

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.]



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 $u(x, a) = \sin \frac{\pi x}{\ell}$.

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 $x^3 - 2x = 5$.

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

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

- (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 ' $H_1 H_2$ ' is subgroup of G iff $H_1 H_2 = H_2 H_1$ 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 $\gcd(m, n) = 1, m \leq n$.

B. Tech. (Civil Engg) 3rd Semester C-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 a 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

3025

B.Tech. (Civil Engg.) 3rd Semester C-Scheme
Examination, December 2024
INTRODUCTION TO CIVIL ENGINEERING
Paper - PCC-CE-2143

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 Engineering.
(b) Describe quarrying of stones.
(c) Write different types of pile foundations.
(d) What are the main causes of Compaction?
(e) Write the types of sound absorbers.
(f) Write the properties and uses of two emerging construction materials. 6 x 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

[P.T.O.]

3025-P-3-Q-9(2A)

(2)

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

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

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° . What is its back bearing? 2.5

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

[P.T.O.]



(2)

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.

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

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 : 8
- (i) Radiation
- (ii) Intersection
- (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

[P.T.O.]

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 N/mm^2 . Find the total elongation of the bar. 15

3027-P-3-Q-9 (24)

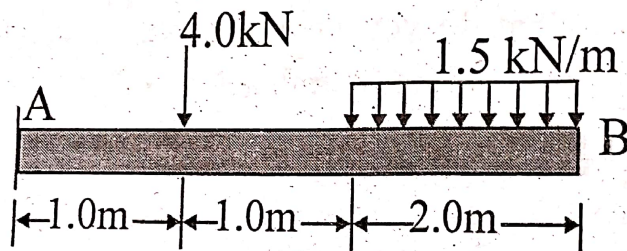
[P.T.O.]

(2)

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



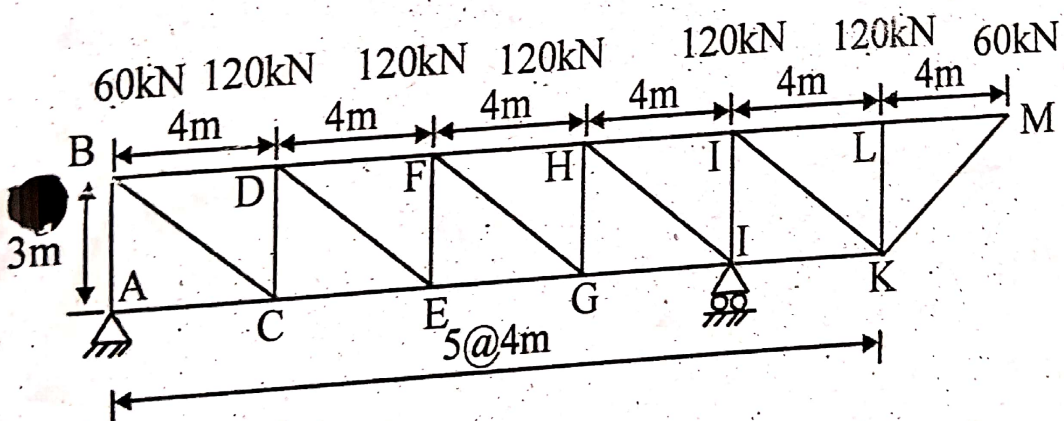
5. (a) What are the assumptions of pure bending theory? 5
- (b) An I section with rectangular ends has the following dimension
 Flange : 15cm \times 2cm, web : 30cm \times 1cm
 Find the maximum shearing stress in the beam for a shearing force of 10 KN. 10

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