

3025

B.Tech. 3rd Semester (Civil Engg.) (G-Scheme)

Examination, November-2023

INTRODUCTION TO CIVIL ENGINEERING

Paper-PCC-CE-201-G

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Before answering the questions, candidate should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question from each section. Question no. 1 is compulsory. All questions carries equal marks.*

1. Describe the following : 15
- (a) Glass Block Masonry
  - (b) Varnishes
  - (c) Fasteners for doors
  - (d) Cavity wall
  - (e) Fire Resisting construction

**Section-A**

2. Explain social, economic, environmental impact of civil engineering on society. 15

3025-P-2-Q-9 (23)

[P. T. O.]

3. What is stone masonry and explain its classification? 15

**Section-B**

4. Explain the manufacturing process of tiles and types of tiles. 15
5. Explain the different types of timbers used in civil engineering. 15

**Section-C**

6. (a) Explain king post truss and queen truss in detail with the help of diagram. 7.5
- (b) What are the fixtures and fasteners used for doors and windows. 7.5
7. Explain in detail different types of foundations used in constructions. 15

**Section-D**

8. Explain the method of waterproofing and waterproofing treatment of roof. 15
9. Explain the classification, measurement and transmission of sound. 15

3024

**B.Tech. 3rd Semester (Civil Engg.) G-Scheme**

**Examination, November-2023**

**ECONOMICS FOR ENGINEERS**

**Paper-HSMC-01-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note : Attempt five questions in all, selecting one question from each unit. Question no. 1 is compulsory. All questions carries equal marks.*

1. Write short notes in 40-50 words : 6×2.5=15
- (i) Law of Demand
  - (ii) Factors of Production
  - (iii) Types of Costs
  - (iv) Features of Monopoly Market
  - (v) Supply
  - (vi) Merits of Privatization

**Unit-I**

2. What do you mean by Demand ? Explain law of demand in detail. 15
3. Define Economics. What is the most acceptable Definition of Economics in your point of view ? 15

3024-P-2-Q-9 (23)

[P.T.O.]

**Unit-II**

4. Explain the following : 3×5=15
- (a) Opportuniry cost
  - (b) Marginal cost
  - (c) Total cost
5. Define Production. Explain in detail the law of variable proportions. 15

**Unit-III**

6. What is Perfect Competition Market ? Explain various features of perfect competition market . 15
7. Define Supply. Explain role of demand and supply in price determination. 15

**Unit-IV**

8. What do you mean by Privatization ? Explain its merits and demerits. 15
9. Write a detailed note on Globalisation of Indian economy. Also explain its merits and demerits. 15

**B.Tech. 3rd Semester (Civil Engg.) (G-Scheme)**

**Examination, November-2023**

**SURVEYING**

**Paper - PCC-CE-207-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note : Attempt five questions in all, selecting one question from each Unit. Question no.-1 is compulsory. All questions carry equal marks.*

1. Explain the following:

- (a) Principle of surveying
- (b) Prismatic and Surveyor's compass
- (c) Temporary adjustments of levels
- (d) Differentiate fly leveling and profile leveling
- (e) Plane table accessories
- (f) Tachometric constants 6×2.5=15

3029-P-4-Q-9(23)

[P.T.O.]

## Unit-I

2. (a) A 30 m long steel tape was standardized at a temperature of  $20^{\circ}\text{C}$  and with a pull of 100 N. The tape was measured a distance AB when the temperature was  $45^{\circ}\text{C}$  and pull was 150N. The tape was supported at the ends only. Compute the corrections per tape length if cross-sectional area of tape is  $4\text{ mm}^2$ , the unit weight of the tape material is  $0.0786 \times 10^{-3}\text{ N/mm}^3$ ,  $E = 2.109 \times 10^6\text{ KN/m}^2$  and co-efficient of expansion of tape per  $1^{\circ}\text{C} = 11.5 \times 10^{-6}$ . 8
- (b) Define surveying. Explain the classification of surveying in detail. 7
3. What is Local attraction? How is it detected and eliminated? The following bearing were taken in running a compass survey:

Line	F.B.	B.B.
AB	$124^{\circ}30'$	$304^{\circ}30'$
BC	$68^{\circ}15'$	$246^{\circ}$
CD	$310^{\circ}30'$	$135^{\circ}15'$
DA	$200^{\circ}15'$	$17^{\circ}45'$

At what stations do you suspect Local attraction? Compute the correct bearing of the lines and also compute the included angles. 15

## Unit-II

4. (a) The following staffs were observed successively with a level, the instrument having been moved after third and sixth readings:
- 1.585, 1.315, 2.305, 1.325, 1.065, 1.815 and 2.385m
- Enter the above reading in page of level book and Calculate the R.L. of remaining points if the first reading was taken with a staff held on a bench mark of 216.0950m. 8
- (b) What is reciprocal leveling? Explain the procedure of reciprocal leveling. 7
5. Derive a relationship for axis signal correction. 15

## Unit-III

6. (a) Describe various methods of plane table survey. 7.5
- (b) State and solve 2-point problem. Under what circumstances the problem is solved? 7.5

7. For a closed traverse ABCDA, the bearings of lines BC and CD could not be measured due to an obstruction. Determine the missing bearings from the following data:

15

Line	Length (m)	W.C.B
AB	550	60°00'
BC	1200	?
CD	880	?
DE	1050	310°00'

**Unit-IV**

8. Describe the fixed hair and movable hair methods of Stadia Tachometry with their expressions. 15
9. (a) What are transition curve? Where they are provided? Derive formula to find out Length of Transition Curve. 7.5
- (b) Two tangents meet at chainage 1022 m; the deflection angle is  $36^\circ$ . A circular curve of radius 300 m is introduced in between them. Find the following: 7.5
- (i) Tangent Length
  - (ii) Chainage of the tangent points
  - (iii) Length of the circular curve

3028

B.Tech. 3rd Semester G-Scheme (Civil Engg.)

Examination, November-2023

FLUID MECHANICS

Paper-PCC-CE-205-G

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note : Attempt any five questions in all, selecting one question from each unit. Question no. 1 is compulsory. All questions carry equal marks.*

1. Explain the following : 6×2.5=15
- (a) Surface Tension and Capillarity
  - (b) Pascal's Law and Manometer
  - (c) Buoyancy and Center of Pressure
  - (d) Uniform and Non-Uniform flow
  - (e) Similar and Distorted model
  - (f) Orifice meter and Pitot tube

**Unit-I**

2. What is Capillarity ? Explain the phenomenon of Capillarity with diagram. Derive an expression for capillary depression in mercury. 15
3. Calculate the dynamic of viscosity of an oil, which is used for lubrication between square plate of

3028-P-3-Q-9 (23)

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3028

size  $0.9\text{m} \times 0.9\text{m}$  and an inclined plane with angle of inclination of  $30^\circ$ . The weight of square plate is  $350\text{N}$  and it slides down the inclined plane with uniform velocity of  $0.4\text{m/sec}$ . The thickness of oil film is  $1.6\text{mm}$ .

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#### Unit-II

4. What is meant by intensity of pressure? How it varies with the depth of fluid. 15
5. A solid cylinder of  $12\text{cm}$  diameter and  $45\text{cm}$  long, consists of two parts of different materials. The first part of the base is  $1\text{cm}$  long and specific gravity =  $5.0$ . The other part of cylinder is made of the material having specific gravity  $0.6$ . State, if it can float vertical in water. 15

#### Unit-III

6. Define and distinguish between stream line, path line and streak line. What is meaning of flow net? Can flow be used very near to boundary. 15
7. Water is flowing through a pipe having diameter  $250\text{mm}$  and  $150\text{mm}$  at the bottom and upper end respectively. The intensity of pressure at the bottom

3028

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3028

end is  $24.5\text{N/cm}^2$  and the pressure at the upper end is  $9.81\text{N/cm}^2$ . Determine the difference in datum head if the rate of flow through pipe is  $40\text{ lit /sec}$ . 15

#### Unit-IV

8. Define displacement thickness. Derive an expression for the displacement thickness. 15
9. Explain the different types of hydraulic similarities that must exist between a prototype and its model. 15

3028

3026

B.Tech (Civil Engg.) 3rd Semester (G-Scheme)

Examination, November-2023

MATHEMATICS-III

Paper-BSC-MATH-205 G

Time allowed : 3 hours ] [ Maximum marks : 75

*Note : Attempt five questions in total by selecting one question from each unit. Question No. 1 is compulsory.*

1. (a) Solve  $y^2zp + x^2zq = y^2x$ . 15  
(b) Write Lagrange's formulae for interpolation.  
(c) Define Laplace Transform and state Convolution theorem.  
(d) Find the number of permutations of the letters of the word ALLAHABAD.

**Unit-I**

2. (a) Solve  $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ . 15  
(b) Solve  $2xz - px^2 - 2qxy + pq = 0$  by Charpit's method.

3026-P-4-Q-9 (23)

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3026

3. A tightly stretched string with fixed end points  $x = 0$  and  $x = \ell$  is initially in a position given by  $y = y_0 \sin^3 \frac{\pi x}{\ell}$ . If it is released from rest from this position, find the displacement  $y(x, t)$ . 15

## Unit-II

4. Find a root of  $x^3 - x^2 - 1 = 0$  by using
- Bisection method
  - Newton Raphson method. 15
5. Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using
- Trapezoidal Rule
  - Simpson's  $\frac{1}{3}$ rd rule 15

## Unit-III

6. Find Laplace Transform of
- $t^3 e^{-3t}$  15

3026

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3026

- (ii) Periodic function  $f(t) = \sin wt$ ,  $0 < t < \frac{\pi}{w}$   
 $= 0$ ,  $\frac{\pi}{w} < t < \frac{2\pi}{w}$ .
- (iii)  $\frac{1-e^t}{t}$

7. (a) Find inverse Laplace Transform of  $\frac{4s+5}{(s-1)^2(s+2)}$  15
- (b) Apply Convolution theorem to evaluate inverse Laplace Transform of  $\frac{1}{(s^2+1)(s^2+9)}$ .

## Unit-IV

8. Write short note on : 15
- Pigeon-hole principle
  - Group
  - Permutations

3026

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(4)

3026

9. Explain the following with the help of suitable examples : 15

(i) Cyclic group

(ii) Normal subgroup.

3026

3027

**B.Tech. 3rd Semester (Civil Engineering) (G-Scheme)**

**Examination, November-2023**

**ENGINEERING MECHANICS**

**Paper - PCC-CE-203-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note : Question no. 1 is compulsory. Attempt total five questions selecting one question from each Unit. All questions carry equal marks.*

1. Write short notes on:

(a) Poisson's Ratio

(b) Proof stress

(c) Bending Moment

(d) Types of Trusses

(e) Hoops Stress

(f) Pure Bending

$6 \times 2\frac{1}{2} = 15$

3027-P-3-Q-9(23)

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3027

Unit-I

2. What is the procedure of finding thermal stresses in a composite bar? 15
3. Direct stress of  $120\text{MN/m}^2$  in tension and  $90\text{MN/m}^2$  in compression are applied to an elastic material at certain point on planes at right angle to another. If the maximum principal stress is not to exceed  $150\text{MN/m}^2$  in tension, to what shearing stress can the material be subjected. What is the maximum resulting shear stress in the material? Also find the magnitude of other principal stress and its inclination to  $120\text{MN/m}^2$ . 15

Unit-II

4. A beam of length 6m is simply supported at the ends and carries a uniformly distributed load  $1.5\text{kN/m}$  run and three concentrated loads of  $1\text{kN}$ ,  $2\text{kN}$  and  $3\text{kN}$  acting at a distance of  $1.5\text{m}$ ,  $3\text{m}$  and  $4.5\text{m}$  respectively from left end. Draw the shear Force and Bending Moment diagram and determine the maximum bending moment. 15

3027

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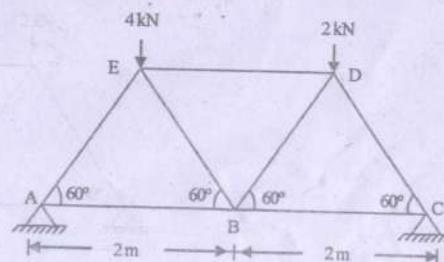
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Unit-III

5. Derive an expression for bending stress at a layer in a beam. 15
6. Derive an expression for the shear stress produced in a circular shaft which is subjected to torsion. What are the assumption made in the derivation? 15
7. Derive the expression for critical load when one end is fixed and other end is free. 15

Unit-IV

8. List different theories of failure. Point out the silent aspects and applications of each theory of failure. 15
9. Analyse the following figure by method of joint. 15



3027

3025

**B.Tech. (Civil Engg.) 3rd Semester G-Scheme  
Examination, December-2024**

**INTRODUCTION TO CIVIL ENGINEERING**

**Paper - PCC-CE-201-G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

*Note : Attempt five questions in all. All questions carry equal marks. Question No. 1 is compulsory. Attempt one question from each section.*

1. (a) Name main disciplines of Civil Engineer.
- (b) Describe quarrying of stones.
- (c) Write different types of pile foundations.
- (d) What are the main causes of dampness?
- (e) Write the types of sound absorbent.
- (f) Write the properties and uses of two emerging construction materials.  $6 \times 2.5 = 15$

**Section-A**

2. (a) Write a short note on English bond. Draw two and half brick thick wall. 6
- (b) Differentiate between rubble and ashler stone masonry with sketch. 5
- (c) Describe briefly about glass block masonry. 4

3025-P-3-Q-9(24)

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( 2 )

3025

3. (a) Describe the contribution of civil engineering to the welfare of the society. 5  
(b) Write a short note on green building concept. 5  
(c) Describe ancient monuments and modern marvels in detail. 5

**Section-B**

4. (a) Write the characteristics of good quality building stones. 5  
(b) Explain the steps followed during manufacturing of tiles. 5  
(c) Describe seasoning of stones. 5
5. (a) Draw a neat sketch of structure of timber. 5  
(b) Write constituents and types of paints and varnishes. 5  
(c) Describe methods for seasoning of timber. 5

**Section-C**

6. (a) Discuss the ledged doors with diagram. 5  
(b) Explain the metal windows and clerestory windows. 5  
(c) Write briefly about king post and queen post truss. 5

3025

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3025

7. (a) Describe the construction of a brick masonry cavity wall. 8  
(b) Classify types of pile foundations with neat sketches. 7

**Section-D**

8. (a) Name and explain different methods used for water proofing in roofs. 8  
(b) Write a short note on steps taken to prevent dampness. 7
9. (a) Discuss the various applications of geotextiles in geotechnical engineering works. And also explain the properties of geotextiles. 8  
(b) How do you insulate ceiling of an auditorium against external sound? 7

3025

3024

**B.Tech. (Electronics & Communication Engg.)**  
**3<sup>rd</sup> Semester G-Scheme**

**Examination, December-2024**

**ECONOMICS FOR ENGINEERS**

**Paper-HSMC-01-G**

*Time allowed : 3 hours] [Maximum marks : 75*

*Note : Attempt five questions in all, selecting one question from each unit. Question No. 1 is compulsory. All questions carry equal marks.*

1. (a) Define Micro Economics.
- (b) Define Marginal Cost.
- (c) What is Economic Problem?
- (d) Define Monopoly.
- (e) What is Law of Demand?
- (f) What is Globalization?

6×2.5=15

**Unit-I**

2. What is Economics? Explain the nature of Economic Problem also discuss the significance of production possibility curve.

15

3024-P-2-Q-9(24)

[P.T.O.]

3. Explain the term Demand. Discuss the nature and importance of Law of Demand. 15

#### Unit-II

4. What is Production? Explain various factors of production and their significance. 15
5. Discuss the Law of Production. Illustrate the various cost in short run and in long run. 15

#### Unit-III

6. Define Market and its characteristics. Differentiate between Perfect Competition, Monopoly, Monopolistic and Oligopoly. 15
7. What is Law of Supply? Explain the various factors that affect the supply of the product. 15

#### Unit-IV

8. What do you understand by Privatization? Explain its merits and demerits. 15
9. What are Commercial Banks? Explain various functions of commercial banks. 15

3029

**B.Tech. (CIVIL ENGG) 3rd Semester G-scheme  
Examination, December-2024**

**SURVEYING**

**Paper - PCC-CE-207G**

*Time allowed : 3 hours]*

*[Maximum marks : 75*

**Note :** (i) **Question No. 1 will be compulsory and of short answer type.**

(ii) *Each question carries equal marks (15 marks).*

(iii) *Student have to attempt **five** questions in total by selecting **one** question from each section.*

1. (a) The representative fraction for a map was 1:5000.  
What was the scale of the map? 2.5
- (b) Describe the terms station in levelling. 2.5
- (c) Define the term true bearing. 2.5
- (d) Mention advantages of using Total station in surveying. 2.5
- (e) What is meant by Degree of curve? 2.5
- (f) The fore bearing of a line is  $32^\circ$ . What is its back bearing? 2.5

3029-P-4-Q-9(24)

[P.T.O.]

(2)

3029

## Section-A

2. (a) Define surveying. What are the principles of surveying? 8
- (b) A 50 m steel tape is found to be 0.05 m too short. Calculate the corrected length if a measured distance is 150 m. 7
3. (a) What is local attraction? How is it detected and eliminated? 8
- (b) Given below are the bearing observed in a traverse survey conducted with a prismatic compass at a place where local attraction was suspected :

Line	FB	BB
AB	134°30'	314°30'
BC	120°00'	299°20'
CD	03°20'	185°30'
DA	265°00'	83°30'

At what stations do you suspect local attraction?  
Find the correct bearings of the lines. 7

3029

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3029

## Section-B

4. The following consecutive readings were taken with a level and 3m leveling staff on a continuously sloping ground at a common interval of 30 m: 0.602, 1.302, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824 and 2.722. R.L of first point was 142.321 m. Calculate R.L of points and gradient of line joining first and last points. 15
5. (a) How would you determine the difference in elevation of the instrument station and top of a chimney if base of the chimney is accessible? 9
- (b) Define axis signal correction. 6

## Section-C

6. (a) Explain with sketches, the following methods of locating a point by plane table survey :  
(i) Radiation  
(ii) Intersection 8
- (b) Define contour and discuss characteristics of contours giving suitable sketches. 7
7. Discuss the detailed procedure for measuring a horizontal angle using the repetition and reiteration methods with a theodolite. 15

3029

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## Section-D

8. (a) Discuss the step-by-step field method for determining tacheometric constants. 7
- (b) It was required to determine the distance between two points A and B by a tacheometer fitted with an anallactic lens ( $k = 100$ ,  $C = 0$ ). With the instrument at A and Staff at B, the observations made were a vertical angle of  $+4^\circ 46'$  and staff intercept of 1.215 m. What is the horizontal distance AB? Later on it was found that the constants of the instrument were 99 and 0.75. What would be the percentage error in the horizontal distance computed? 8
9. A circular curve has a 200 m radius and  $65^\circ$  deflection angle. What is its degree: (i) by arc definition, and (ii) by chord definition? Also calculate : (a) length of curve, (b) tangent length, (c) length of the long chord, (d) apex distance, and (e) mid-ordinate. 15

**B.Tech. (Civil Engg) 3rd Semester G-scheme  
Examination, December-2024  
FLUID MECHANICS  
Paper - PCC-CE-205-G**

*Time allowed : 3 hours] [Maximum marks : 75*

*Note : Attempt five questions in total. Question No. 1 is compulsory. Attempt one question from each section. All questions carry equal marks.*

1. Write short note on the following :  $6 \times 2.5 = 15$
- (i) Explain Pascal's Law.
  - (ii) Write Euler's Equation.
  - (iii) What is Metacentric Height?
  - (iv) Derive the equation of stream function.
  - (v) Derive the equation for actual discharge in an orifice meter.
  - (vi) How the discharge in a venturi meter will change if its orientation changes?

**Section-A**

2. Define fluid. What do you understand by ideal fluid and real fluid? Give one example of each. What is the difference between real and ideal fluids? 15

(2)

3028

3. Define the following fluid properties and state their units : 15
- (i) Specific weight
  - (ii) Dynamic viscosity
  - (iii) Surface tension
  - (iv) Specific gravity
  - (v) Mass density

**Section-B**

4. With the help of diagrammatic presentation, Explain : 15
- (i) Atmospheric pressure
  - (ii) Gauge pressure
  - (iii) Vacuum pressure
  - (iv) Absolute pressure
5. A 6m deep tank contains 4m of water and 2m of oil of relative density 0.8. Determine the pressure at the bottom of the tank. 15

**Section-C**

6. In a two-dimensional flow, the velocity components are  $u = 4y$  and  $v = -4x$  15
- (i) Is flow possible?
  - (ii) If so, determine the stream function.
  - (iii) Plot a set of stream lines.
7. Derive Euler's equation along a streamline, integrate it to get Bernoulli's equation. 15

3028

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3028

**Section-D**

8. What is boundary layer? Explain with a sketch the development of boundary layer over a smooth flat plate. 15
9. What are model laws? What is their importance in model studies? Name the situations where each law is applicable. 15

3028

3026

B.Tech. (Civil Engg.) 3rd Semester (G-Scheme)

Examination, December-2024

MATHEMATICS-III

Paper-BSC-MATH-205-G

Time allowed : 3 hours ] [ Maximum marks : 75

*Note : Attempt five questions in all by selecting one question from each unit. Question No. 1 is compulsory. All questions carry equal marks.*

1. (a) Solve  $pq = p + q$ .
- (b) Solve  $(p - q)(z - px - qy) = 1$
- (c) What is Trapezoidal rule ? Explain its uses.
- (d) Evaluate  $L(\sin h at) = ?$
- (e) Evaluate  $L^{-1}\left(\frac{s - a}{(s - a)^2 + b^2}\right) = ?$
- (f) Show that every subgroup of abelian group is normal subgroup.

3026-P-4-Q-9 (24)

[P.T.O.]

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## Unit-I

2. (a) Solve  $px(z-2y^2) = (qy-z)(y^2+2x^3-z)$   
 (b) Solve  $xp+3yq=2(z-x^2q^2)$
3. (a) Use method of separation of variable to solve  $\frac{\partial^2 v}{\partial x^2} = \frac{\partial v}{\partial t}$ , given that  $v=0$  as  $t \rightarrow \infty$  and  $v=0$  at  $x=\ell$  and  $x=0$ .  
 (b) Solve  $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial y^2} = 0$ , which satisfies the condition  $u(0, y) = u(\ell, y) = u(x, 0) = 0$  and  $u(x, a) = \sin \frac{n\pi x}{\ell}$ .

## Unit-II

4. (a) Using Bisection method find a real root of equation  $x^3 = x+1$ .  
 (b) By method of Regula-falsi find a real root of equation  $x^3 - 2x = 5$ .

3026

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3026

5. (a) Using Lagrange's interpolation formula find the form of function  $f(x)$  from the following table :

x	0	1	3	4
f(x)	-12	0	12	24

- (b) Apply Simpson's rule to the integral  $\int_0^1 \sqrt{1-x^2} dx$  having interval  $h$  for better accuracy.

## Unit-III

6. (a) Find the Laplace transform of

$$f(t) = \begin{cases} 1; & 0 \leq t < 1 \\ t; & 1 \leq t < 2 \\ t^2; & 2 \leq t < \infty \end{cases}$$

- (b) Find  $L^{-1} \left( \frac{2s^2 - 4}{(s+1)(s-2)(s-3)} \right) = ?$

7. (a) Apply convolution theorem to evaluate

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

3026

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- (b) Solve the following differential equations by Laplace transform  $(D^2 + n^2)y = a \sin(nx + \alpha)$  ;  
 $y = Dy = 0$  at  $x = 0$ .

**Unit-IV**

8. (a) In how many ways can we constitute a committee of three professors and two readers from a group of five distinct professors and eight readers.
- (b) If 25 journals in a library contain a total of 52,042 pages then show that one of the journal must contain at least 2,082 pages.
9. (a) Prove that ' $H_1H_2$ ' is subgroup of  $G$  iff  $H_1H_2 = H_2H_1$  where  $H_1$  and  $H_2$  are subgroups of  $G$ .
- (b) Let  $G = \langle a \rangle$  be a cyclic group of order  $n$ . Then prove  $a^m \in G$  is a generator of  $G$  iff  $\gcd(m, n) = 1, m \leq n$ .

3027

B.Tech. (Civil Engg) 3rd Semester (G-Scheme)

Examination, December-2024

ENGINEERING MECHANICS

Paper-PCC-CE-203-G

*Time allowed : 3 hours ]*

*[ Maximum marks : 75*

*Note : Attempt five questions in total. Q. No. 1 is compulsory. Attempt one question from each section. All questions carry equal marks.*

1. (i) What do you mean by degree of static and kinematic indeterminacy?
- (ii) What is Euler's theory?
- (iii) Derive a relationship between Young's modulus, Bulk modulus and Poisson's ratio.  $3 \times 5 = 15$

**Section-A**

2. A steel bar 900 mm long has first 200 mm of diameter 40 mm, second 500 mm has diameter of 20 mm and the last 200 mm has diameter of 30 mm. Determine the maximum axial pull which the bar is subjected if the maximum stress is limited to  $100 \text{ N/mm}^2$ . Find the total elongation of the bar. 15

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[P.T.O.]

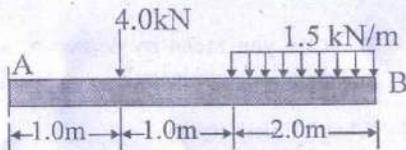
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3. (a) For a certain material  $E = 2.8K$ . Calculate the Poisson's ratio. Also calculate the ratio of modulus of elasticity of modulus of rigidity. 7
- (b) Draw stress-strain diagram for mild steel to explain Hook's law. 8

Section-B

4. Draw SF and BMD for the beam shown in figure. 15



5. (a) What are the assumptions of pure bending theory? 5
- (b) An I section with rectangular ends has the following dimension  
Flange :  $15\text{cm} \times 2\text{cm}$ , web :  $30\text{cm} \times 1\text{cm}$   
Find the maximum shearing stress in the beam for a shearing force of 10 KN. 10

3027

(3)

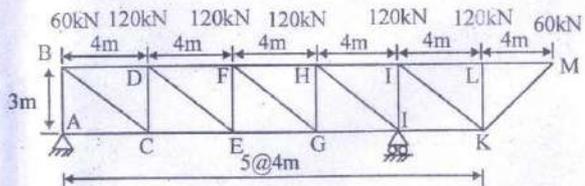
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Section-C

6. Derive Torsion equation for a hollow circular shaft of radius 'R'. 15
7. A cast iron hollow circular column of length 2 m, external diameter 80 mm and internal diameter 60 mm is fixed at both the ends. Using Rankine's formula determine the crippling load. Take  $\sigma_c = 600 \text{ MN/m}^2$ . 15

Section-D

8. Determine the force in each member of the truss using method of joint. 15



9. Define failure theories. Classify and differentiate its types. 15

3027