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B.Tech. II Semester (Main) Exam 2022

2FY2-01 Engineering Mathematics-II
2E3201

Time: 3 Hours   Maximum Marks: 70

Part-A (All Ten Questions)

Q.1 Let v_1, v_2 and v_3 be the first, second and third column vectors, respectively, of the matrix

$$A = \begin{pmatrix} 2 & 1 & 7 \\ 1 & 0 & 2 \\ -1 & 5 & 13 \end{pmatrix}.$$

What can we conclude about rank(A) from the observation $2v_1 + 3v_2 - v_3 = 0$?.

Q.2 Suppose the system $AX = B$ is consistent and A is a 5×8 matrix and rank(A) = 3. How many parameters does the solution of the system have ?.

Q.3 State Cayley-Hamilton Theorem.

Q.4 Write the non-linear first order Bernoulli equation.

Q.5 Define Exact first order differential equation.

Q.6 Write the Euler-Cauchy differential equation.

Q.7 Write Clairaut's type differential equation.

Q.8 Write Bessel's differential eqiation.

Q.9 Write the Charpit's equations for the first order partial differential equation $f(x, y, z, p, q) = 0$.

Q.10 Classify the partial differential equation $\dfrac{\partial^2 u}{\partial x^2} + 3\dfrac{\partial^2 u}{\partial x \partial y} + \dfrac{\partial^2 u}{\partial y^2} = 0$.

$$10 \times 2 = 20$$

Part-B (All Five Questions)

Q.1 Find the values of λ for which the equations

$$\begin{aligned} (\lambda - 1)x + (3\lambda + 1)y + 2\lambda z &= 0 \\ (\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z &= 0 \\ 2x + (3\lambda + 1)y + 3(\lambda - 1)z &= 0 \end{aligned}$$

are consistent.

Q.2 Solve the differential equation

$$(2y^3 xe^y + y^2 + y)dx + (y^3 x^2 e^y - xy - 2x)dy = 0.$$

Q.3 Solve: $y = 2px + yp^2$; where $p = \dfrac{dy}{dx}$.

Q.4 Solve: $(D^2 - 4D + 13)y = 18e^{2x}\sin 3x$; where $D \equiv \dfrac{d}{dx}$.

Q.5 Find the general solution of the partial differential equation

$$(3 - 2yz)p + x(2z - 1)q = 2x(y - 3); \text{ where } p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}.$$

$$5 \times 4 = 20$$

Part-C (Any Three Questions)

Q.1 Examine whether the matrix

$$A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$$

is diagonalizable. If so, obtain the matrix P such that $P^{-1}AP$ is a diagonal matrix.

Q.2 Find the general solution of the differential equation

$$(D^2 + 4D + 4)y = e^{-2x}\sin x, \ D \equiv \frac{d}{dx}$$

using the method of variation of parameters.

Q.3 Find the power series solution of $(1 - x^2)\dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} + 2y = 0$ about $x = 0$.

Q.4 Find the complete integral of the partial differential equation

$$p^2 q^2 = 9p^2 y^2 (x^2 + y^2) - 9x^2 y^2.$$

Q.5 Solve the following equation $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial z}{\partial x} + \dfrac{\partial z}{\partial y} = 0$ by the method of separation of variables.

3 × 10 = 30

25

Attempt all ten questions from Part A, four questions out of seven questions from Part B and four questions out of five questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1 _____   2._____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q.1   A 3×3 matrix has Eigen values $2, 3, 4$ then find the Eigen values of $adj(A)$.

Q.2   State Cayley-Hamilton theorem.

Q.3   Find integrating function (IF) for the following equation:

$$x \log x \frac{dy}{dx} + y = 2 \log x.$$

Q.4   Solve $(y - px)(p - 1) = p$.

Q.5   Find solution of the following differential equation

$$\frac{d^4 y}{dx^4} - 64 y = 0.$$

Q.6   What is the condition of exactness for second order ordinary differential equation?

Q.7   Solve $yzp + zxq = xy$.

Q.8   Find the complete integral of $z = px + qy + p^2 + q^2$.

Q.9   Classify the following partial differential equation

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0.$$

Q.10   Write the equations for two dimensional heat and wave equations.

                                                    $10 \times 3 = 30$

Part B(Analytical/Problem solving questions)
Attempt any Four questions

Q.1   Reduce the matrix

$$A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

in its normal form and hence find its rank.

Q.2 Determine the values of p and q for which the system

$x + 2y + 3z = 6,\ x + 3y + 5z = 9,\ 2x + 5y + pz = q$

has(i) No solution (ii) Unique solution (iii) Infinite number of solutions.
Also find the solutions in case (ii) and (iii).

Q.3 Solve the differential equation $y = 2px + y^2 p^3$.

Q.4 Solve $(x^4 y^4 + x^2 y^2 + xy)\, y\, dx + (x^4 y^4 - x^2 y^2 + xy)\, x\, dy = 0$.

Q.5 Solve $\dfrac{d^2 y}{dx^2} - 4x\dfrac{dy}{dx} + (4x^2 - 1)y = -3e^{x^2}\sin 2x$ by changing dependent variables.

Q.6 Solve

$\cos x\dfrac{d^2 y}{dx^2} + \sin x\dfrac{dy}{dx} - 2y\cos^3 x = 2\cos^5 x$

Q.7 Solve the following partial differential equation by separation of variables:

$\dfrac{\partial z}{\partial x} = 16\dfrac{\partial z}{\partial y}.\ z(0,y) = 4e^{-5y}$.

5 x10 = 50

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any two questions

Q.1 Find the Eigen values and the corresponding Eigen vectors of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

Q.2 Solve $(2y\,dx + 3x\,dy) + 2xy(3y\,dx + 4x\,dy) = 0$.

Q.3 Solve $x^2\dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} - y = x^2 e^x$ by the method of variation of parameters.

Q.4 Find complete integral by Charpit method:

$$2xz - px^2 - 2qxy + pq.$$

Q.5 Using the method of separation of variables, find general solution of the two dimensional Laplace's equation.

4 x20 = 80

Roll No. _____ [Total No. of Pages : 3]

2E2002

2E2002

B.Tech. II-Sem. (Back) Examination, July - 2022
202 Engineering Mathematics - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **Five questions**, selecting **one question** from **each unit**. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary). Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

UNIT - I

1. a) Find the equation of the sphere whose centre is $(1, 1, 1)$ and which passes through the point $(2, 0, 3)$. **(8)**

   b) Find the equation of a right circular cone with vertex $(2, 3, 1)$, axis parallel to the line $\frac{x}{-1} = \frac{y}{2} = \frac{z}{1}$ and one of its generators have the direction ratios $1, -1, 1$. **(8)**

(OR)

1. a) Prove that the center of sphere which touch the line $y = mx$, $z = c$ and $y = -mx$, $z = -c$ lies on the conicoied $mxy + c(1 + m^2)z = 0$. **(8)**

   b) Find the equation of the right circular cylinder passing through A $(3, 0, 0)$ and having the axis $x - 2 = z$, $y = 0$. **(8)**

UNIT - II

2. a) Reduce the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 7 & 13 \\ 4 & -3 & -1 \end{bmatrix}$ to the normal form and hence, find its rank. **(8)**

b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$. Find the inverse of matrix and also express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a linear polynomial in A. (8)

(OR)

2. a) Find the Eigen values and the corresponding Eigen vectors of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

(8)

b) Solve the following system of linear equations:

$x + 2y - z = 3, 3x - y + 2z = 1, 2x - 2y + 3z = 2$ and $x - y + z = -1$. (8)

UNIT - III

3. a) Find the directional derivative of $x^2 + y^2 + 4xz$ at $(1, -2, 2)$ in the direction of vector $2i - 2j + k$. (8)

b) Evaluate $\iint_S A \cdot n \, ds$, where $A = 18zi - 12j + 3yk$ and S is the part of the plane $2x + 3y + 6z = 12$, which is located in the first octant. (8)

(OR)

3. a) A fluid motion is given by $\vec{q} = (y+z)i + (z+x)j + (x+y)k$. Is this motion irrotational? If so, find the velocity potential. (8)

b) If $\vec{r} = xi + yj + zk$, show that $div\left(\dfrac{\vec{r}}{r^3}\right) = 0$. (8)

UNIT - IV

4. a) Verify Stoke's theorem for $F = yi + zj + xk$, where S is the upper half surface of the sphere $x^2 + y^2 + z^2 = 1$ and C is its boundary. (8)

b) Obtain the Fourier series for the function $f(x) = x^2, -\pi < x < \pi$, and reduce from it the relations $\dfrac{\pi^2}{6} = 1 + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dfrac{1}{4^2} + \dots$. (8)

(OR)

4. a) Verify Green's theorem for $\int_C [(xy + y^2)dx + x^2 dy]$, where C is bounded by with vertices $y = x$ and $y = x^2$. (8)

b) Analyze harmonically the data given below and express $y = f(x)$ in Fourier series up to the second harmonic. (8)

x	0	1	2	3	4	5
$f(x)$	4	8	15	7	6	2

5. a) Solve in series the differential equation $2x^2 \dfrac{d^2 y}{dx^2} - x\dfrac{dy}{dx} + (1-x^2)y = 0$. (8)

b) Find the general solution of the partial differential equation

$2xzp + 2yzq = z^2 - x^2 - y^2$. (8)

(OR)

5. a) Find complete integral by Charpit method: $2xz - px^2 - 2qxy + pq$. (8)

b) Solve: $x(y^2 + z)p - y(x^2 + z)q = (x^2 - y^2)z$. (8)

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2E3202

B.Tech. II Sem (Main) Examination, July - 2022
2FY2-03/Engineering Chemistry

Time : 3 Hours   Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. What is the cause of hardness of water?   (2)
2. How silica can be removed from water?   (2)
3. What are the units of hardness?   (2)
4. Name any two primary solid fuels.   (2)
5. What is octane rating for petrol?   (2)
6. What are the consequences of corrosion?   (2)
7. Define annealing of glass.   (2)
8. What are clinkers?   (2)
9. What are Electrophilic reagents?   (2)
10. Define flash point and fire point.   (2)

PART - B
(Analytical/Problem solving questions)

Attempt any **Five** questions :   (5×4=20)

1. With the help of a neat diagram, describe fractional distillation of crude petroleum and name the various products obtained.   (4)
2. What is priming and foaming? Discuss their disadvantages.   (2+2=4)

3. What is break point chlorination. Explain with suitable diagram. (4)

4. Discuss the following in brief. (2+2=4)
   a) Borosilicate glass
   b) Optical glass

5. Explain setting and hardening of cement. (4)

6. Write short notes on: (2+2=4)
   a) Cloud Point and Pour Point
   b) Viscosity and viscosity Index.

7. Discuss the mechanism of dry corrosion. (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any **Three** questions: (3×10=30)

1. Calculate the amount of lime (84% pure) and soda (92% pure) required for treatment of 20,000 litres of water, whose analysis is as follows:

   $Ca(HCO_3)_2$ = 40.5 ppm; $Mg(HCO_3)_2$ = 36.5 ppm; $MgSO_4$ = 30.0 ppm; $CaSo_4$ = 34.0 ppm; $CaCl_2$ = 27.75 ppm, and Nacl = 10.00 ppm. (10)

2. A sample of coal was found to contain C = 92%, H = 5% and Ash = 3%. When this coal was tested in laboratory for its calorific value in Bomb calorimeter, following data were obtained:

Weight of coal burnt	=	0.95 g
Weight of water taken	=	700 g
Water equivalent of bomb and calorimeter	=	2,000 g
Rise in temperature	=	2.48 °C
Cooling correction	=	0.02 °C
Fuse wire correction	=	10.0 Cal
Acid correction	=	60.0 Cal

   Calculate the net and gross calorific values of the coal in cal/g. Assume the latent heat of condensation of steam as 580 cal/g. (10)

3. How would you determine the calorific value of coal by Bomb calorimeter? Explain with the help of a neat diagram. (10)

4. How is water softened by lime-soda process? Describe with suitable diagrams and chemical reactions. (10)

5. Describe the synthesis, properties and uses of paracetamol. (10)

2E3202 (2)

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Total No. of Questions: Total No. of Pages:

Roll No. _____

B.Tech. II-Sem (Back) Exam July 2022
BSC
1FY2-03 Engineering Chemistry
1E2403

Time: 3 Hours   **Maximum Marks: 160**
                                                Min. Passing Marks: 56

Attempt all ten questions from Part A, four questions out of seven questions from Part B and four questions out of five questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1_____   2. _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Discuss Blow -down process

Q.2 Why do metals corrode?
Q.3 Define flash & fire print for lubricating oil.

Q.4 What are the disadvantages of using hard water in boiler operations.
Q.5 Write down the uses of Aspirin
Q.6 Define antiknocking agents with the examples.
Q.7 Why buffer solution is added in determination of hardness of water by EDTA method.
Q.8 What is meant by calorific value of fuel, explain it.
Q.9 Which of the molecules & ions are a nucleophilic
       CH_4, H_2O, BH_3, $CH_2=Ch_2$, OH^-, Br^+, NH_3, Br^-
Q.10 What is scale & sludge formation in boiler feed water.

                                                $10 \times 3 = 30$

Part B(Analytical/Problem solving questions)
Attempt any Five questions
Q.1 Describe Bective over method with labelled diagram.
Q.2 Explain zeolite method for softing of hard water
Q.3 Why is annealing important for manufacturing of glass, explain it.
Q.4 Impurities increases the rate of corrosion. Explain it.
Q.5 Calculate weight & volume of air required for the combustion of 1 Kg of carbon..

Q.6 Describe setting & hardening of cement with the help of chemical equations
Q.7 Define cracking . Discuss the thermal cracking in detail

                                                5x10 =50

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any four questions

Q.1 Explain viscosity & Viscosity Index with the help of labelled diagram

Q.2 What is an elimination reactions; Explain its reaction mechanism.

Q.3 What do you mean by temporary & permanent hardness of water, calculate the amount of lime(90% pure) & soda(95%) pure, required for 50,000 liter of water whose analysis is as follows-
Ca(HCo3)2 = 9.2 mg/l, mg(HC3)2 = 7.9 mg/l.
CaSo4= 15.3 mg/l, mgSo4= 15.0 mg/l, mgcl2: 3mg/l & HCL : 4.3 mg/l

Q.4. Discuss giving equation, sketch of the manufacture composition & uses of oil gas.

Q.5 Define corosion, explain the electro chemical corrosion with the help of suitable diagram

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2E3203

2E3203

B.Tech. II Sem. (Main) Examination, July - 2022
2FY2-02 Engineering Physics

Time : 3 Hours   Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

All questions are compulsory.   (10×2=20)

1. What will happen if we use a lens (Newton's Ring) of small radius of curvature?

2. What do you mean by "Q" factor for light?

3. State Rayleigh's criterion of resolution.

4. What is the physical interpretation of wave-function?

5. Define spatial and temporal coherence.

6. Write threshold conditions for laser action.

7. What is the difference between spontaneous and stimulated emission.

8. State Faraday's Law and Bio-Savart Law.

9. What do you mean by Maxwell's equations?

10. What do mean by covalent and metallic bonding.

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions: (5×4=20)

1. What is Numerical Aperture (NA) of an optical fibre? What does the numerical aperture signify?

2. Calculate the conductivity of the intrinsic germanium at 300 K. Given
   $n_i = 2.4 \times 10^{19}/m^3$, $\mu_e = 0.39$ $m^2V^{-1}s^{-1}$ and $\mu_p = 0.19$ $m^2V^{-1}s^{-1}$.

3. An electron is confined to a one dimensional box of side 1 A°. Obtain the first four eigenvalue of the electron in eV.

4. A diffraction grating just resolves lines 4547.27 A° and 4547.98 A° in third order.
   Will it resolve lines 6437.48 A° and 6437.95 A° in the first order?

5. Give the construction and working of semiconductor laser. Draw necessary energy level diagrams.

6. In an He-Ne laser system, the two energy levels of Neinvolved in lasing action have energy value of 20.66eV and 18.76eV. Population inversion occurs between these two levels. What will be the wave length of a laser beam produced?

7. Explain fermi-Dirac distribution function and fermi energy.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Three** questions: (3×10=30)

1. A plane transmission grating produces and angular separation of 0.01 radian between two wavelengths observed at an angle of 30°. If the mean value of the wavelength is 5000A° and the spectrum is observed in the second order, calculate the difference in the two wavelengths.

2. The spectral spread of red cadmium light of wavelength 694.3 nm is 0.001 mm. Calculate spectral purity factor, coherence length and coherence time.

3. Show that the Hall coefficient is independent of the applied magnetic field and is inversely proportional to the current density and electronic charge. Mention the application of Hall Effect.

4. State and prove pointing theorem for the rate of flow of energy in electromagnetic field. What is pointing vector?

5. Prove that in high frequency region Laser action is not possible.

Total No. of Questions:

Total No. of Pages:

Roll No. _____

B.Tech. II-Sem (Back) Exam July 2022
BSC
2FY2-02 Engineering Physics
1E2402

Time: 3 Hours

Maximum Marks: 160
Min. Passing Marks: 56

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1_____

2. _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Write down the Rayleigh criterion of resolution.
Q.2 Write physical interpretation of wave function in brief.
Q.3 What do you understand by coherence? Write down the need of coherent sources in interference.
Q.4 What is the meaning of stimulated emission? How it is different than spontaneous emission.
Q.5 Write Fermi Dirac distribution function and the cases for different temperatures.
Q.6 Write Laplace's and Poisson's equations for electrostatic potential.
Q.7 How the conductivity of a semi-conductor is different than that of the conductor?
Q.8 Explain the term 'Degeneracy' in the context of particle confined in 3D box.
Q.9 Write Bragg's law of X-ray diffraction.
Q.10 Write two applications of optical fiber.

$10 \times 3 = 30$

Part B(Analytical/Problem solving questions)
Attempt any five questions

Q.1 Newton's rings are observed between a spherical surface of radius of curvature 120 cm and a plane plate. The diameters of 5th and 16th bright rings are 0.314 cm and 0.583 cm. Calculate the diameter of 25th and 37th bring rings and also the wavelength of light used.
Q.2 Derive the Schrodinger time dependent equation. Explain Hamiltonian operator.
Q.3 Find an expression for the numerical aperture and maximum acceptance angle of a step index optical fiber. Determine the numerical aperture of a step index fiber where the core refractive index is 1.54 and the cladding refractive index if 1.50. Also find the maximum acceptance angle if fiber is placed in air.

P.T.O.

Q.4.Write down the differences between the followings:
   (a) Temporal and Spatial coherences
   (b) Intrinsic and Extrinsic semiconductors.
Q.5 Starting with the expression of intensity distribution for Fraunhofer diffraction in a place diffraction grating, find the intensities and conditions for various maxima and minima.
Q.6 Write down application of lasers in science, engineering and medicines.
Q.7 Prove the following for a vector field $\vec{A}$ and position vector $\vec{r}$
   (a) div curl $\vec{A} = 0$
   (b) div $(\vec{r}/r^3) = 0$

$$5 \times 10 = 50$$

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any four questions

Q. 1 Discuss the phenomenon of Fraunhofer diffraction at single slit and show that the intensities of successive maxima are nearly in the ratio 1 : 1/22 : 1/61 : 1/121.
Q.2 Write down time independent Schrodinger equation and solve it to determine the eigenvalues and eigenfunctions for a particle in one dimensional box. Draw the necessary diagrams.
Q.3 Explain basic principle of laser action. Describe the construction and working of He-Ne laser using suitable energy level diagram. What is the use of Ne in this laser?
Q.4 What is Hall Effect? Give the elementary theory of Hall Effect. Deduce the formula of Hall Coefficient. Mention the applications of Hall Effect.
Q.5 Derive all four Maxwell's equations for electromagnetism. What do you mean by displacement current? Explain its significance in deriving the fourth Maxwell's equation.

$$4 \times 20 = 80$$

Roll No. _____   [Total No. of Pages : 2]

2E2003

2E2003

B.Tech. II Sem. (Back) Examination, July - 2022
203 Engineering Physics - II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Attempt any Five questions, selecting One question from each unit. All Questions carry Equal marks.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

UNIT - I

1. a) What is compton Scattering? Obtain an expression for shift in wavelength of scattered. Photon by compton scattering.   **(8)**

    b) Derive the Schrodinger time dependent wave equation and discuss the physical interpretation of wave function ψ.   **(8)**

(OR)

    a) Solve the Schrodinger equation and get the energy expression for a particle contined in one dimensional box.   **(8)**

    b) A particle of mass $m = 10^{-29}$ kg is contined to move in a one dimensional box of length $2A°$ whose ends are at $x = 0$ and $x = 2A°$. What is the probability of finding the particle between $1.6000A°$ and $1.6001A°$. Calculate for $n=1$ and $n=2$.   **(8)**

UNIT - II

2. a) What do you mean by degeneracy? Solve the Schrodinger equation for a particle in three dimensional box and get the energy value.   **(10)**

    b) Write a short note on Fermi energy and density of states.   **(6)**

(OR)

    a) Solve the schrodinger equation for a rectangular potential barrier of potential energy V_o and get the expression for transmission coefficient.   **(10)**

    b) Discuss the application of barrier penetration and α-decay.   **(6)**

UNIT - III

3. a) What do you mean by coherence? Discuss in detail temporal and spatial coherence with 'Q' factor of light. **(8)**

   b) Discuss visibility of fringes as a measure of coherence. **(8)**

(OR)

   a) What is an optical fibre? Derive the numerical aperture of an step index optical fibre and explain maximum angle of acceptance. **(8)**

   b) The spectral spread of a red cadmium light of wavelength 694.3 nm is 0.001 nm. Calculate

      i) Spectral purity factor.

      ii) Coherence length.

      iii) Coherence time. **(8)**

UNIT - IV

4. a) What is spontaneous and stimulated emission of radiations? Derive the relation between Einstein's coefficients and discuss the result. **(8)**

   b) Discuss the construction and working of a semiconductor LASER. **(8)**

(OR)

   a) Explain the construction and working of He-Ne LASER with a neat energy level diagram. Discuss the application of it. **(8)**

   b) What is holography? Write down the difference between holography and photography. Discuss the basic theory of holography and requirements of a holographic laboratory. **(8)**

UNIT - V

5. a) Classify the gas filled detectors on their working and discuss the various region of operation of a gas filled detector. **(8)**

   b) Discuss the construction, working and application of Ionization chamber. **(8)**

(OR)

   a) Discuss the construction of Geiger-Muller counter and explain its working as particle detector. **(8)**

   b) Give construction, working and application of scintillation counter together with working of photomultiplier tube. **(8)**

Roll No. _____ [Total No. of Pages : 2

2E3204

2E3204

B.Tech. II Sem (Main) Examination, July - 2022
2FY1-05 Human Values

Time : 3 Hours   Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

Attempt **ALL** questions are compulsory.   (10×2=20)

1. What do you understand by 'Natural Acceptance'?

2. Define 'Prosperity'.

3. Explain 'Sukh'.

4. Explain the material Body.

5. Give meaning of vishwas.

6. Define 'Nyaya'.

7. What is 'Recyclability'?

8. What do you understand by 'Self regulation in Nature?

9. Explain 'Professional Ethics'.

10. Define 'Humanistic Education'.

PART - B
(Analytical/Problem solving questions)

Attempt any **Five** questions:

(5×4=20)

1. Explain the process of 'Self exploration'.

2. Discuss the needs of Self 'I'.

3. State the differences between Intention and competence.

4. Write a short note on 'Ubhay-tripti'.

5. Explain the significance of 'Sah-astitva' of mutually interacting units in all pervasive space.

6. Discuss the role of the professional competence for augmenting universal human order.

7. Explain the significance of ethical human conduct in a profession.

PART - C
(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Three** questions:

(3×10=30)

1. Discuss the methods to fulfill different human aspirations.

2. Explain 'Harmony in Myself'. Discuss 'Sanyam' and 'Swasthya' with their role in keeping harmony between self and body.

3. Discuss the concept of 'Undivided Society'. Explain the major values in human-human relationships.

4. Discuss in details the interconnectedness of the four orders of Nature.

5. Describe the significance of Profession Ethics in identifying the characteristics of Eco-friendly production systems and technologies. Give strategies for transition from the present state to the state of universal human order.

———————

2E3204

(2)

1E2405

Total No. of Questions: **Total No. of Pages:**

Roll No. _____

B.Tech. II-Sem (Back) Exam July 2022
HSMC
2FY1-05 Human Values
1E2405

Time: 2 Hours   **Maximum Marks: 80**
Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)
1_____   2._____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Define Self exploration .

Q.2 Define experiential validation.

Q.3 What do u understand by Humanistic Constitution ?

Q.4 Define Values.

Q.5 Define Nyaya.

$5 \times 2 = 10$

Part B (Analytical/Problem solving questions)
Attempt any Four questions

Q.1 Explain basic human aspirations in brief.

Q.2 State the consequences of confusing between sukh and suvidha.

Q.3 " Human beings are more than just a body". Elucidate.

Q.4 " Family is a natural laboratory to understand human relationships" Elaborate.

Q.5 What are the four orders in nature? Briefly explain them.

Q.6 What is ethical human conduct? Discuss its characteristic.

$4 \times 10 = 40$

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any two questions

Q. 1 Critically examine the prevailing notions of happiness in the society and their consequences.

Q.2 Explain the broad holistic criteria for evaluation of technologies production systems and management models. How do these map with the comprehensive human goals.

Q.3 Write a detailed note on competence in professional ethics.

2 x 15= 30

Roll No. _____   [Total No. of Pages : 3]

2E3205

2E3205

B.Tech. II Sem (Main) Examination, July - 2022
2FY1-04 Communication Skills

Time : 3 Hours   Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. Define the term communication.

2. Write any two barriers of communication.

3. How interpersonal communication can be improved?

4. Change the sentence into passive voice:

   a)   Shut the window

   b)   Don't tell a lie

5. Fill in the blanks with suitable models:

   a)   _____ I borrow your rain coat, please?

   b)   You ought to buy now, the prices _____ go up.

6. Write the name of author "The night train at Deoli".

7. Write the essence of the poem "No Men are Foreign". (Within 25 words).

8. Fill in the words with suitable linking words.

   a) John bought the watch, _____ it was expensive.

   b) _____ the fact that it wasn't easy, I finished the homework.

9. Complete the statements with suitable conditional words;

   a) If I had known, I _____

      i) Will help

      ii) Would help

      iii) Would have helped

   b) Millions of people will die if they _____ aid soon.

      i) don't receive

      ii) Won't receive

      iii) Wouldn't receive

10. " How much Land Does a Man need?" Who is author of this story and write in brief the outcome of story.

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions: **(5×4=20)**

1. Discuss the meaning of communication. Draw the chart of communication process and explain each & step.

2. Draft a letter of complaint to the Sales Manager of a Manufacturing company who has sent you some defective and worthless electric items in response to your order placed last month.

3. Discuss the summary of story "Luncheon". What makes the narrator's lady friend remark - 'you are quite a humorist'?

4. "Where knowledge is free

   Where the world has not been

   Broken up into fragments

   By narrow domestic walls".

   Write the context, Explanation and Reference of these lines.

5. "Whenever me are told to hate our brothers". When do you think this happen? Why? Should we do as we are told at such times what does the poet say? Write the answers of this questions in brief discuss the essence of poem.

46

6. Write a paragraph of about 100-120 words on any one of the following.

   a)   Ragging in professional institutions.

   b)   A visit a museum.

   c)   Environmental Scanning for corporate strategy.

7. a)   List out any four qualities needed for good communication. Explain in brief of any two qualities.

   b)   Write two physical barrier, of Listening and speaking.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any **Three** questions: (3×10=30)

1. a)   Differentiate between formal and Informal channels of Communication.

   b)   Elaborate the types of Communication.

2. What is meant by Human Communication and discuss the methods to improve interpersonal communication.

3. Prepare your Curriculum-Vitae with an application for the post of programmer after seeing an advertising in the times of India dated 23 March 2021.

4. Recently your college held a seminar conservation of electricity and natural resources as a part of 'earth day'. Write a report in 100-125 words which covers concept with significance of report. Sign as Sandeep (Delhi 2021).

5. Define the summary of the poem "If" by Rudyard Kipling. What does the poem teacher us? Write all the suggestions given by poet in his creation "If".

_____

4 7

Attempt all questions from Part A, four questions out of six questions from Part B and two questions out of three questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1._____   2. _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 What is the meaning of Communication?

Q.2 What do you mean by survey report?

Q.3 'Reading is a most important skill if you develop in a well manner' Explain.

Q.4 Critically Compare and contrast among listening and hearing?

Q.5 Use the word thought first as noun and then as verb in meaningful sentences?

$5 \times 2 = 10$

Part B (Analytical/Problem solving questions)
Attempt any Four questions

Q.1 What do you mean by analyzing audience and locale?

Q.2 What are the Barriers of Communication?

Q.3 What is a Resume? Describe its content with illustrations?

Q.4. Write a short note on the appropriate of the title ' The Eyes Are Not Here'

Q.5 What would be the suitable format of preparing interview reports?

Q.6 'Organizing content and preparing an outline plays a vital role in presentation'. Explain.

$4 \times 10 = 40$

48

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any two questions

Q. 1"No Men are Foreign" by James Kirkup. Write down the crux of the poem?

Q.2 write short notes on the following:

      (a) The importance of press release

      (b) Different types of official letters

Q.3 "Wanted young, dynamic graduates in the field of Computer Engineering Having an experience of minimum3 years" Write a job application letter with resume to Post Box No 156. Employment News, Mumbai----400042

                                                  2 x 15= 30

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Roll No. _____

2E3206

[Total No. of Pages : 2]

2E3206

B.Tech. II Sem (Main) Examination, July - 2022
2FY3-07 Basic Mechanical Engineering

Time : 3 Hours

Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

Attempt **ALL** questions are compulsory.   (10×2=20)

1. What is industrial engineering? Write its scope.   (2)

2. Explain the adiabatic system with suitable example.   (2)

3. Describe Zeroth law of thermodynamics.   (2)

4. Define steam boiler and write different types of boiler.   (2)

5. Define blade velocity coefficient.   (2)

6. Define toughness and brittleness.   (2)

7. What do you understand by chamfering and Baring.   (2)

8. What is pattern in casting process?   (2)

9. What are different types of belt drives?   (2)

10. What is the difference between efficiency and Co-efficient of performance.   (2)

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions: (5×4=20)

1. Why cooling of I.C. Engines required? Describe briefly any one cooling method used in I.C. Engines. **(4)**

2. Write short note on comfort air conditioning. **(4)**

3. The distance between two bearing of a shaft which transmits 200 h.p. at 250 rpm is 250 cm. It is subjected to torsion only. Determine the diameter of the shaft for steady loading if the safe shear stress is 400 kg/cm². **(4)**

4. Derive an expression for the length of open belt drive. **(4)**

5. Differentiate between welding, braning and soldering processes. **(4)**

6. What is metal casting? Describe different methods of metal casting. **(4)**

7. Explain the various engineering materials properties. **(4)**

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Three** questions: (3×10=30)

1. An engine, based on air standard Otto cycle, is supplied with air at 0.1 Mpa and 35° C. The compression ratio is 8. The heat supplied is 500 KJ/kg. for given working air specific heat capacity at constant pressure and at constant volume is 1.005 KJ/kgk, 0.718 KJ/kgk respectively find the following. **(10)**

   a) Efficiency of an engine

   b) Temperature and pressure at the end of compression

   c) Maximum temperature of the cycle.

2. What is meant by refrigeration system? Describe vapor compression refrigeration system with suitable diagram. **(10)**

3. Explain in detail, the various operations of drilling machine with diagrams. **(10)**

4. Explain the various stages of heat treatment process. **(10)**

5. A belt is running over a pulley of diameter 100 cm at 300 rpm. The angle of contact is 150° and coefficient of friction between the belt and pulley is 0.3. If the maximum tension in the belt is 3000 N, find the power transmitted by the belt. **(10)**

$\mathcal{S}\mathsf{I}$

Total No. of Questions: Total No.of Pages:

Roll No. _____

B.Tech. II-Sem (Back) Exam July 2022
ESC
1FY3-07Basic Mechanical Engineering
1E2407

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Attempt all questions from Part A, four questions out of six questions from Part B and two questions out of three questions from Part C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1_____   2. _____

Part A (Answer should be given up to 25 words only)
All questions are compulsory

Q. 1 Enlist four important components of I.C. engines.
Q.2 Define ton of refrigeration.
Q.3 What is compounding of steam turbines?
Q.4 Define Mach number.
Q.5 Enlist two effects of frosting.

$5 \times 2 = 10$

Part B(Analytical/Problem solving questions)
Attempt any Four questions

Q.1 Differentiate between open and closed cycle gas turbines.
Q.2 Explain with neat sketch the vapour compression system used in domestic refrigerator.
Q.3 Suggest with justification the remedies in the following situations :
i) Engine does not start.
ii) Smokey exhaust of diesel engine.
Q.4. Explain the concept of centrifugal pump.
Q.5 What are the difference between Francis and Kaplan turbine.
Q.6 With the help of a neat diagram explain the working of 4 stroke cycle diesel engine.

$4 \times 10 = 40$

Part C(Descriptive/Analytical/Problem Solving/Design question)
Attempt any two questions

Q. 1 Explain length of cross belt drive with the help of suitable diagram.
Q.2 Explain the sand casting process with the help of neat sketches.
Q.3 Explain Working of SI Engine with the help of suitable diagram and also enlist its components.

$2 \times 15 = 30$

2E3207

2E3207

B.Tech. II Sem. (Main) Examination, July - 2022
2FY3-06 Programming for problem Solving

Time : 3 Hours

Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer shold be given upto 25 words only)

All questions are compulsory.   (10×2=20)

1.   What are the basic operations performed by a computer system?

2.   What are the different kinds of main memory?

3.   What is flow chart?

4.   Explain the working of control unit.

5.   What is pseudo code?

6.   Explain the basic input-output statements in c programming.

7.   What is compiler?

8.   Explain the basic components of computer architecture.

9.   Differentiate between assembler and interpreter.

10. What are ASCII Codes?

PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.   (5×4=20)

1. Differentiate between High-level, assembly and low-level languages.

2. What are operators in c? Explain its types in detail.

3. Explain the followings with suitable example :

   a) Binary addition

   b) Binary subtraction

4. What are Random, direct and sequential access methods?

5. Write a program in c language to identify greatest number among any three numbers.

6. Explain switch statement with a suitable example.

7. What is file handling? Explain different modes of file handing.

PART - C

(Describptive/Analytical/Problem Solving/Design question)

Attempt any three questions.   (3×10=30)

1. Differentiate between 'Call by value' and 'call by reference'.

2. What are pointers? Also explain the concept of 'Recursion'.

3. What are data types? Explain the different data types in detail.

4. What are loops? Explain different loops with suitable example.

5. Write short note on (Any 2)

   a) r's and (r-1)'s complement

   b) Array

   c) Functions

_____

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2E2006

2E2006

B.Tech. II-Sem. (Back) Examination, July - 2022
206 Fundamentals of Computer Programming

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

*Attempt any **Five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

UNIT - I

1. a) What is the difference between constant and variable? **(8)**

    b) What is conditional operator? Write a small program using conditional operator. **(8)**

(OR)

1. a) What do you understand by type casting? Give examples of implicit and explicit type casting? **(10)**

    b) Predict the output of the following: **(6)**

        main ( )

        {

        int X=5

        Print ("%d %d %d \n" , X, X<<2, x,>>2);

        }

UNIT - II

2. a) What is array? How do we initialize array elements? What are the advantages of array? WAP to find max value from n value in array? **(16)**

(OR)

2. a) Explain memory allocation for 2D- array. (4)

b) Explain command line argument with suitable example? (4)

c) WAP to add two matrices and store the results in the third matrix? (8)

UNIT - III

3. a) Write a short note on: (4+4=8)

    i) fscanf and fprintf

    ii) EOF marker

b) WAP to reverse the order of string through pointer? (8)

(OR)

3. a) Differentiate b/w malloc, calloc and relloc. (8)

b) WAP to reallocated memory using realloc ( ) function. (8)

UNIT - IV

4. a) Write a short note on: (4+4=8)

    i) Void Pointer

    ii) Array of structure.

b) Explain how to pass an array in a function. (8)

(OR)

4. a) What do you mean by function? How many types of functions available in C. (8)

b) WAP to check the input number is prime or not using function call by value? (8)

UNIT - V

5. a) Differentiate b/w low level language and high level languages. (8)

b) Draw a flowchart to find sum of 10 elements. (8)

(OR)

5. a) Convert: (10)

$$(1101.11)_2 = (?)_{10}$$
$$(47.23)_{10} = (?)_8$$
$$(217)_8 = (?)_2$$
$$(268.14)_{10} = (?)_{16}$$
$$(B2F8)_{16} = (?)_2$$

b) Find out the r's and (r-1)'s complement of $(413062)_{10}$. (6)

2E3208

2E3208

B.Tech. II Sem (Main) Examination, July - 2022
2FY3-09 Basic Civil Engineering

Time : 3 Hours   Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. Write the scope of Civil Engineering.

2. Define plan and Maps in survey.

3. Explain the object of levelling.

4. Describe solid waste and its types.

5. Explain principles of surveying.

6. What are the various types of Buildings.

7. Describe various modes of transportation in brief.

8. Write down harmful effects of Air Pollution.

9. Define contour maps.

10. Explain Bio diversity.

PART - B
(Analytical/Problem solving questions)

Attempt any **Five** questions: (5×4=20)

1. Explain various types of tapes used in survey.

2. Describe Impact of Infrastructural development on economy of country.

3. Convert the whole circle bearing into quadrantal bearing.
   a) OA 32°
   b) OB 109°
   c) OC 211°
   d) OD 303°

4. Explain in brief the procedure of ranging survey line.

5. Describe in brief various components of buildings.

6. Explain in short various types of foundations with neat sketch.

7. Describe Rain Water Harvesting.

PART - C
(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Three** questions: (3×10=30)

1. Describe various types of tape corrections in survey.

2. Describe various causes of Road Accidents and what safety measures will you take to avoid Road Accidents.

3. Explain hydrological cycle with neat sketch.

4. Write short note on sanitary land fill.

5. Describe in brief treatment of waste water.

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Roll No. _____ [Total No. of Pages : 3]

1E2408

B.Tech. I Sem. (Back) Examination, July - 2022
ESC
1FY3-08 Basic Electrical Engineering

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Attempt All questions from Part A, Four questions out of Six questions from Par B and Two questions out of Three questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

ALL questions are compulsory.   (5×2=10)

1. State maximum power transfer theorem.

2. Compare line regulation and load regulation.

3. Compare Active power and reactive power.

4. Discuss different application of SCR.

5. What is the need of earthing? Explain any two earthing.

1E2408/2022   (1)   [Contd....

PART - B

(Analytical/Problem solving questions)

Attempt any **Four** questions.   (4×10=40)

1. Explain the working principal of transformer? Derive expression for EMF equation of transformer.

2. Explain the construction and working of a three phase induction motor.

3. Explain the working of single phase rectifier with R load.

4. Solve the given circuit to find the current through 15Ω using Thevenin's Theorem.
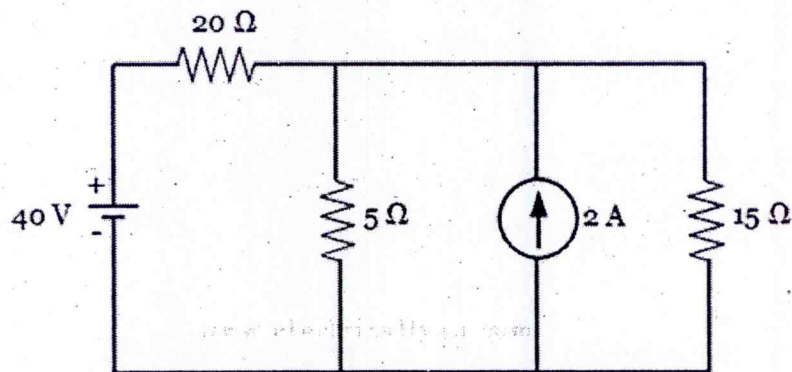
5. For a given RLC series circuit finds (a) Circuit current (b) Phase angle between voltage and current (c) Power consumed (d) Q-factor of the circuit at resonant frequency.
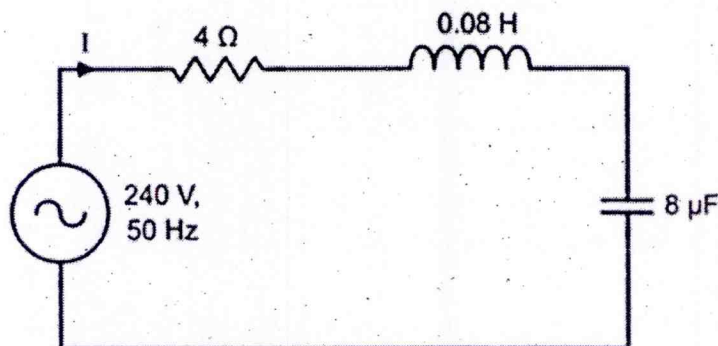
6. Derive voltage and current relations in delta connections and plot phase diagram For delta connection.

PART - C   60

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Two** questions: **(2×15=30)**

1. State super position theorem. Find the value of current I using super position theorem.
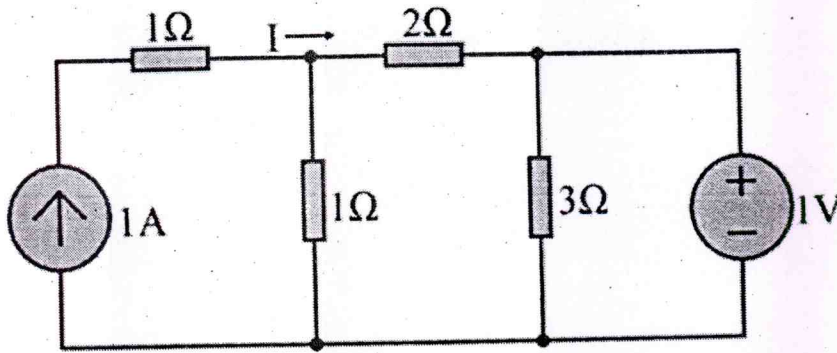
2. Compare power transistor and IGBT. Explain the working of IGBT using schematic diagram and V-I characteristics.

3. a) What is the need of Inverter and explain the working of inverter circuit using suitable schematic.

    b) Explain the speed control method of separately excited DC motor.

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Roll No. _____

[Total No. of Pages : 3]

2E3209

2E3209

B.Tech. II Sem (Main) Examination, July - 2022
2FY3-08 Basic Electrical Engineering

Time : 3 Hours

Maximum Marks : 70

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

ALL questions are compulsory.   (10×2=20)

1. How is the Norton's theorem similar to Thevenin's theorem? In what respect do they differ?   (2)

2. What is function of commutator and brushes?   (2)

3. Find the relationship between phase and line voltage and currents for delta and star connected system.   (2)

4. What is significance of the form factor and peak factor?   (2)

5. Give the comparision between squirrel cage induction motor and slip ring induction motor.   (2)

6. Why the stator windings of alternator are generally star-connected?   (2)

7. Why three - phase synchronous motor will always run at synchronous speed? (2)

8. What are the values of the power - factor for following circuits-   (2)
    a)   Pure inductive circuit and
    b)   Pure resistive circuit?

9. Why transistor is called current controlled device? What is need of biasing the transistor?   (2)

10. Give the comparision between different voltage source and between different types of current source.   (2)
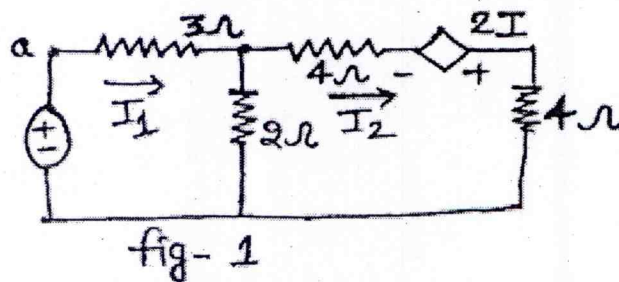
PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions: (5×4=20)

1. Find the current in branches of fig-1 using node voltage method.   (4)

fig- 1

2. Determine the resonant frequency in an series R-L-C circuit. Determine current, power factor at resonance condition.   (4)

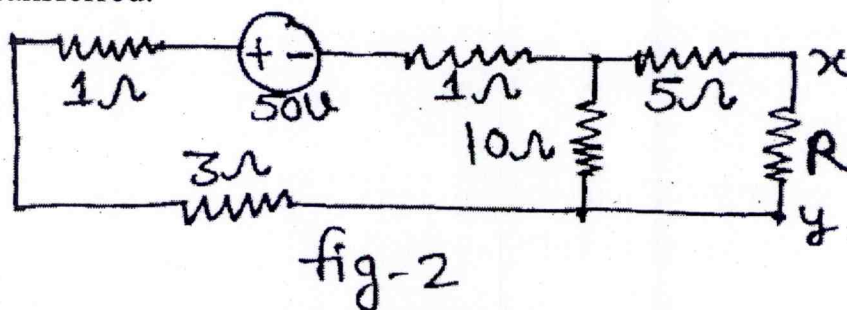3. A 3-phase induction motor is wound for 4-poles and is supplied from a 50Hg system. Find

   a) Actual speed of the motor when running at 4% slip and

   b) Frequency of emf induced in rotor.   (4)

4. Find R to have maximum power transfer in circuit of Fig. 2. Also find maximum power transferred.   (4)

fig-2

5. Derive the emf. equation of a single phase transformer Draw phasor diagram of ideal transformer under.   (4)

   a) Unity power factor

   b) Lagging and

   c) Leading power factor.

6. Draw the V-I characteristics of SCR. And mark all important points on characteristics and define them.   (4)

7. Classify different types of 1-phase rectifier with R-Load. Draw equivalent circuit diagram of each type. Also sketch input, output voltage waveform and current waveform with proper labeling.   (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any **Three** questions: (3×10=30)

1. Give the comparision between switch fuse unit, MCB, ELCB, MCCB. Discuss need of earthing. Explain different types of earthing with suitable circuit diagram.**(10)**

2. Sketch a layout of squirrel cage induction motor and label all the parts. Explain working principle of 3-phase induction motor and draw equivalent circuit diagram.   **(10)**

3. Explain working principle of transformer. Classify different types of losses occur in transformer. Deduce relationship between losses for maximum efficiency. **(10)**

4. Prove that is a D.C. current of I amp is super imposed on an AC current of peak value I amp, the rms value of the resultant current is $\sqrt{3/2}$ I.   **(10)**

5. Find the current through 3Ω resistance of circuit shown in fig. 3 using Norton's Theorem, verify the result using Thenenin's theorem.   **(10)**
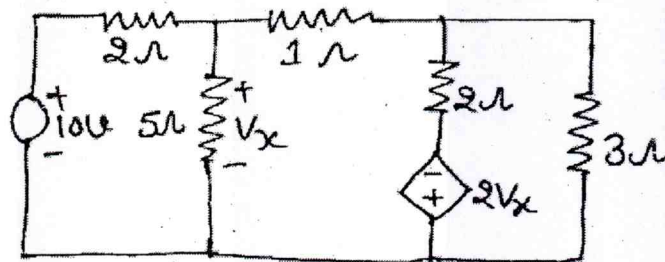
fig-3

B.Tech. II Sem. (Back) Examination, July - 2022
OE-101 Elective - Engineering Mechanics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

*Attempt any **Five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

UNIT - I

1. a) Determine the angle between two equal forces $\vec{p}$, whose resultant is also $\vec{p}$. **(4)**

   b) Draw free body diagram of a man weighing W kg, standing on a ladder at x meter distance from the bottom, and ladder is inclined at an angle of θ from the horizontal. **(4)**

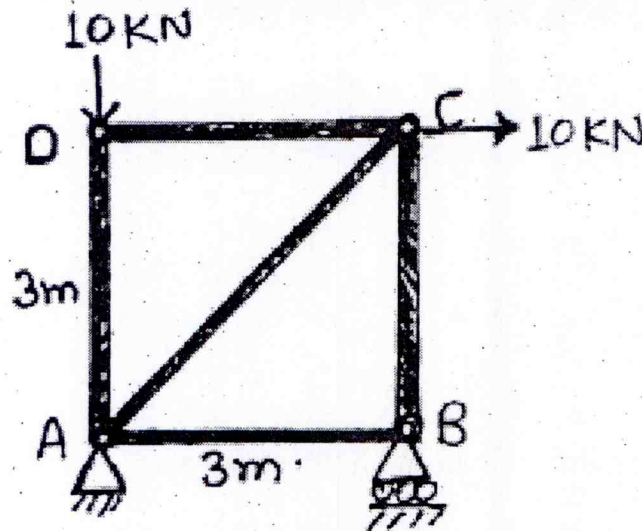   c) Determine the resultant moment of the four forces acting on the rod as shown in the fig. about point "O". **(8)**

(OR)
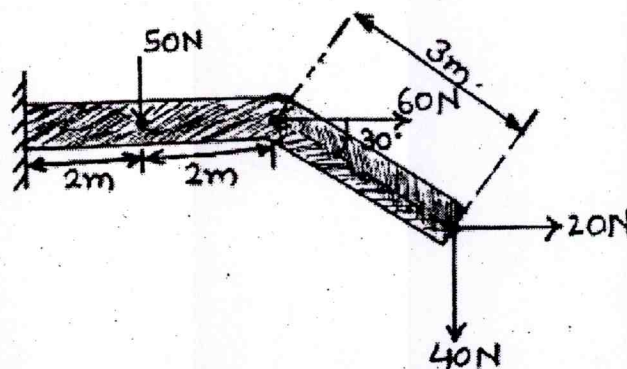
1. Determine the Polar moment of inertia about centroidal axis of the below fig. (16)

200

50

400

60
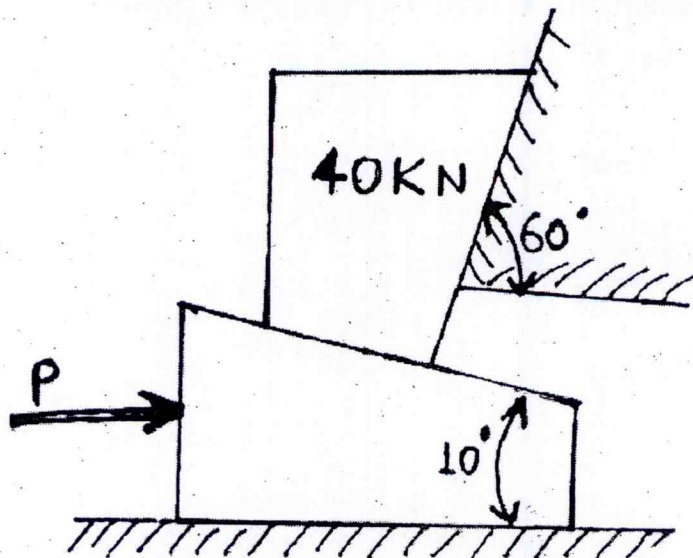
A

50

250
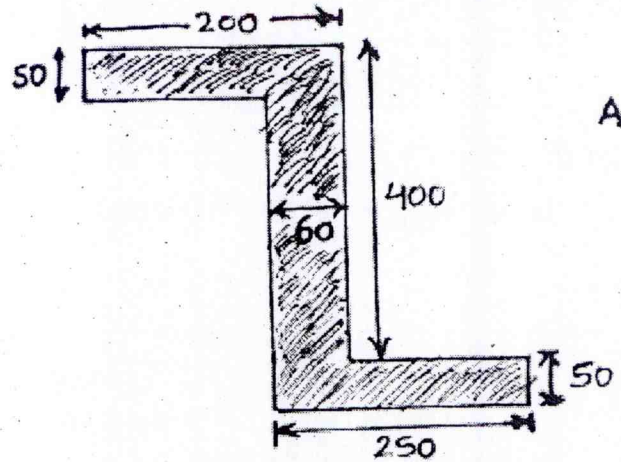
All dimensions are in m.m.

UNIT - II

2. Using virtual work method find the reactions on points A and B. (16)

10 KN

D

C → 10 KN

3m

A

3m

B

(OR)

2. Determine the force P required to lift a load of 40 KN by means of a wedge as shown in fig. take coefficient of friction as 0.25 for all surfaces. (16)

40 KN

60°

P →

10°

UNIT - III

3. a) A particle is projected from ground with a velocity of 20 m sec^{-1} at an angle of 30° with the horizontal. Determine the time at which the vertical displacement of projectile is 3 m. [Take g = 9.8 m sec^{-2}] **(8)**

    b) Apply the Kinematic relations for uniformly. Accelerated motion to determine the time at which the tangential velocity of the sphere at the surface is zero, i.e. when the sphere stops sliding. **(8)**

(OR)

3. a) What is D'–Alemberts principle, explain its significance in classical mechanics.**(8)**

    b) The cable supporting a 2125 kg elevator has a maximum strength of 21,750 N. What maximum upward acceleration can it give the elevator without Breaking. **(8)**

UNIT - IV

4. a) Derive work - Energy theorem. **(8)**

    b) Calculate the work Done of a man carrying 50 Kg. Weight on his head and travelled adistane of 100 m; take coefficient of friction, as 0.3 neglect its own weight. **(8)**

(OR)

4. a) A 10 kg object Accelerated from 5m/sec. to 10 m/sec. Determine the network done by the object. **(8)**

    b) A 2.0 kg ball is resting at the top of a 20 m. hill. If the ball rolls down the entire hill, how fast will it be going? **(8)**

UNIT - V

5. a) Derive Impulse - Momentum relation. **(8)**

    b) A particle of mass m is projected from origin O with speed u at an angle θ with positive x-axis. Find the angular momentum of particle at any time t about O, before the particle strikes the ground again. **(8)**

(OR)

5. Write short note on :- **(4×4=16)**

    a) System of variable mass.

    b) Conservation of Angular Momentum.

    c) Principle of Linear impulse.

    d) Angular Impulse.

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B.Tech. II Sem (Back) Examination, July - 2022
Common to All Branch
### 205 Engineering Mechanics

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

*Attempt any **Five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

UNIT - I

1. a) State and explain the Varignon's theorem with an example. **(8)**

   b) A hemisphere of radius r and weight W is placed with its curved surface on a smooth table and a string of length l(<r) is attached to a point on its rim and to a point on the table as shown in Figure. Find the tension of the string. **(8)**
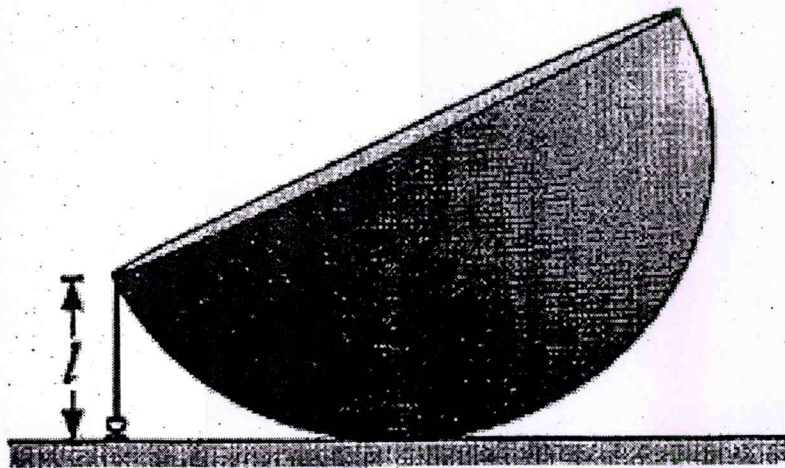

(OR)

1. a) Explain the principle of virtual work? **(8)**

b) What is the maximum load W that a force will hold up, if the coefficient of friction between lever and pulley is 0.2 in the arrangement shown in Figure. Neglect the weight of lever. (8)
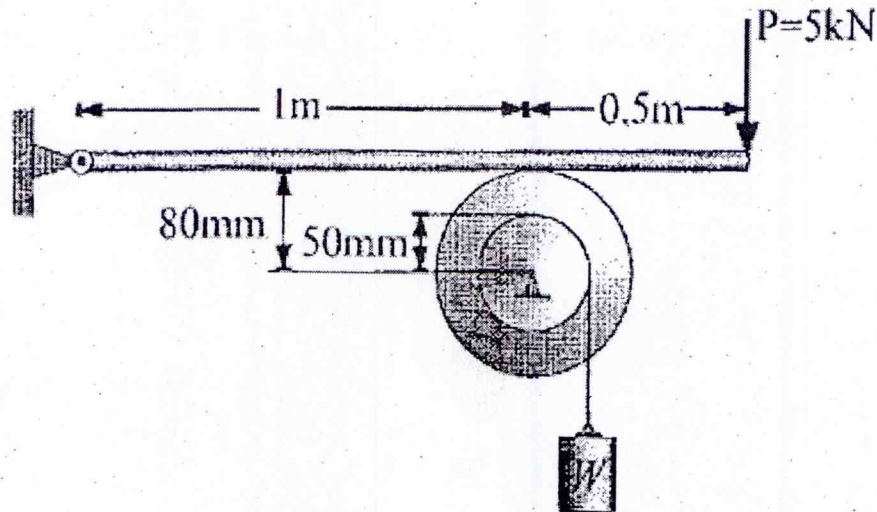
UNIT - II

2. a) Determine the moment of inertia of a thin elliptical disk of mass m, having axial radius of a and b. (8)

   b) Determine the centroid of the composite figure about x-y coordinate. Take x = 40 mm. (8)
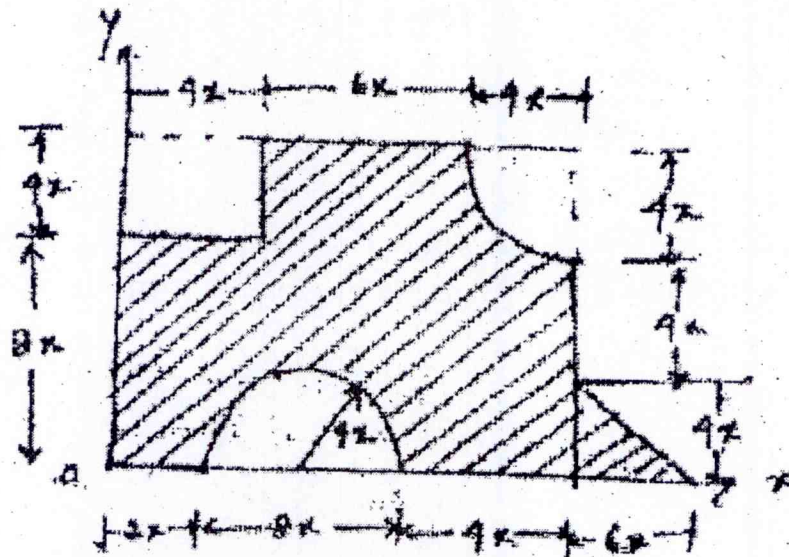
(OR)

2. a) Explain the Law of machines. (8)

   b) The number of teeth on the worm wheel of a single worm and worm wheel is 60. Calculate the velocity ratio if the diameter of effort wheel is 30 cm and that of load drum is 15 cm. The effort required to lift a load of 600 N by this machine is 20 N. Find the efficiency of the machine. (8)

UNIT - III

3. a) Explain the laws of friction. (8)

    b) Find the minimum value of the coefficient of friction between a body and a plane, so that the body may roll without slipping. The radius of gyration and radius of body *are k* and *r*, respectively [Fig.]. (8)
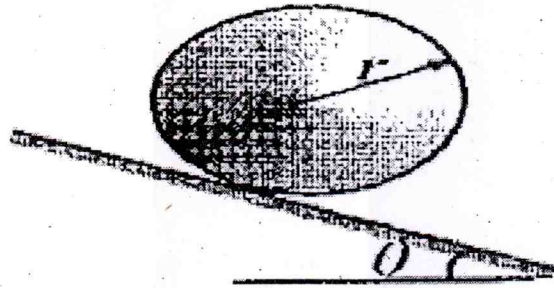

(OR)

3. a) Explain the types of belts. (8)

    b) Explain the velocity ratio of belt drive. (8)

UNIT - IV

4. a) Find Range, time of flight and maximum height for a projectile motion. (8)

   b) Explain the concept of relative motion with an example. (8)

(OR)

4. a) Define the Newton's law of motion. (8)

    b) If the system shown in figure is released from rest, find (a) velocity v of the falling block A as a function of y, and (b) tensions of the string. (8)
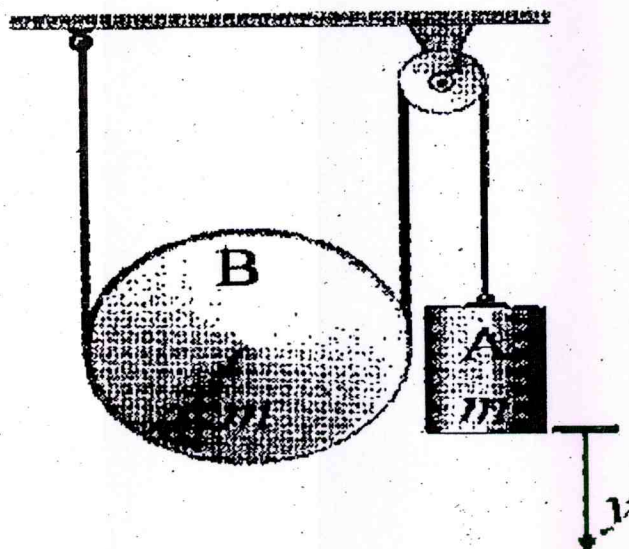
5. a) Differentiate the work and energy.   **(8)**

    b) By transferring a load 10 kN at C by a force 10 kN and a moment 4 kN m, we draw free body diagram of the beam [Fig.] and applying equations of equilibrium, we have $\sum M_A = 0 \Rightarrow 10 \times 4 - 4 - R_B \times 6 = 0$ **(8)**

$$\sum F_y = 0 \Rightarrow R_A + R_B - 10 = 0$$

$$\boxed{R_A = 4kN \text{ and } R_B = 6kN}$$

(OR)
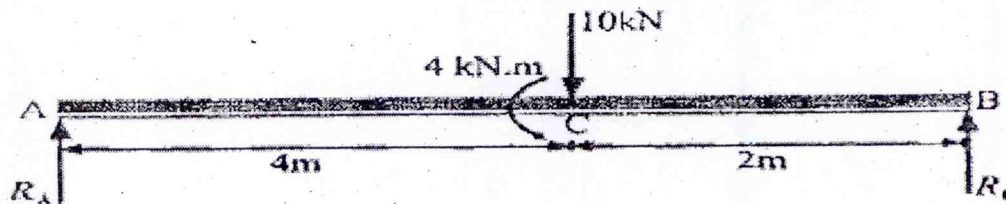
5. Write short note on: **(16)**

    a) Conservative and Non-conservative Force.

    b) Linear and angular momentum.

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