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R-17

Code: 7G537

II B.Tech. I Semester Supplementary Examinations May/June 2022

Electrical and Mechanical Technology

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

Use separate booklets for Part-A & Part-B

PART-A

Marks

UNIT-I

1. a) Explain resistance, inductance and capacitance elements in detail.
b) Two resistances of 50 and 40 respectively are connected in parallel. A third resistance of 10 is connected in series with the combination and a D.C supply of 220 V is applied to the ends of the completed circuit. Calculate the current in each resistance.

OR

2. a) Discuss about various types of D.C generators.
b) A 4-pole wave connected DC generator having 60 slots on its armature with 6 conductors per slot, run at 750 rpm and generate an open circuit voltage of 230V. Find the useful flux per pole.

UNIT-II

3. a) Explain the constructional details of a DC generator with a neat sketch.
b) Derive the expression for torque in a DC Motor? And write applications of the DC motors?

OR

4. a) Discuss the various losses in single phase transformer.
b) Describe the principle of operation of an Alternator in detail.

PART-B

UNIT-III

5. a) Classify various types of welding rods.
b) What are the essential characteristics of a flux?

OR

6. a) Name the tools and equipment used in electric arc welding. Describe the working principle of arc welding.
b) Compare A.C. and D.C. arc welding.

UNIT-IV

7. a) What are the merits and demerits of four stroke engines over two stroke engines?
b) Why should I.C engines be lubricated? Explain any one type of lubrication?

OR

8. a) Explain in detail splash lubrication system with a block diagram?
b) Explain the working of a four strokes S.I Engine with the help of a neat sketch?

UNIT-V

9. a) Explain the working of vapour compression refrigeration system and state its advantages and disadvantages?
b) State the factors which affect comfort air conditioning and explain The working of comfort air conditioning system?

OR

10. Explain any three refrigerants used in refrigeration systems with their properties?

Code: 7G632

II B.Tech. I Semester Supplementary Examinations May/June 2022

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. Define total pressure and centre of pressure. Also derive the expressions for the same for an inclined immersed surface.

OR

2. Find the total pressure and position of center of pressure on a triangular plate of base 2.4m and height 3.6m which is immersed in water in such a way that the plan of the plate makes an angle of 60° with the free surface of the water. The base of the plate is parallel to water surface and is at a depth of 3.0m from water surface.

UNIT-II

3. Given that $u = x^2 - y^2$ and $v = -2xy$, determine the stream function and potential function for the flow.

OR

4. A bend in pipe line conveying water gradually reduces from 60 cm to 30 cm diameter and deflects the flow through an angle of 60° . At the larger end the gauge pressure is 1.75 Kg/cm^2 . Determine the magnitude and direction of force exerted on the bend, a) When there is no flow, b) When the flow is 876 liters/sec.

UNIT-III

5. A horizontal pipe of diameter 40cm carrying water is suddenly reduced to a diameter of 20cm. the pressure at the larger and smaller diameter pipes are 150 kN/m^2 and 130 kN/m^2 respectively. Find the loss of head due to contraction and volume flow rate of water assume $C_c = 0.6$.

OR

6. a) Explain the terms 'Total Energy line' and 'Hydraulic gradient line'.
b) Distinguish between notch and weir, orifice and mouth piece

UNIT-IV

7. In a laminar flow show that the average velocity of flow in pipe is half of the maximum velocity at any section.

OR

8. a) Explain about Reynolds Experiment with the help of a neat sketch.
b) Write the characteristics of the laminar and turbulent flows.

UNIT-V

9. a) State Buckingham's π -theorem.
b) Explain distorted and undistorted models.

OR

10. Water is flowing through a pipe of diameter 30 cm at a velocity of 4m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.01 poise and 0.025 poise. Take 'G' of oil as 0.8.

Code: 7G633

II B.Tech. I Semester Supplementary Examinations May/June 2022

Strength of Materials

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

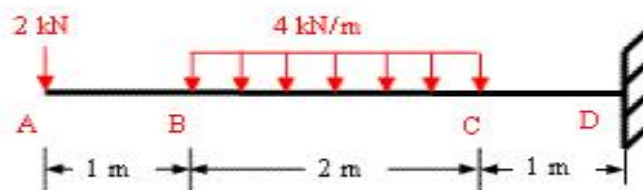
1. Formulate the relationship between shear modulus, bulk modulus and elastic modulus?

OR

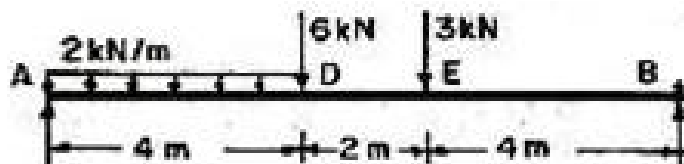
2. A load of 100N Falls through a height of 2cm on to a collar rigidly attached to the lower end of a vertical bar 1.5m long and of 1.5 cm² cross sectional area. The upper end of the vertical bar is fixed. Determine
- Maximum instantaneous stress induced in the vertical bar.
 - Maximum instantaneous elongation and strain energy stored in the vertical rod.

UNIT-II

3. Calculate the intensity of maximum shear force and bending moment?

**OR**

4. Draw Shear Force Diagram and Bending Moment diagram for the beam shown below.

**UNIT-III**

5. A T-section is used as a cantilever of span 1.5 m. A point load of 2.0 kN is acting at the free end of the cantilever in addition to a udl of 3 kN/m from the free end to a distance of 1.0 m. The flange is 100 x 20 mm and web is 10 x 150 mm deep. Calculate the maximum tensile and compressive stresses in the section.

OR

6. A simply supported beam of rectangular cross section 100mm x 200mm deep carries an udl on an effective span of 4 m. If the allowable stress in bending is 10 N/ mm² and in shear is 1 N/ mm², what is the safe value of the udl that can be placed on the beam? Find the maximum stresses in shear and bending, if a udl of 10 kN/m is applied.

UNIT-IV

7. Write the moment area theorems and explain? Determine the deflection of a simply supported beam subjected to concentrated load W KN at its centre?

OR

8. A beam of length 10m is simply supported at its ends and carries two point loads of 100KN and 60KN at a distance of 2m and 5m respectively from the left support. Calculate the deflections under each load. Find also the maximum deflection by double integration method. Take $I=18 \times 10^4 \text{ mm}^4$ and $E=2 \times 10^5 \text{ N/mm}^2$.

UNIT-V

9. At a point in a strained material, direct stresses of 100 N/mm² tension and 80 N/mm² compression are applied on planes at right angles. The greater principal stress is limited to 120 N/mm². What shearing stress may be applied to the given planes and what will be the maximum shearing stress at the point.

OR

10. a) Describe the construction steps of Mohr's Circle.
b) A simply supported beam of span 3 m is carrying point loads of 9 kN and 18 kN at 1 m and 2 m respectively from the left hand support. Determine the strain energy stored in the beam due to bending.

Code: 7G634

II B.Tech. I Semester Supplementary Examinations May/June 2022

Surveying

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. a) Explain clearly the difference between a prismatic compass and a surveyors compass. 7M
 b) How can the accuracy of a closed traverse and open traverse be checked? 7M

OR

2. Two stations A and B are not intervisible due to rising ground between them. Explain with a neat sketch how the line AB can be ranged if both the stations are visible from intermediate points. 14M

UNIT-II

3. The formation width of a road is 10m and the side slopes is 2:1. The surface of the ground has a traverse slope of 1 in 10. If the depths of cutting at the centres of three sections 60m apart are 1.5, 2.5 and 2.0m respectively, determine the volume of earth work. 14M

OR

4. Calculate the area of the corresponding to the following data recorded by planimeter:
 a. IR = 3.436 b. FR = 8.745 c. M = 120cm² d. C = 30.00
 e. The figure traversed clockwise with the anchor point inside and the zero of the dial passed the index once in the reverse direction. 14M

UNIT-III

5. Define the following terms:
 Centering, swinging, transiting, face left, face right, telescope inverted, temporary adjustment, permanent adjustment, and magnification. 14M

OR

6. a) What are the methods of locating interior details in theodolite traversing? Describe the methods of checking the accuracy of close and open traverse. 7M
 b) What are the possible sources of error while using a theodolite? How can they be eliminated? 7M

UNIT-IV

7. What is a two-point problem? Explain with a neat sketch the procedure of solving a two-point problem in plane table surveying. 14M

OR

8. Derive the expression for horizontal and vertical distances in the fixed hair method when the staff is held vertically and the measured angle is that of elevation. 14M

UNIT-V

9. Explain the different methods of overcoming the difficulties in setting out circular curves. 14M

OR

10. a) What is a vertical curve? 5M
 b) Why is it provided? 5M
 c) State an expression for calculating the length of a vertical curve. 4M

Hall Ticket Number :

R-17

Code: 7GC32

II B.Tech. I Semester Supplementary Examinations May/June 2022

Engineering Mathematics-III

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks

UNIT-I

1. a) Using Taylor's series method, compute the value of y at $x=0.2$ from $\frac{dy}{dx} = x + y$; $y(0)=1$. 7M
- b) Using the bisection method, find a real root of the equation $\cos x = x e^x$ correct to three decimal places. 7M

OR

2. a) Apply fourth order Runge-Kutta method to $\frac{dy}{dx} = 3x + \frac{1}{2}y$, $y(0)=1$ determine $y(0.1)$ correct to four decimal places. 7M
- b) Find a real root of the equation $3x = \cos x + 1$ by Newton-Raphson's method correct to four decimal places. 7M

UNIT-II

3. a) Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Simpson's 1/3 rule. 7M
- b) Using Lagrange formula find $f(4)$. Given

x	0	2	3	6
y	-4	2	14	158

7M

OR

4. The following table of values of x and y is given.

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=6$

14M

UNIT-III

5. a) Fit a straight line $y = a + bx$ to the data by the method of least squares

x	0	1	3	6	8
y	1	3	2	5	4

7M

- b) Form the partial differential equation by eliminating a, b from $ax^2 + by^2 + z^2 = 1$

7M

OR

6. a) Form a partial differential equation by eliminating the arbitrary functions from
 $z = f(x + at) + g(x - at)$. 7M
- b) Form a partial differential equation by eliminating the arbitrary functions $f(x)$ and $g(y)$ from $z = y f(x) + x g(y)$. 7M

UNIT-IV

7. a) Express $f(x) = x$ as half range sine in $0 < x < 2$ 7M
- b) Find the Fourier series to represent $f(x) = f x$ in $0 \leq x \leq 2$ 7M

OR

8. a) Find the half range cosine series for $f(x) = x(2 - x)$ in $0 \leq x \leq 2$ and hence find prove that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \frac{1}{6^2} + \dots = \frac{f^2}{12}$ 7M
- b) Find the Fourier series to represent $f(x) = |x|$ when $-f < x < f$ and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}$ 7M

UNIT-V

9. a) Find the Fourier sin and cosine transform of $f(x) = \frac{e^{-ax}}{x}, a > 0$ 7M
- b) Find the Fourier cosine transform of $f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$ 7M

OR

10. Find the Fourier transform of $e^{-|x|}$. Hence show that $\int_0^\infty \frac{x \sin mx}{1 + x^2} dx = \frac{f}{2} e^{-m}, m > 0$ 14M
