Digital Storage Oscilloscope (DSO). [5]
 c) Define with typical & ideal values for IC 741, the following Operational amplifier (OP-AMP) parameters? [4]
 i) CMRR
 ii) Bandwidth

OR

- Q8)** a) Draw & Explain Block Diagram of Digital Multimeter (DMM). [5]
 b) For the Non - Inverting amplifier using op-amp if $R_F = 10\text{ K}\Omega$, $R_1 = 1\text{ K}\Omega$, $V_{cc} = \pm 12\text{V}$, $V_i = 100\text{mv}$. Calculate Voltage gain & Output voltage. [5]
 c) Explain Op amp application as an Inverting amplifier with the help of waveform. [4]

- Q9)** a) Draw & Explain block diagram of IoT based Data Acquisition System. [5]
 b) With the help of block diagram, explain operation of Electronic Communication System. [5]
 c) Compare Thermocouple and RTD. [4]

OR

- Q10)** a) Explain wired and wireless communication media. [5]
 b) Explain the principle of operation, construction and working of LVDT. [5]
 c) Draw and Explain detail architecture of GSM system. [4]



Total No. of Questions : 5]

SEAT No. :

PD-4038

[Total No. of Pages : 3

[6401]-2405

F.E.

**ESC-102-ELE : BASIC ELECTRICAL ENGINEERING
(2024 Pattern) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

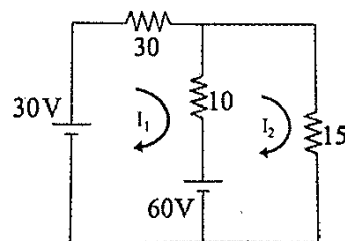
- 1) All questions are compulsory.
- 2) Attempt any one from each sub question.
- 3) Figures to the right indicate full marks.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Assume suitable additional data, if necessary.
- 6) Use of non-programmable calculator is allowed.

Q1) a) Attempt any One : [6]

- i) Derive the expressions for conversion of a delta connected resistive network into an equivalent star connected resistive network.
- ii) Define the following terms related with DC network
 - 1) Active Network
 - 2) Passive network
 - 3) Linear Network
 - 4) Non-Linear network
 - 5) Unilateral Network
 - 6) Bilateral network

b) Attempt any One : [8]

- i) State Kirchhoff's laws and find current flowing through 15Ω using loop current analysis method



- ii) State Superposition theorem and find current flowing through 15Ω resistance in above network, using Superposition theorem.

P.T.O.

Q2) a) Attempt any One : [6]

- i) Compare Magnetic and Electric Circuit clearly mentioning similarities and dissimilarities.
- ii) Derive the expression for dynamically induced emf with suitable diagram.

b) Attempt any One : [8]

- i) Define MMF and Reluctance, An iron ring with mean circumference of 80 cm, cross sectional area of 15 cm^2 and relative permeability of 2000 wound with 160 turns coil. If the coil carries a current of 2.5 amp, then calculate MMF, magnetic field strength, reluctance, flux and flux density.
- ii) State Flemings right hand rule. Two coils with 1250 and 1600 turns are placed side by side such that 60 % of the flux produced by first coil links with second coil. A magnetic flux of $60 \mu\text{Wb}$ and $80 \mu\text{Wb}$ is produced by each coil, when a current of 5A flows through them separately. Calculate self-inductance of each coil, mutual inductance and 'coefficient of coupling'.

Q3) a) Attempt any One : [6]

- i) Define average value and derive the expression for average value of sinusoidal current in terms of its maximum value.
- ii) Obtain the expression for instantaneous power in case of purely inductive circuit and by using this expression, prove that this circuit never consumes power.

b) Attempt any One : [8]

- i) Define RMS value. A sinusoidal voltage with frequency of 50 Hz has RMS value of 200 V. Write the expression for its instantaneous value and find its instantaneous value at $t = 1.78 \text{ mSec}$ and time required to reach 100 V for first time from $t = 0$.
- ii) Define inductive and capacitive reactance. A voltage of 230 volt is applied across inductance of 350mH and capacitance of $25\mu\text{F}$ independently. Calculate RMS and maximum value of current flowing through each element.

- Q4) a) Attempt any One : [6]**
- i) Derive the expression for average power in case of R-C series circuit. Draw voltage, current and power waveforms.
 - ii) Derive the relation between line current and phase current for three phase delta connected balanced R-L load.
- b) Attempt any One : [8]**
- i) Draw impedance triangle for R-L and R-C series circuit. Resistance of 15Ω , inductance of 200mH and capacitance of $150\ \mu\text{F}$ are connected in series across 230V , 50 Hz single phase supply. Calculate impedance, current, power factor and power consumed.
 - ii) Define phase sequence and balanced load. Three phase star connected balanced load with impedance of $9+j12\ \Omega$ per phase is connected across 440V , 50 Hz three phase supply. Calculate phase voltage, phase current, line current, active power and reactive power.
- Q5) a) Attempt any One : [6]**
- i) Draw torque-armature current, speed-armature current characteristics for DC Shunt and series motor. Give two applications of each motor.
 - ii) Explain the working principle of three phase Induction motor with suitable diagram. State two applications of squirrel cage and slip ring induction motor.
- b) Attempt any One : [8]**
- i) Define kVA rating of transformer. A 25 kVA , 50 Hz single phase transformer has 500 turns on primary side and 50 turns on secondary side. A voltage of 3000 volt is applied across primary winding. Calculate primary and secondary full load currents and cross-sectional area of core, if maximum flux density is 1.8 tesla .
 - ii) State, how eddy current and hysteresis loss can be minimized in case of single- phase transformer. 150kVA , $11000\text{V}/230\text{V}$, 50 Hz single phase transformer has iron losses of 1400 watt and full load copper losses of 1600 watt . Calculate the efficiency of transformer for full load at 0.707 power factor and for half of full load at 0.8 power factor.



Total No. of Questions : 10]

SEAT No. :

PD-4039

[Total No. of Pages : 4

[6401]-2406

F.E.

**ESC-103-MEC : ENGINEERING GRAPHICS
(2024 Pattern) (Semester - I/II)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q.2 or Q.3, Q.4 or Q.5, Q.6 or Q.7, Q.8 or Q.9 or Q.10.*
- 2) *Figures to the right indicate full marks.*
- 3) *State clearly the assumptions made, if any.*
- 4) *Use of non-programmable calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) The end point P of line PQ is 25 mm above HP while its point Q is 15 mm in front of VP. Its plan and elevation makes 40° and 35° with XY respectively. Draw the projection, if the projector distance between the end points is 60 mm. Find inclination made by the line with HP and VP. [12]

OR

Q2) A line AB 70 mm long is inclined at an angle 30° to HP. Its end point A is 10 mm above HP and 15 mm in front of VP. Elevation length of the line is 45 mm. Draw the projections of line. [12]

Q3) An equilateral triangle of 60 mm side is resting on HP on one of its side. Then its surface is inclined with HP at an angle of 40° . Draw the projections of plane, if the resting side is inclined to VP at an angle of 30° . [12]

OR

Q4) A pentagonal plane of side 40 mm is resting on HP on its corner and the edge opposite to the corner makes an angle of 25° with VP. Surface of the plane, is inclined at 40° to HP. Draw the projections of the plane. [12]

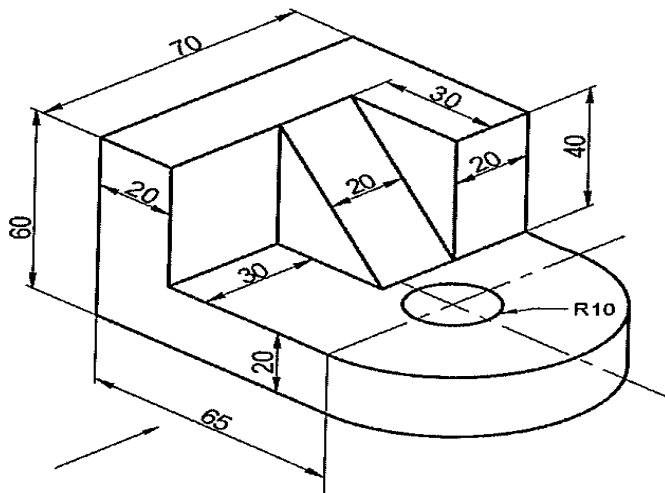
P.T.O.

- b) Draw the development of lateral surfaces of pentagonal prism of base side 30 mm and axis height 80 mm. [7]

OR

- b) Draw the development of lateral surface of cone of base diameter 50 mm and axis height 70 mm. [7]

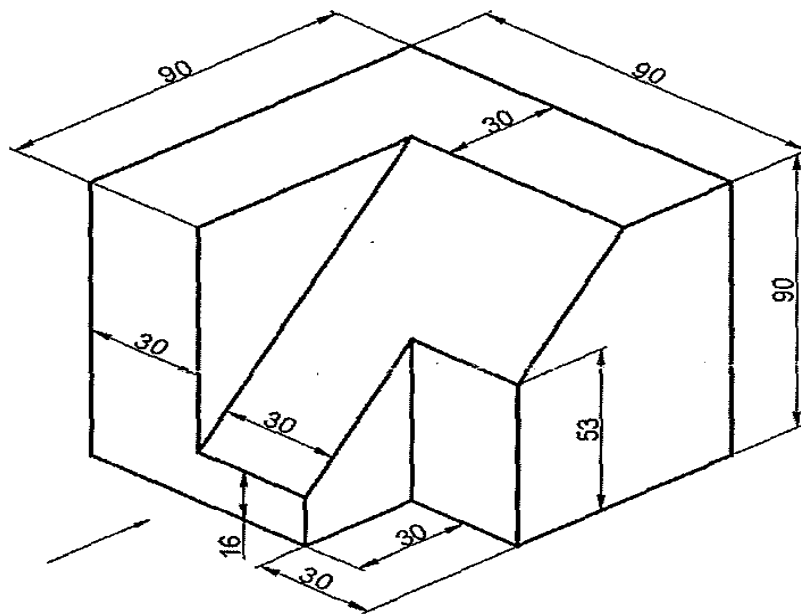
- | | | |
|----|----------------------|-----|
| a) | Front View | [5] |
| b) | Top View | [5] |
| c) | Right Hand Side View | [5] |
| d) | Give Dimensions | [1] |



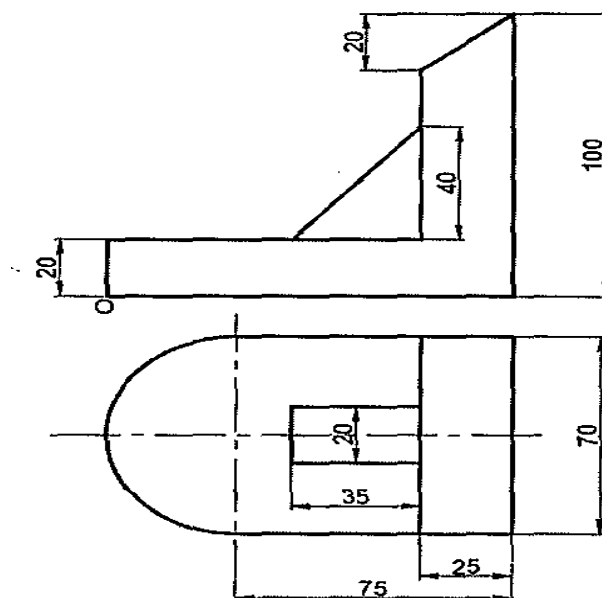
OR

Q8) Fig. shows a pictorial view of an object. Using first angle method of projection draw: [16]

- a) Front View [5]
- b) Top View [5]
- c) Right Hand Side View [5]
- d) Give Dimensions [1]

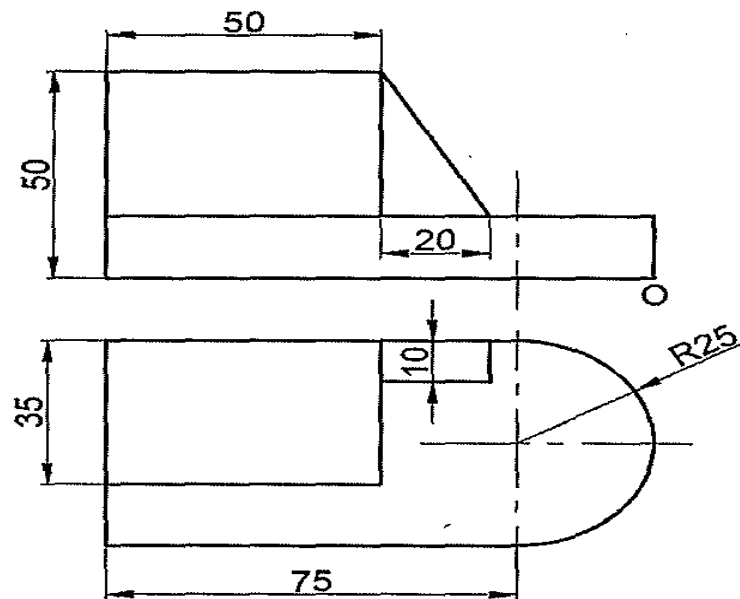


Q9) Figure show orthographic views of an object by first angle method of projection. Draw its isometric view. [16]



OR

Q10) Figure show orthographic views of an object by first angle method of projection. Draw its isometric view. **[16]**



Total No. of Questions : 6]

SEAT No. :

PD-4040

[Total No. of Pages : 6

[6401]-2407

F.E

**ESC-104-CVL : ENGINEERING MECHANICS
(2024 Pattern) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *All questions are compulsory.*
- 2) *Neat sketches must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Use of cell phone is prohibited in the examination hall.*

Q1) Write the correct option for the following multiple choice questions :

[5 × 2 = 10]

- i) The resultant magnitude of four forces 50 N, 100 N, 110 N and 180 N are acting along sides AB, BC, CD, and DA of a square ABCD is ____
 - a) 180 N
 - b) 100 N
 - c) 50 N
 - d) 110 N
- ii) A simply support beam of span 1 m is loaded with uniformly varying load of 10 N/m to 20 N/m from left to right end, find the reaction at left end support.
 - a) 6.67 Upward
 - b) 6.67 Downward
 - c) 8.33 Downward
 - d) 8.33 Upward
- iii) Find the maximum force P required to move a block of mass 800 N resting on a rough floor having $\mu_s = 0.25$.
 - a) 800 N
 - b) 200 N
 - c) 600 N
 - d) 400 N
- iv) A car is travelling along a rectilinear motion with initial velocity of 40 m/s undergoes an acceleration of 4 m/s², find the velocity after 10s.
 - a) 40 m/s
 - b) 60 m/s
 - c) 0 m/s²
 - d) 80 m/s
- v) The pendulum bob has a mass 10 kg and is released from rest when $\theta = 0$ with horizontal. If the length of cord is 1 m, determine the velocity of the bob at $\theta = 30^\circ$.
 - a) 4.12 m/s
 - b) 4.23 m/s
 - c) 3.13 m/s
 - d) 9.81 m/s

P.T.O.

Q2) Solve any two of the following :

- Find the resolve components of the force 300 N acting along the axis u and v as shown in **Fig. 2 a**. [6]
- Determine the magnitude F and the angle θ of force F as shown in **Fig. 2 b** so that the resultant of the three forces acting on the point O is zero. [6]

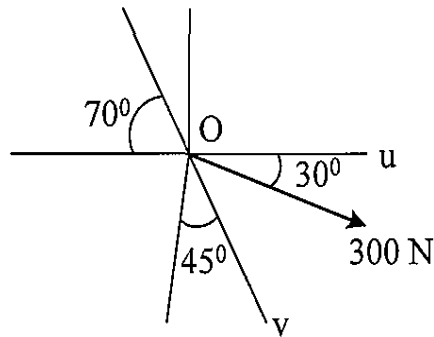


Fig. 2 a

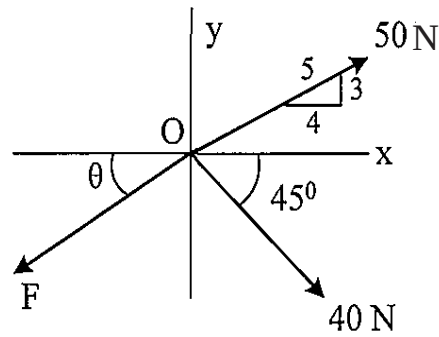


Fig. 2 b

- A 150×300 mm plate is subjected to four forces as shown in **Fig. 2c**. Determine the resultant of the four forces with respect to point F. [6]
- Locate the centroid of the shaded plane lamina with respect to origin O as shown in **Fig. 2 d**. [6]

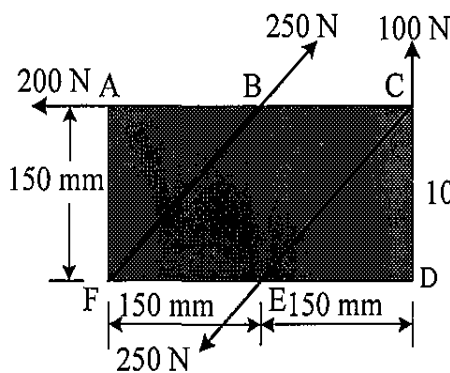


Fig. 2 c

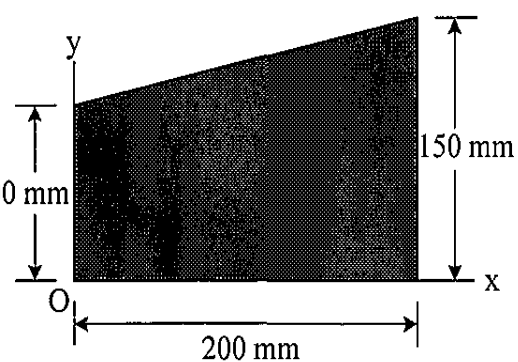


Fig. 2 d

Q3) Solve any two of the following :

- A 1.5 m cable placed around a crate as shown in **Fig. 3 a**. If the mass of the crate is 300 kg, determine the tension in the cable. [6]

- b) The wall crane is supported by smooth collar at B and pin at A as shown in **Fig. 3 b**. Determine the components of reaction at A and the horizontal reaction at B. [6]

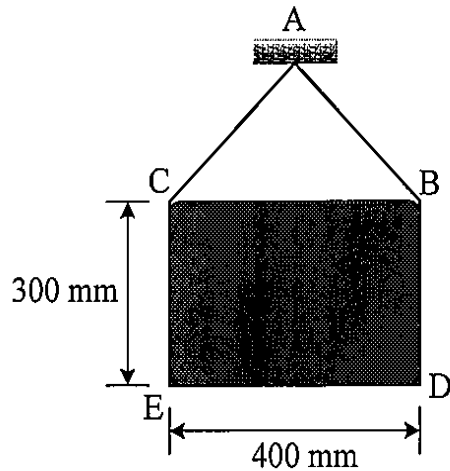


Fig. 3 a

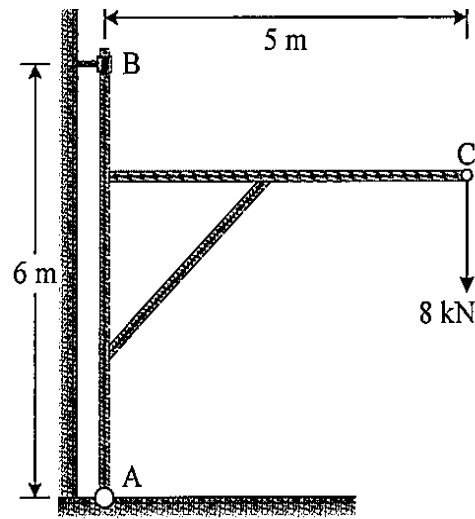


Fig. 3 b

- c) A cylinder of mass 100 kg rest between the inclined plane as shown in **Fig. 3 c**. Determine the normal reaction at A and B. [6]
- d) Determine the support reaction at A and B for the simply supported beam loaded and supported as shown in **Fig. 3 d**. [6]

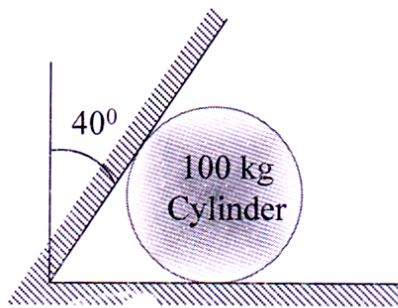


Fig. 3 c

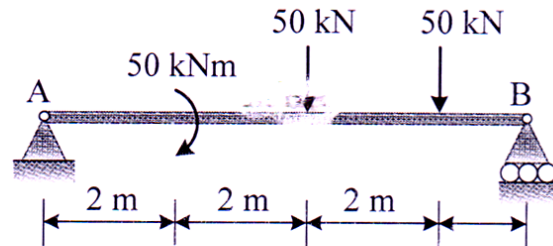


Fig. 3 d

Q4) Solve any two of the following :

- a) Determine the horizontal force P needed to just start moving the 30 kg block up the plane as shown in **Fig. 4 a**. Take $\mu_s = 0.25$ [6]

- b) A flexible cable which supports the 100 kg block is passed over a fixed circular drum shown in **Fig. 4 b** subjected to a force P to maintain equilibrium. If the coefficient of friction between the cable and drum is $\mu_s = 0.3$, determine the range of P . [6]

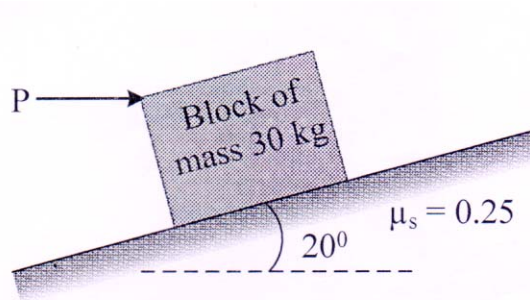


Fig. 4 a

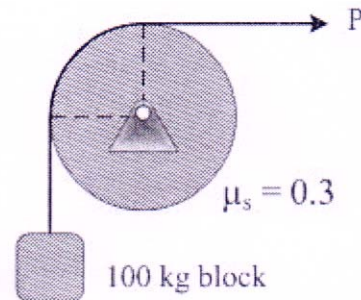


Fig. 4 b

- c) The 15 m ladder has a uniform weight of 80 N and rest against the smooth wall at B shown in **Fig. 4 c**. If the coefficient of statics friction at A is $\mu_A = 0.4$. Determine the smallest angle θ at which the ladder will not slip. [6]
- d) Determine the forces in each member of the truss in terms of external loading as shown in **Fig. 4 d**. [6]

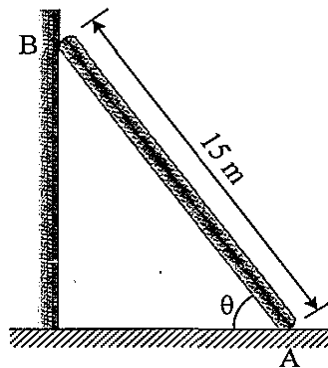


Fig. 4 c

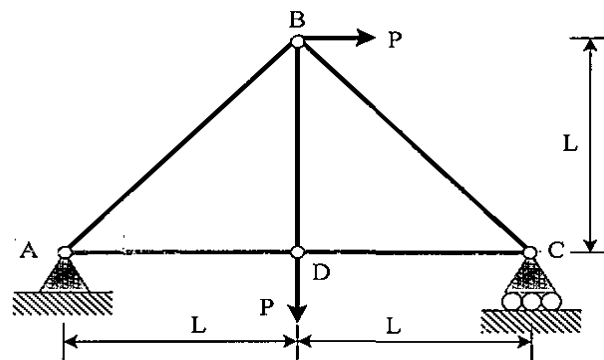


Fig. 4 d

Q5) Solve any two of the following :

- a) A motorist enters a freeway at 36 kmph and accelerate uniformly to 90 kmph. From the odometer in the car, the motorist knows that she traveled 0.2 km while accelerating. Determine a) the acceleration of the car and b) the time required reach 90 kmph. [6]
- b) The velocity of a particle is given by $v = 20t^2 - 100t + 50$, where v is in m/s and t is in seconds. Determine the velocity of particle when acceleration is zero. [6]

- c) Water flows from a drain spout with an initial velocity of 0.75 m/s at an angle of 75° with the vertical as shown in **Fig. 5 c**. Determine the range of values of the distance d for which the water will enter the trough BC. [6]

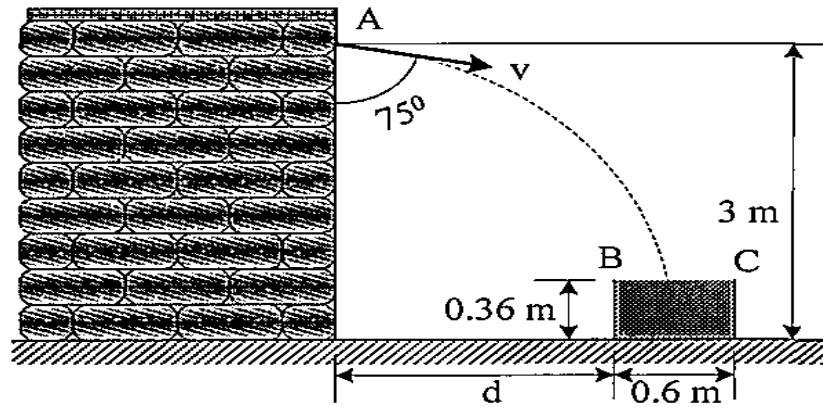


Fig. 5 c

- d) The truck travels at a speed of 4 m/s along a circular road that has a radius of 50 m . For a short distance from $s = 0$, its speed is then increased by $a_t = (0.05s) \text{ m/s}^2$, where s is in meters. Determine the speed and magnitude of its acceleration when it has moved $s = 10 \text{ m}$. [6]

Q6) Solve any two of the following :

- a) The initial velocity of the block at A is 9 m/s . The coefficient of kinetic friction between the block and the plane is $\mu_k = 0.30$ as shown in **Fig. 6 a**. Find the time it takes for the block to reach at B with zero velocity. [6]

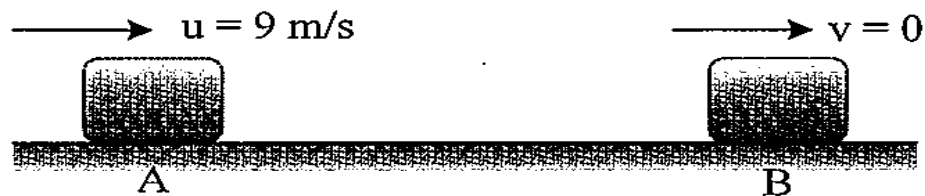


Fig. 6 a

- b) A ball has a mass of 30 kg is thrown upward with a speed of 15 m/s . Determine the time and distance traveled by the ball before stopping. Use impulse momentum principle. [6]

- c) A woman having a mass of 70 kg stands in an elevator which has a downward acceleration of 4 m/s^2 starting from rest. Determine work done by her weight and the work of the normal force which the floor exerts on her when the elevator descends 6 m. [6]
- d) Disk A has a mass of 250 g and is sliding on a smooth horizontal surface with an initial velocity of 2 m/s. It makes direct collision with disk B, which has a mass of 175 g and is originally at rest as shown in **Fig 6 d**. If both disks are of the same size and the collision is perfectly elastic, determine the velocity of each disk just after collision. [6]

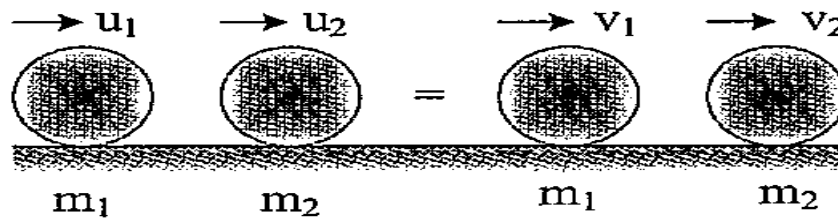


Fig 6 d



Total No. of Questions : 10]

SEAT No. :

PD4041

[Total No. of Pages : 2

[6401]-2408

F.E.

ESC-105-COM:FUNDAMENTALS OF PROGRAMMING LANGUAGES
(2024 Credit Pattern) (Semester - I/II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Figure to the right indicates full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) List the data types in C and provide one example of each. [3]
b) Define flowchart. Explain the symbols used in a flowchart. [3]
c) List the different C tokens and provide an example for each type. [4]
d) Explain symbolic constant with example. [4]

OR

- Q2)** a) Define the following terms: Constant and Variable. [3]
b) Define the following Storage classes in C: auto, extern and static. [3]
c) Explain the keywords in C programming and give examples of reserved keywords. [4]
d) Create a simple flowchart to depict the steps involved in calculating the area of a rectangle. [4]

- Q3)** a) What is arithmetic operator? Explain with example. [3]
b) List all the logical operators in C and provide an example of each. [3]
c) Explain conditional (ternary) operator (? :) in C. [4]
d) Explain with an example the usage of shorthand assignment operators. [4]

OR

- Q4)** a) What is special operator in C. Explain with an example. [3]
b) List any three bitwise operators in C and provide an example of each. [3]
c) Discuss the increment and decrement operator in C. [4]
d) Explain Operator Precedence in C? [4]

P.T.O.

- Q5)** a) Explain the difference between an if statement and an if-else statement with examples. [4]
b) Create a program that uses a switch statement to perform basic arithmetic operations (addition and subtraction) based on user input. [5]
c) Write a Program in C to print the first 10 even numbers using for loop. [5]

OR

- Q6)** a) Explain the syntax and usage of the goto statement in C with example. [4]
b) Explain break statement in loops with an example. [5]
c) Explain while loop with an example that prints numbers from 1 to 10. [5]

- Q7)** a) Explain how to declare and initialize a one-dimensional array in C, with an example. [4]
b) Compare the strcpy() and strncpy() functions. Give suitable example. [5]
c) Write a program to concatenate two strings using the strcat() function. [5]

OR

- Q8)** a) Explain how to declare and initialize a two-dimensional array in C, with an example. [4]
b) Explain the string functions- strcpy, strlen, strcmp, strncmp, strcat. [5]
c) Write a C Program to Check if a Given String is Palindrome. [5]

- Q9)** a) Explain built-in functions and user-defined functions in C programming. [4]
b) What is structure? Explain C syntax of structure declaration with example. [5]
c) Write a program to declare a structure for an employee with members for name, age and gender. Initialize the structure and print the values. [5]

OR

- Q10)** a) How do we define and call a function in C. [4]
b) How do you access structure members in C? Explain with an example. [5]
c) Write a C program for addition and subtraction of 2 numbers, using function. [5]



Total No. of Questions : 11]

SEAT No. :

PD-5274

[Total No. of Pages : 4

[6401]-2409

F.E.

BSC-151-BES : ENGINEERING MATHEMATICS - II
(2024 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory. Q.2 or Q.3, Q.4 or Q.5, Q.6 or Q.7, Q.8 or Q.9, Q.10 or Q.11.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) Write the correct option.

a) The value of $\int_0^{\pi/2} \sin^4 x dx$ is [2]

i) $\frac{\pi}{2}$

ii) $\frac{3\pi}{8}$

iii) $\frac{3\pi}{16}$

iv) $\frac{\pi}{4}$

b) First loop of the curve $r = a \sin 3\theta$ is along [2]

i) $\theta = \frac{\pi}{4}$

ii) $\theta = 0$

iii) $\theta = \frac{\pi}{2}$

iv) $\theta = \frac{\pi}{6}$

P.T.O.

c) Area bounded by the curves $y = x^2$ and $y = x$ is [2]

i) $\frac{1}{6}$

ii) $\frac{1}{2}$

iii) $\frac{1}{3}$

iv) $\frac{1}{12}$

d) Integrating factor of the linear differential equation $\frac{dy}{dx} - \frac{y}{x} = \frac{-1}{x^2}$ is [2]

i) $\log x$

ii) $\frac{1}{x}$

iii) $-\frac{1}{x}$

iv) x

e) Maximum current $i_{\max}$ of R-L circuit is [1]

i) $\frac{E}{R}$

ii) $\frac{R}{E}$

iii) ER

iv) $\frac{-E}{R}$

f) The orthogonal trajectory of a family of curve that intersect each curve of the family at angle [1]

i) $\theta = 0^\circ$

ii) $\theta = 180^\circ$

iii) $\theta = 90^\circ$

iv) $\theta = 60^\circ$

Q2) a) Evaluate $\int_0^1 \frac{x^8}{\sqrt{1-x^2}} dx$ [4]

b) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$ [4]

c) Prove that $\int_0^1 \frac{x^a - 1}{\log x} dx = \log(1+a)$ $a \geq 0$ [4]

OR

Q3) a) Evaluate $\int_0^{\infty} \frac{x^2}{(1+x^2)^{7/2}} dx$ [4]

b) Evaluate $\int_0^1 x^3 (1-x)^5 dx$ [4]

c) Prove that $\int_0^{\infty} \frac{e^{-x} - e^{-ax}}{x \sec x} dx = \frac{1}{2} \log \left(\frac{a^2 + 1}{2} \right), a > 0$ [4]

Q4) a) Trace the curve $xy^2 = a^2(a-x)$ [4]

b) Trace the curve $r = a(1 + \cos \theta)$ [4]

c) Find the equation of sphere passing through the circle $x^2 + y^2 + z^2 = 4, z = 0$ meeting the plane $x + 2y + 2z = 0$ in a circle of radius 3. [4]

OR

Q5) a) Trace the curve $r = a \sin 2\theta$ [4]

b) Find the equation of the cone with vertex at $(1, 2, -3)$, semi-vertical angle $\cos^{-1} \frac{1}{\sqrt{3}}$ and the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+1}{-1}$ as axis of the cone. [4]

c) Find the equation of right circular cylinder of radius 2 whose axis is given by $\frac{x-1}{2} = \frac{y+2}{3} = \frac{z-4}{6}$ [4]

Q6) a) Change the order of integration

$$\int_0^5 \int_{2-x}^{2+x} f(x, y) dx dy$$
 [6]

b) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the plane $y + z = 4$ and $z = 0$ [6]

OR

Q7) a) Find the area of one loop of the curve $r = a \cos 2\theta$ [6]

b) Find the centre of gravity of the area bounded by $y^2 = x$ and $x + y = 2$. [6]

- Q8)** a) Solve $(2x - y) dx = (x - y) dy$ [4]
 b) Solve $(x - y^2) dx + 2xy dy = 0$ [4]
 c) Solve $\frac{dy}{dx} = y \tan x - y^2 \sec x$ [4]

OR

- Q9)** a) Solve $x^2 y dx - (x^3 + y^3) dy = 0$ [4]
 b) Solve $x \frac{dy}{dx} + y = x^3 y^6$ [4]
 c) Solve $e^y \frac{dy}{dx} + e^{x+y} = e^{2x}$ [4]

- Q10)** a) A body originally at 80°C cools to 60°C in 20 minutes and the temperature of air being 40°C . What will be the temperature of the body after 40 minutes [4]
 b) A body of mass m falling from rest is subjected to the force of gravity and an air resistance proportional to the square of the velocity (KV^2). If it falls through a distance ' x ' and possesses a velocity ' v ' at that instant, prove that $\frac{2kx}{m} = \log\left(\frac{a^2}{a^2 - v^2}\right)$ where $mg = ka^2$ [4]
 c) A resistance of 100Ω , an inductance of 0.5 henry are connected in series with a battery of 20 volts. Find the current in a circuit as a function of t . [4]

OR

- Q11)** a) A circuit consistant of resistance ' R ' ohm and a condensor of ' c ' farads connected to a constant e.m.f. If $\frac{q}{c}$ is the voltage of the condensor at time ' t ' after closing the circuit. Show that the voltage at time t is $E(1 - e^{-t/Rc})$. [4]
 b) A bullet is fired into a sand tank. It's retardation is proportional to square root of it's velocity. Show that the bullet will come to rest in time $\frac{2\sqrt{V}}{K}$ where V is initial velocity. [4]
 c) A pipe 10 cm in diameter contains a steam at 100°C . It is covered with asbestos 5 cm thick for which $K = 0.006$ and the outside temperature is at 30°C . Find the amount of heat lost per hour from a meter long pipe. [4]



Total No. of Questions : 10]

SEAT No. :

PD-5300

[Total No. of Pages : 3

[6401]-2410
F.E. (BOS-IT)
(PCC-151-ITT): Programming and Problem Solving
(2024 Credit Pattern) (Semester - I/II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidate:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*

- Q1)** a) What are the types of problems? Explain in detail. **[3]**
- b) Explain brief history of python programming language and list different software developed in python. **[3]**
- c) Describe object oriented programming features. **[4]**
- d) Define problem solving. Write down steps of problem solving process. **[4]**

OR

- Q2)** a) Describe flowchart and symbols in detail. **[3]**
- b) Write down the applications of python programming languages. **[3]**
- c) Explain the python programming features. **[4]**
- d) Describe TOP-DOWN design approach in detail. **[4]**

P.T.O.

- Q3)** a) List down all the advanced data types in python & Explain any two. [3]
- b) Describe the following terms with examples (any three): [3]
- i) break ii) continue iii) pass iv) range
- c) Implement a program in python to check whether a number entered by user is positive, negative, or zero [4]
- d) Explain decision control statements in python in detail. [4]

OR

- Q4)** a) Explain different arithmetic operators with suitable example [3]
- b) Write down the difference between for loop and while loop. [3]
- c) Develop a python program to check whether a given number is even or odd. [4]
- d) What is the dictionary data type? Explain any 3 operations of the dictionary data type. [4]
- Q5)** a) Compare Regular functions and lambda functions in python with suitable examples. [4]
- b) Describe the use of the return statement in functions with example. [5]
- c) Develop an algorithm & program to concatenate two strings using + operator. [5]

OR

- Q6)** a) Analyze the difference between ord () and chr () functions with examples. [4]
- b) Explain the concepts of variable scope (local and global) and lifetime in python with suitable code examples. [5]
- c) Implement program to reverse a string using user defined function. [5]

- Q7)** a) Describe the purpose & use of file handling. [4]
b) Differentiate between mutable and immutable data types with focus on dictionaries in python. Provide examples. [5]
c) Implement a program to append data to an already existing file. [5]

OR

- Q8)** a) Explain different types of files in detail. [4]
b) Explain key directory methods: mkdir (), rmdir (), listdir (), and chdir () with syntax and usage example. [5]
c) Develop a program to print the absolute path of a file using OS. path. join. [5]
- Q9)** a) Differentiate between class variables and object variables with an example. [4]
b) Analyze the significance of garbage collection in python how does python handle object destruction? [5]
c) Describe classes and objects in detail. [5]

OR

- Q10)** a) Explain the role of __init__ () and __del__ () methods in object lifecycle. [4]
b) Distinguish between public and private members of a class with proper examples. [5]
c) Describe data abstraction & Encapsulation in detail. [5]

