2E3201

2E3201
B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY2 – 01 Engineering Mathematics - II

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

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 may 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.   NIL_____   2.   NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 1 & 6 & 5 \end{bmatrix}$

Q.2   State the Cayley-Hamilton Theorem.

Q.3   Write the Integrating Factor (I.F.) of the following differential equation -
       $(x + 2y^3)\, dy = y\, dx$.

Q.4   Write the condition of exactness of the differential equation
       $M\, dx + N\, dy = 0$.

Q.5 Solve – $(D^3 - 3D^2 + 4)$ y = 0, D ≡ d/dx

Q.6 Write the Legendre differential equation.

Q.7 Find the partial differential equation from Z = ax + by + ab.

Q.8 Write the Lagrange form.

Q.9 Classify the partial differential equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$

Q.10 Write the one dimensional heat equation.

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Reduce the matrix in its normal form and hence find its rank -

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

Q.2 For what values of k, the equations x + y + z = 1, 2x + y + 4z = k, 4x + y + 10z = k^2 have a solution, and solve in each case.

Q.3 Solve – y = 2px – p^2

Q.4 Solve – $(D^2 + 2D + 1)$ y = e^x + x^2 – sin x

Q.5 Solve the differential equation by method of change of dependent variable – $\frac{d^2 y}{dx^2} - 2 \tan x \frac{dy}{dx} + 5y = e^x \sec x$

Q.6 Solve the following –

x^2 (y–z) p + y^2 (z –x) q = z^2 (x – y)

Q.7 Describe the method of separation of variables.

PART – C   [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$

Hence, find A^{-1}

Q.2   Solve the following differential equation –

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

Q.3   Solve by the method of variation of parameter –

$x^2 \dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} - y = x^2 e^x$

Q.4   Solve by Charpit's method –

$px + qy = pq$

Q.5   Solve the Laplace equation – $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ by the method of separation

of variable.

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2E2401

2E2401

B. Tech. II - Sem. (Back) Exam., - 2023
BSC
2FY2 – 01 Engineering Mathematics - II

Time: 3 Hours

Maximum Marks: 160
Min. Passing Marks: 56

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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. NIL _____   2.   NIL _____

PART – A

[10×3=30]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   State the rank nullity theorem.

Q.2   Define orthogonal matrix.

Q.3   Write the standard form of the Bernoulli's equation.

Q.4   Find the integrating factor of the equation:

$(x + 2y^3)dy = y.dx$

Q.5   Solve: $(D^3 – 4D^2 + 5D – 2)y = 0$; $D \equiv d/dx$

Q.6 Write the Bessel differential equation.

Q.7 Find the partial differential equation from $(x - a)^2 + (y - b)^2 + z^2 = c^2$.

Q.8 Find the solution of PDE: $q = 3p^2$

Q.9 Calculate the value of $(B^2 - 4AC)$ in the PDE:

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

Q.10 Write down one dimensional wave equation.

PART – B [5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Show that the equations $x + y + z = -3$, $3x + y - 2z = -2$, $2x + 4y + 7z = 7$

are not consistent.

Q.2 Solve : $p^2 + 2p - 8 = 0$

Q.3 Solve : $(D^2 + 4)y = \cos 2x$

Q.4 Solve : $x^2 \dfrac{d^2y}{dx^2} - x\dfrac{dy}{dx} - 3y = x^2 \log x$

Q.5 Solve : $(z - y)\, p + (x - z)\, q = x - y$

Q.6 Find a complete integral of $9\,(p^2 z + q^2) = 4$

Q.7 Use method of separation of variables, solve $\dfrac{\partial u}{\partial x} = z\dfrac{\partial u}{\partial y} + u$, where

u $(x, 0) = 6e^{-3x}$.

PART – C

[4×20=80]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

Q.1 Find the rank of the matrix A,

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

by reducing it to normal form.

Q.2 Solve the following differential equation -

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

Q.3 Solve by method of variation of parameters

$\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$

Q.4 Solve by Charpit's method –

$z = pq$

Q.5 Find the solution of $\frac{\partial u}{\partial y} = c^2 \frac{\partial^2 u}{\partial x^2}$

for which $u(0, y) = u(l, y) = 0$ and $u(x, 0) = \sin \frac{\pi x}{l}$ by method of separation

of variables.

| | Roll No. _____ | Total No. of Pages: 3 |

2E2301

2E2301

B. Tech. II - Sem. (Back) Exam., - 2023

MA– 102 Engineering Mathematics - II

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 26

Instructions to Candidates:

Attempt *five* questions. Question *no. 1 is Compulsory* and attempt any *4* questions out of remaining *6 questions*. 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)

1. NIL _____   2. NIL _____

Q.1   Attempt all questions :   [8×2=16]

(a) Define rank of a matrix.

(b) State Cayley – Hamilton theorem.

(c) Define a_0, a_n and b_n in Fourier series.

(d) Write half range Fourier sine and cosine series formulae.

(e) Explain exact differential equation of first order.

(f) Find the one part of CF of the following differential equation -

$$\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x)y = e^x \sin x$$

(g) Write the order and degree of following partial differential equation -

$$x^2p - y^2q = \sin z$$

(h) Write the Charpit's auxiliary equations.

Q.2   (a) Obtain the rank of matrix :   [8]

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}$$

after reducing it to the normal form.

(b) Evaluate the Eigen roots of matrix :   [8]

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

Q.3   (a) Find the Fourier series of -   [8]

$$f(x) = x^2, \ -\pi < x < \pi$$

(b) Find the half range cosine series of sinx in the interval $0 < x < \pi$.   [8]

Q.4   (a) Solve the following differential equation -   [8]

$$(1 + x^2)\frac{dy}{dx} + 2xy = 4x^2$$

(b) Solve the following differential equation -   [8]

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

Q.5   (a) Solve the following differential equation -   [8]

$(D^2 - 4D + 4)y = e^{2x} + \sin2x$

(b) Solve the following second order differential equation -   [8]

$x^2 \dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} - 4y = x^2$

Q.6   (a) Solve the following partial differential equation -   [8]

$z(xp - yq) = y^2 - x^2$

(b) Solve the following partial differential equation -   [8]

$pq = xy$

Q.7   (a) Apply matrix theory to solve the following system of equation -   [8]

$x + y + z = 3$

$x + 2y + 3z = 4$

$x + 4y + 9z = 6$

(b) Find the Fourier series for $f(x) = x, \ -\pi < x < \pi$ [8]

2E3202
B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY2 – 03 Engineering Chemistry

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

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 may 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. NIL _____   2. NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Why should an ideal fuel have moderate ignition temperature?

Q.2   What type of dissolved impurities are present in water?

Q.3   What do you mean by the term 'Disinfection'?

Q.4   What is octane number?

Q.5   What are the consequences of corrosion?

Q.6   Define viscosity index.

Q.7   What are the constituents of Portland cement?

Q.8 Define glassy state of matter.

Q.9 Why gypsum in added to cement?

Q.10 Why the complex of Ca^{+2}/Mg^{+2} with EDTA is more stable than the complex of Ca^{+2}/Mg^{+2} with EBT?

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Explain thin layer mechanism of lubrication.

Q.2 Explain in brief, chemistry of settling & hardening of cement.

Q.3 What are (a) Electrophilic reagents (b) Nucleophilic reagents, give two example of each.

Q.4 What is fuel? Give the different types of fuel. What are the requirement of fuel to be used in an industry?

Q.5 Discuss various chemical method for disinfection of water.

Q.6 A sample of coal was found to have the following composition by weight -

C = 70%, O = 14%, H = 6%, N = 5% & rest is ash

Calculate gross & net CV of coal by Dulongs formula.

Q.7 Why annealing is required in the manufacturing of glass?

PART – C
[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   What is corrosion? Discuss the mechanism of electrochemical corrosion.

Q.2   Describe hot lime-soda process for water softening, give the chemical reactions involved in it.

Q.3   What are the different types of organic reactions? Explain them with an example.

Q.4   What is glass? Discuss the manufacturing of ordinary glass.

Q.5   Draw neat & labelled diagram and explain coke manufactured by Otto-Hoffmann's method.

1E2205

1E2205

B. Tech. II - Sem. (Back) Exam., - 2023
CY – 101 Engineering Chemistry

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

*Attempt any **five questions, out of seven questions** including Question No. **1 which is Compulsory**. 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)

1. NIL _____ 2. NIL _____

Q.1 Compulsory, answers for each sub question be given in about 50 words - [8×2= 16]

(a) What is hardness of water?

(b) Preparation of Nylon 6,6.

(c) Flash and fire point of lubricants.

(d) Advantage of gaseous fuels.

(e) Role of gypsum in cement.

(f) Annealing of glass.

(g) Classification of refractories.

(h) Galvanic corrosion.

Q.2 What is degree of hardness of water? Explain temporary and permanent hardness of water? Determine the hardness of water by EDTA Method. [16]

Q.3 What is the process of carbonization? Explain Beehive Coke Oven Method. [16]

Q.4 Explain following - [8+8=16]

(i) Flue gas analysis by Orsat's Apparatus

(ii) Proximate analysis of coal

Q.5 Write notes on the following - [4×4=16]

(i) Classification of polymers

(ii) Synthetic rubber buna-s

(iii) Break point chlorination

(iv) Sludge and Scale

Q.6 (a) What is viscosity of lubricants? Describe the analysis of viscosity by Redwood Viscometers. [10]

(b) Explain property of setting and hardening of cement. [6]

Q.7 What is Drinking grade water? Describe various steps involved in making drinking grade municipal water. [16]

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2E3203

2E3203

B. Tech. II - Sem. (Main / Back) Exam., - 2023

2FY2 – 02 Engineering Physics

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

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 may 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.   NIL _____   2.   NIL _____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   How do circular fringes originate in Michelson's interferometer?

Q.2   Calculate the longest wavelength that can be analyzed by a crystal of spacing d = 3.64 Å in the second order.

Q.3   What is wave function and write basic postulates of wave function?

Q.4   Define the term matter wave and wave-particle duality.

Q.5   Define spatial and temporal coherence.

Q.6   What is the difference between absorption, spontaneous and stimulated emission?

Q.7   Write a difference between intrinsic and extrinsic semiconductors.

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

Q.9   Write threshold conditions for laser action.

Q.10 Define Fermi dirac function and Fermi energy.

PART – B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   Light of wavelengths 5000 Å and 5200 Å falls normally on a plane transmission grating having 4000 lines per cm. If a lens of focal length 100 cm is used to view spectrum on a screen, find the distance between the two lines in the first order.

Q.2   Consider a particle moving in a one-dimensional potential box of infinite height of 25×10^{-10} m width. Estimate the probability of finding the particle within an interval of 5×10^{-10} m at the center of the box when it is in its state of least energy.

Q.3   A gaseous medium gives a laser at an infrared wavelength of 3.4 μm. What is the difference of energy between the upper and lower levels?

Q.4   The spectral spread of a red cadmium light of wavelength 694.3 nm is 0.001 nm. Calculate spectral purity factor, coherence length or coherence time.

Q.5   If a potential function is given by the expression $\phi = xyz$, determine the potential gradient and also prove that the vector is ir-rotational.

Q.6   Calculate the conductivity of the intrinsic germanium at 300 K. Given $n_i = 2.4 \times 10^{19}$ per m^3, $\mu_e = 0.39$ $m^2V^{-1}s^{-1}$ and $\mu_p = 0.19$ $m^2V^{-1}s^{-1}$.

Q.7   In an He-Ne laser system, the two energy levels of Ne involved in lasing action have energy values of 20.66 eV and 18.76 eV. Population inversion occurs between these two levels. What will be the wavelength of a laser beam produced?

PART – C   [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1   Derive an expression for the intensity of diffracted light in the Fraunhofer diffraction due to a single slit and deduce the position of the maxima, minima and secondary maxima.

Q.2   Derive time dependent and time independent Schrodinger wave equation.

Q.3   Explain the construction and working of He-Ne laser. Draw necessary diagrams. What is the role of He in this laser?

Q.4   Show that Hall Effect is independent of the applied magnetic field and is inversely proportional to the current density and electronic charge.

Q.5   State and prove Pointing Theorem for the rate of flow of energy in electromagnetic field. What is pointing vector?

Roll No. _____   Total No. of Pages: 3

1E2402
B. Tech. II - Sem. (Back) Exam., - 2023
BSC
1FY2 – 02 Engineering Physics

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

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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.   NIL _____   2.   NIL _____

PART – A   [10×3=30]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is interference?

Q.2   What is resolving power?

Q.3   Write the properties of wave – function.

Q.4   Define the coherence length.

Q.5   What are the properties of LASER?

Q.6   Define numerical aperture.

Q.7   What is normalization condition?

Q.8   Define insulators, semiconductors and conductors.

Q.9   What is Hall Effect?

Q.10   Write Laplace's and Poisson's equation.

PART – B   [5×10=50]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1   Light containing two wavelengths λ_1 and λ_2 falls normally on a plano –

       convex lens of radius of curvature R resting on a glass plate. If the nth dark

       ring due to λ_1, coincides with the $(n+1)^{th}$ dark ring due to λ_2, prove that

       the radius of the nth dark ring of λ_1 is $\sqrt{\dfrac{\lambda_1\lambda_2 R}{\lambda_1-\lambda_2}}$.

Q.2   Derive an expression for the intensity of diffracted light in the

       Fraunhofer's diffraction due to a single slit.

Q.3   A laser operates at wavelength of 6000Å and its spectral line width (Δv)

       is 10^2Hz. For this laser calculate:

       (i)   Coherence time

       (ii)   Coherence length

       (iii) Bandwidth

       (iv)   Quality factor

Q.4   Find the probability that a particle in a box can be found between 0.45a

       and 0.55a, when the particle is in the first excited state, where a is the

       width of the box.

Q.5 What are spontaneous and stimulated emission? How could probability of stimulated emission be increased?

Q.6 What are bonds? Explain covalent and metallic bonding?

Q.7 Write the short note on physical interpretation of Gradient, Divergence and Curl.

PART – C [4×20=80]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any four questions

Q.1 What is interferometer? Explain the construction and working of Michelson's interferometer.

Q.2 Write down Schrodinger's equation for a particle of mass m trapped in a 3-D box. Solve it for energy Eigen values and Eigen functions.

Q.3 What is optical fibre? Find the expressions for the numerical aperture and maximum acceptance angle of the optical fibre in air.

Q.4 Describe the principle, construction, working and applications of a semiconductor laser.

Q.5 Derive the Maxwell's equations.

Roll No. _____

2E3204

Total No. of Pages: 2

2E3204

B. Tech. II - Sem. (Main / Back) Exam., - 2023

2FY1 – 05 Human Values

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

Attempt all ten questions from Part A. All five 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 may 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. NIL_____   2. NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What does natural acceptance mean?

Q.2   What do the abbreviations SVDD, SSDD and SSSS signify?

Q.3   List down the activities of the self.

Q.4   Differentiate between animal consciousness and human consciousness.

Q.5   What is the comprehensive human goal?

Q.6   What does definitiveness of ethical human conduct mean?

Q.7   How is Sanyam related to Svasthya?

Q.8 What are the four elements of justice?

Q.9 What do you understand by competence in professional ethics?

Q.10 How is wealth different from prosperity?

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt all five questions

Q.1 List some of the specific criteria for holistic evaluation of technologies.

Q.2 Explain the feelings of care, guidance, glory and gratitude.

Q.3 How are units different from space?

Q.4 What are the basic guidelines for value education?

Q.5 Briefly discuss the four orders in nature.

PART – C [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss fully the meaning and concept of self-exploration.

Q.2 Activities of imaging (desire), analyzing (thought) and selecting/testing (expectation) are constantly taking place in 'I'. Discuss.

Q.3 The issues in professional ethics are becoming very complex in the current scenario. Discuss.

Q.4 'Respect' for human being is based on the evaluation on the basis of 'I'. Discuss.

Q.5 The problems we face today are due to preconditioned desires, thoughts and selections. Explain.

Roll No. _____

Total No. of Pages: 3

2E3205

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2E3205

B. Tech. II - Sem. (Main / Back) Exam., - 2023

2FY1 – 04 Communication Skills

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

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 may 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. NIL _____

2. NIL _____

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What are the two main types of communication?

Q.2 Explain the importance of a clear topic sentence in a paragraph.

Q.3 How do you form the Conditional Tense?

Q.4 What is the purpose of a Business Letter?

Q.5 What is the story about "How Much Land Does a Man Need"?

Q.6 Who is the author of the poem "No Men are Foreign"?

Q.7 Name one quality emphasized in "Where the Mind is Without Fear".

Q.8 Define Verbal Communication.

Q.9 Convert the following sentence "A song was written by her" to active voice.

Q.10 How do you introduce yourself in a job application letter?

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Fill in the blank questions are based on the grammar topics mentioned:

(a) Reported speech: She said, "I will come to the party", and I replied that she _____ coming to the party.

(b) Conditional sentence: If it rains, I _____ (take) an umbrella with me.

(c) Modal verb: He _____ swim when he was five years old.

(d) Linking word: I love chocolate ice cream; _____, my sister prefers vanilla.

Q.2 What are some common barriers to effective communication in a multicultural workplace and how can they be overcome?

Q.3 Write a paragraph discussing the impact of social media on society. Highlight both the positive and negative aspects of social media and provide examples to support your points.

Q.4 Write a report on the effect of plastic waste on the environment in your local community.

Q.5 In "Luncheon" by Somerset Maugham, what are the major themes explored in the story and how do they contribute to the storyline?

Q.6 In Rabindranath Tagore's poem, "Where the Mind is Without Fear" what is the poet's vision of an ideal society and how does he emphasize the importance of certain values and qualities?

Q.7 Identify and explain the different types of conditional sentences and demonstrate how each type is used in context.

PART – C [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any three questions

Q.1 What are the main types of communication and how do they differ in conveying information?

Q.2 Describe the differences between formal and informal channels of communication in a corporate setting and provide examples of each.

Q.3 Who wrote "The Night Train at Deoli"? What is the central event in "The Night Train at Deoli"?

Q.4 How do the poems "No Men are Foreign" and "If" inspire readers?

Q.5 You are applying for the position of a Marketing Manager in a reputable company. Write a job application letter explaining your qualifications, relevant experience and why you believe you are the best fit for the role. Include specific details and examples to support your application.

2E3206
B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY3 – 07 Basic Mechanical Engineering

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

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 may 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. NIL _____

2. NIL _____

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   Explain in brief different types of steam turbines.

Q.2   What is priming in pumps? How it is done?

Q.3   Explain the specific function of fuel pump and injector in a diesel engine.

Q.4   Explain scavenging in a 2-stroke engine.

Q.5   State the desirable properties of refrigerants and also list few of the refrigerants used in Air Conditioning.

Q.6   What are the advantages of rope drive as compared to belt drive?

Q.7 Enumerate the various zones in a cupola furnace.

Q.8 What are the different reactions that take place in oxy-acetylene welding?

Q.9 Explain briefly the hot working and cold working of metals.

Q.10 State the main reasons why pig iron cannot be used for industrial applications?

PART – B [5×4=20]

(Analytical/Problem solving questions)
Attempt any five questions

Q.1 What is compounding in steam turbine? Explain various types of compounding in impulse steam turbine with suitable schematic diagrams.

Q.2 What are the important differences between reciprocating pump and centrifugal pump? Also gives their applications.

Q.3 Compare and contrast the working of vapour compression and vapour absorption refrigeration systems. Draw schematic diagram of each.

Q.4 Describe the different types of gears with sketches.

Q.5 Explain the five types of pattern allowances with appropriate diagrams.

Q.6 Explain the drawing process with a schematic diagram.

Q.7 What are the applications of mild steel, medium carbon steel and high carbon steel?

PART – C
[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any three questions

Q.1 What are the differences between impulse and reaction turbines? Describe the working of Parson's reaction turbine with neat schematic diagram.

Q.2 Explain the differences between a petrol and a diesel engine with neat schematic sketches and diagrams along with suitable examples of some popular models and their applications.

Q.3 What is brazing process? What are brazing materials? Describe various brazing methods and how it is different from braze welding?

Q.4 What are common alloying elements used in steels? Describe the effect of each of them on the properties of steel along with their applications.

Q.5 Describe the Closed-Cycle OTEC System with a neat sketch. How it differs from Open-Cycle OTEC system?

1E2407

Total No. of Questions:

Total No.of Pages:

Roll No. _____

B.Tech. I-Sem (Back) Exam 2023
ESC
1FY3-07Basic Mechanical Engineering
1E2407

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Attempt all ten 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 S.I. engines.
Q.2 What is pattern in casting process?
Q.3 What is computer aided manufacturing?
Q.4 Define Mach number.
Q.5 Describe law of thermodynamics.

5 x 2 = 10

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

Q.1 Differentiate between 2 stroke and 4 stroke engine.
Q.2 With the help of a neat diagram explain the working of 4 stroke cycle diesel engine.
Q.3 Explain S.I. Engine with the help of neat sketch.
Q.4. Explain the various stages of heat treatment process..
Q.5 What are the difference between Francis and Kaplan turbine.
Q.6 Explain with neat sketch the vapour compression system used in domestic refrigerator.

4 x 10 =40

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

Q. 1 Explain velocity triangle for single stage impulse turbine.
Q.2 Explain the sand casting process with the help of neat sketches.
Q.3 What is gear transmission? Explain different types of gears with neat sketch.

2 x 15= 30

Roll No. _____   Total No. of Pages: 4

2E3207

2E3207

B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY3 – 06 Programming for Problem Solving

Time: 3 Hours   **Maximum Marks: 70**

Instructions to Candidates:

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 may 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. NIL_____   2. NIL_____

PART – A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   What is stored program architecture of computers?

Q.2   What are the differences among sequential access, direct access and random access methods?

Q.3   Write the key properties of semiconductor memory.

Q.4   Form the two's complement of $(111011101110)_2$ binary numbers.

Q.5   Convert $(39.B8)_{16}$ to its decimal equivalent.

Q.6 What is the output of following code segment? Justify the output.

```
int a=1,b=2,c,d;

float x=5.0, y=6.0, w, z;

printf("%d %d \n", a, b);

printf("%f %f \n", x, y);

printf("%d %d \n", w, z);

printf("%f %f \n", c, d);
```

Q.7 Rewrite the following code segment using IF-ELSE structure without compromising on the underlying logic.

```
int a;

switch(a+2)

{

case 49: { printf("the value of this case is %d", 49);

        break;

    }

case 48: printf("the value of this case is %d \n", 48);

printf("case without break st");

default: printf("i am in default case");

}
```

Q.8 What is bound checking in an array?

Q.9 Write the differences between break and continue.

Q.10 Show the use of strcmp function for strings.

PART – B [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 What is flowchart? List and show the uses of each symbol of flow chart.

Q.2 What are the differences between primary and secondary memory?

Q.3 Convert the $(3754)_8$ octal numbers to binary, decimal and hexadecimal formats.

Q.4 Write a C code to check whether a given number is prime or composite. If it is composite, display all its prime factors.

Q.5 Write a C program to print the following series upto 20 terms.
1 2 6 15 31 46.

Q.6 What are the differences between the structure and union?

Q.7 What is file in C? Write the syntax of C code for reading and writing text in file.

PART – C [3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss the concepts of High-level, Assembly and Low-level languages.

Q.2 Consider the base r system.

(i) What is the range of numbers in decimal represented by this system in -

(a) signed system

(b) 1's complement system

(c) 2's complement system

(ii) Given an integer n, how many bits do you need to represent n in all of the above three systems. Express as a function of n and r.

Q.3 Define the function. Discuss the parameter passing methods with the help of an example.

Q.4 An array, Array[20][15] is stored in the memory along the column with each element occupying 8 bytes of memory. Find out the Base address and address of the element Array[2][3], if the element Array[10][25] is stored at the address 1000.

Q.5 Write a program in C to demonstrate the use of the &(address of) and *(value at address) operators.

Total No. of Questions: 7	Total No. of Pages: 2

Roll No. _____

B.Tech. II-Sem (Back)Exam 2023
CS-103 Computer Programming-II
2E2303

Time: 3Hours

Maximum Marks: 80

Min Passing Marks: 26

Instruction to Candidates:

Attempt any **fivequestions** *including* **Question No. 1, which is compulsory.** *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)

1 NIL _____   2. NIL _____

Q.1 (a) What is system software. [2]

(b) What do you mean by firmware? [2]

(c) What's the difference between freeware and open-source software? [2]

(d) What is a one-dimensional array in C? [2]

(e) Why loader is used in computer system? [2]

(f) What is the purpose of the C preprocessor? [2]

(g) Which file functions is used for opening, reading, writing, and closing files. [2]

(h) Which header file is used for reading computer graphics functions in C? [2]

Q.2 What is the difference between system software and application software? Provide examples of each and explain their roles in a computer system. [16]

P.T.O.

Q.3 What are multi-dimensional arrays, and how do they differ from one-dimensional arrays? Provide an example of a 2D array and explain how to access its elements.

[16]

OR

Q.3 Write a C program to transpose a square matrix (2D array) [16]

Q.4 Explain pointer arithmetic in C with suitable examples. How does pointer arithmetic work with arrays?

[16]

OR

Q.4 Write a C program to reverse the elements of a one-dimensional integer array using pointer arithmetic.

[16]

Q.5 Define structures and unions in C. Provide an example of each and compare their differences in terms of memory allocation and member accessibility. [16]

OR

Q.5 Define a C structure to represent a student with name, roll number, and marks in three subjects. Write a program to calculate the total and average marks of a student using the structure.

[16]

Q.6 What are the use of sscanf() and sprintf() functions in C? Provide examples of each function and demonstrate their role in parsing strings and formatting output. [16]

OR

Q.6 Discuss dynamic memory allocation in C using functions. Provide an example of each function and explain their roles in managing memory.

[16]

Q.7 How can C be used to perform basic graphics operations? Provide an example of drawing basic shapes or patterns using graphics functions in C.

[16]

Roll No. _____

2E3208

Total No. of Pages: 2

2E3208

2E3208
B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY3 – 09 Basic Civil Engineering

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A. All five 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 may 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.   NIL _____   2.   NIL _____

PART – A   [10×2=20]

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

Q.1   Discuss about scope of civil engineering.

Q.2   Define levelling and any one objects of levelling.

Q.3   Discuss basic concept of R.C.C.

Q.4   Write down the different units of measurement.

Q.5   Discuss about various road traffic signs.

Q.6   Explain in brief the functional concepts of ecology.

Q.7   Discuss about classification of solid waste.

Q.8   Discuss about greenhouse effects.

Q.9   Explain about global warming & climate change.

Q.10 Discuss about energy flow in eco-systems.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt all five questions

Q.1 Describe various modes of transportation.

Q.2 Explain types of buildings and building byelaws.

Q.3 Explain about rain water harvesting with a neat sketch.

Q.4 Describe surveying tap corrections and conventional systems.

Q.5 What are the various safety measures will you take during accidents in civil construction?

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Explain the importance of a Civil Engineer in society, also explain ranging out survey lines.

Q.2 Describe reuse and saving of water, also explain control of noise pollution and air pollution.

Q.3 Explain various components of buildings along with their functions.

Q.4 The following readings are taken from a level: 1.885, 2.770, 1.585, 1.985, 2.115, 1.660, 0.985, 1.110, 0.765, 0.885 and 1.005. Instrument is shifted once after sixth reading.

Enter the above reading in a level field book and compute the reduced level of all stations using height of instrument method. The first reading was taken when a staff was held at a bench mark of 101.500 meter.

Q.5 Write short note on -

(a) Types of tapes

(b) Properties of concrete

(c) Types of foundations

(d) Floor space index

2E3209

Roll No. _____

Total No. of Pages: 3

2E3209

B. Tech. II - Sem. (Main / Back) Exam., - 2023
2FY3 – 08 Basic Electrical Engineering

Time: 3 Hours

Maximum Marks: 70

Instructions to Candidates:

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 may 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.   NIL _____   2.   NIL _____

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1   State Kirchhoff's voltage law.

Q.2   State Thevenin's theorem.

Q.3   Define RMS and average value for an AC.

Q.4   Differentiate Active power and Reactive power.

Q.5   What is resonance? Write its condition also.

Q.6   What is ideal transformer?

u8

Q.7   Discuss the efficiency formula of transformer.

Q.8   What is commutator?

Q.9   Differentiate the DC motor and DC generator.
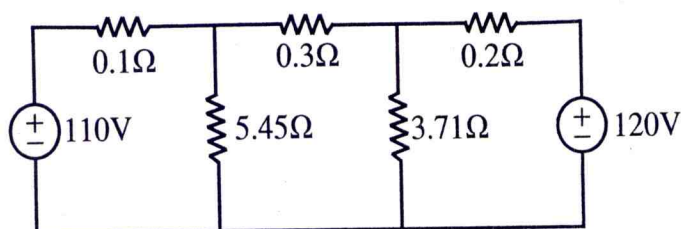
Q.10   Draw VI characteristics of SCR.

PART – B   [5×4=20]

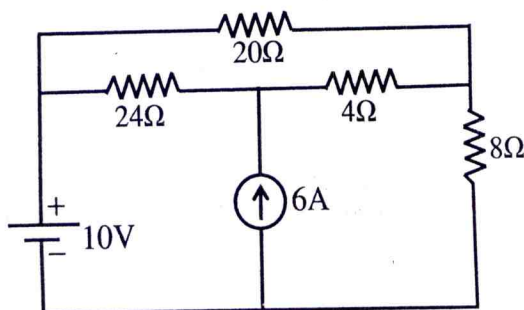## (Analytical/Problem solving questions)

Attempt any five questions

Q.1   Find values of unknown currents in each branch.

Q.2   Find current in 8Ω using Superposition principle.

Q.3   Draw & explain phasor diagram of purely inductive and capacitive circuit.

Q.4   Explain power triangle with suitable phasor diagrams.

Q.5   Derive the EMF equation of transformer.

Q.6   Discuss basic circuit of single phase rectifier with R-load.

Q.7   Describe different types of Earthing.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 State and derive the Maximum Power Transfer Theorem.

Q.2 In a series RLC circuit R = 4.2Ω, L = 0.03H and C = 450 μF. If I = 10A, Find the drop across each element, supply voltage and power factor angle. Also, draw the vector diagram. Assume, f = 50Hz.

Q.3 By taking suitable data, draw and explain the equivalent circuit of transformer.

Q.4 Briefly discuss the speed control of Induction motor.

Q.5 Describe single phase inverter with suitable diagrams.

2E2307

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

Roll No. _____

B.Tech. II-Sem (Back) Exam 2023
OE-101 Elective - Engineering Mechanics
2E2307

Time: 3Hours   **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)

1_____   2._____

UNIT -I

Q. 1 Answer the followings   (4x4 = 16)
      a. Explain superposition law and law of transmissibility.
      b. Define equilibrium of a body and give conditions of equilibrium when subjected to forces.
      c. Differentiate centriod and center of gravity.
      d. Write Impulse-Momentum equation

OR

Q.1   Answer the followings   (4x4 = 16)
      a. Define coefficient of friction. How is it related to angle of friction?
      b. State the D`Alembert`s principle.
      c. Explain the terms: (i) concurrent and (ii) coplanar force system.
      d. State lami's Theorem.

UNIT -II

Q. 2 (a) A block of mass m is dropped on to a spring of stiffness k from a height h. Find the maximum deflection of the spring. Assume $m = 6$ kg, $k = 550$ N/m, $h = 10$ cm.

(8)

Q.2 (b) Prove work energy theorem.

(6)

Q.2 (c) A body of mass m is at rest on flat surface. Could you predict the friction force between the surface of the body and the flat surface. μ is the static coefficient of friction between both the surfaces.

(2)

OR

Q.2 (a) Explain the conservative and non-conservative forces with suitable examples.

(4)

Q.2 (b) Calculate friction force between the ladder and the vertical wall. The ladder is about to slip. Take $W_1 = 10$ Kg, $W_2 = 60$ Kg, $\mu_1 = 0.3$, $\mu_2 = 0.2$, $L = 5$m.

wt. of ladder = W_1 Kg
wt. of man = W_2 Kg
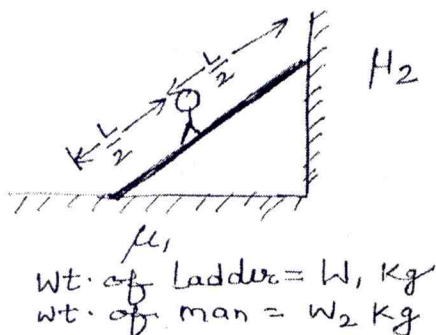
(12)

UNIT -III

Q. 3 (a) Explain physical significance of moment of inertia.

(4)

Q. 3(b) Locate centroid the following section.


All dimensions are in mm.
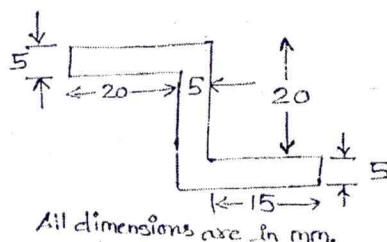
(12)

OR

Q.3 (a) A ball is thrown (horizontal plane) to the wall. Calculate the net force acting on the wall and ball. The collision is treated as perfectly elastic.

$m = 200$ gm, speed of ball $= 20 \frac{m}{sec.}$

time of impact $= 0.2$ sec.
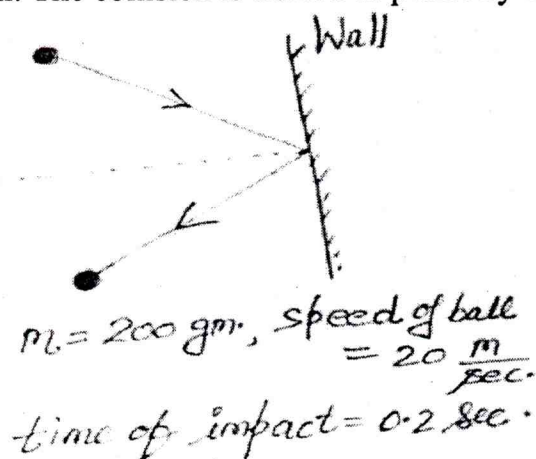
(4)

Q.3 (b) Using the following figure, calculate (Take initial speed = 10 m/sec.)

a. Maximum height attained by the particle (H_{max}) and Time taken by the particle to reach at B
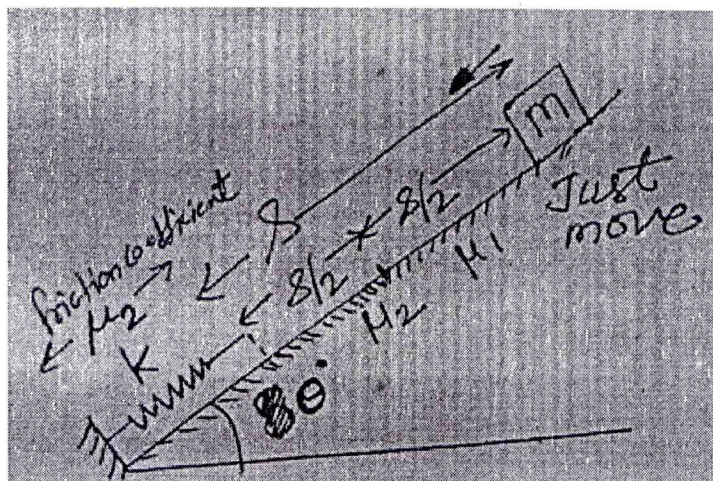
b. Value of x (as shown in figure)
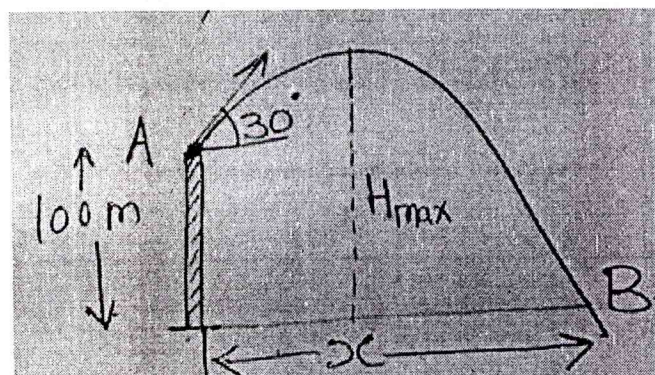
(12)

## UNIT -IV

Q. 4 (a) State Principle of Virtual Work. (4)

54

Q.4 (b) Derive an expression for maximum compression of the spring (Body of mass m is just move) for following figure

(12)

OR

Q.4 (a) Explain physical significance of polar moment of inertia. (4)

Q.4(b) A 10 kg cylinder of diameter 2 m rolls without slipping under the action of a 100 N force. A spring is attached to a cord that is attached to the cylinder as shown in figure. What is the speed of the cylinder after it has moved 50 cm ? The spring is outstretched when the 100 N force is applied.
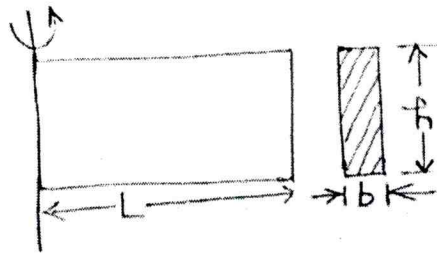

(12)
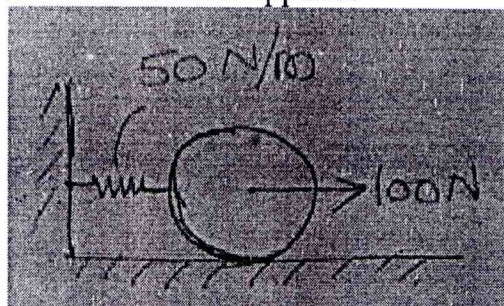
UNIT -V

Q.5 (a) Differentiate between particle and rigid body. (4)

Q.5 (b) Derive an expression for moment of inertia for the following figure. The mass of the plate is M.
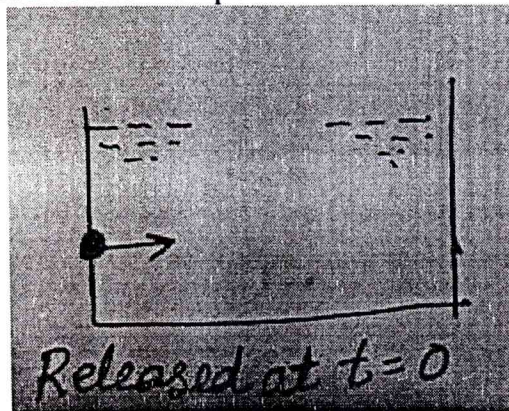
(12)

OR

Q.5 (a) State principle of angular momentum. (4)

Q.5 (b)A particle is moving in the liquid. Use the followings
Initial speed of particle = 27 m/sec.
Acceleration of particle = - 6 t m/s^2
Calculate distance travelled before it stops.

Released at t = 0

(12)

END OF PAPER