

**Code: 7G632**

II B.Tech. I Semester Supplementary Examinations March/April 2023

**Fluid Mechanics**  
(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

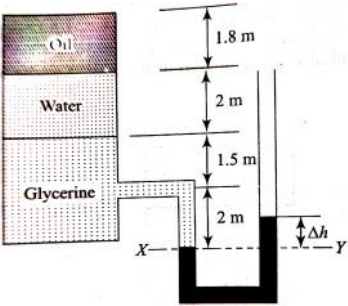
Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

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Marks

<b>UNIT-I</b>
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1. A tank is constructed of a series of cylinders having diameter of 1.8 m, 2 m, 3 m as shown below fig. The tank contains oil, water and glycerine and a mercury manometer is attached to its bottom as shown below. Calculate the manometer reading  $h$  if specific gravities of oil, glycerine and mercury are 0.9, 1.3 and 13.6 respectively.



14M

**OR**

2. State Pascal's law. Derive the equation for the same.

14M

<b>UNIT-II</b>
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3. Define and distinguish between stream line, path line and streak line.

14M

**OR**

4. State the momentum equation. Explain how we will apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend.

14M

<b>UNIT-III</b>
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5. Derive Darcy-Weisbach equation for turbulent flows.

14M

**OR**

6. a) Classify the various types of orifice?  
b) A square orifice 1.5 m long is provided in a tank. The water level on one side of the orifice is 1 m above the top edge of the orifice and 0.5 m below the top edge on the other side of the orifice. Find the discharge through the orifice, if  $C_d = 0.64$

6M

8M

<b>UNIT-IV</b>
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7. a) Explain about Reynolds Experiment with the help of a neat sketch.  
b) Write the characteristics of the laminar and turbulent flows.

8M

6M

**OR**

8. The two reservoirs with surface level difference of 20m are to be connected by 1m dia pipe 6km long. Calculate the discharge when a cast iron pipe of roughness  $k=0.3\text{mm}$  is used. What will be the percentage increase in discharge if cast iron pipe were to be replaced by steel pipe of roughness  $k=0.1\text{mm}$ . neglect local losses

14M

<b>UNIT-V</b>
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9. a) Define the terms: model, prototype, model analysis, hydraulic similitude  
b) A 1/50 model of spillway was made and test was conducted with a water flow rate of  $3\text{m}^3/\text{s}$ . The water velocity was found to be  $2\text{m/s}$ . Estimate the water flow rate and velocity of the prototype.

6M

8M

**OR**

10. a) Explain distorted and undistorted models.  
b) Water is flowing through a pipe of diameter 30 cm at a velocity of  $4\text{m/s}$ . 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.

6M

8M

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Code: 7G633

II B.Tech. I Semester Supplementary Examinations March/April 2023

**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)

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Marks CO BL

**UNIT-I**

1. A steel tie rod 20 mm diameter is encased in a copper tube of external dia. of 36mm and internal diameter of 24 mm with the help of washers and nuts. The nut on the tie rod is tightened and the assembly is subjected to a tensile load of 20kN. The temperature of the assembly is now raised to 80°C. Determine the resultant stresses in the rod and the tube. Take  $E_s=210\text{GPa}$ ,  $E_c=100\text{ GPa}$ ,  $\alpha_s=11\times 10^{-6} / ^\circ\text{C}$  and  $\alpha_c=18\times 10^{-6} / ^\circ\text{C}$

14M 1 B1

OR

2. Define stress and explain the different types of stress.

14M 1 B4

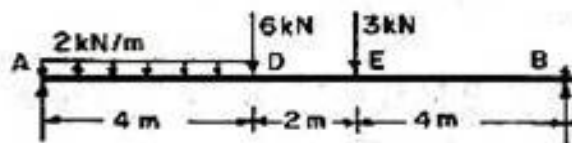
**UNIT-II**

3. Draw the shear force & bending moment diagram for the simply supported beam carrying a central point load.

14M 2 B4

OR

4. Draw shear force and bending moment diagram for the beam shown below. Mark all salient values on them. Comment on point of contra flexure.



14M 2 B4

**UNIT-III**

5. A beam of size 150 mm wide, 250 mm deep carries a uniformly distributed load of  $w\text{ kN/m}$  over entire span of 4 m. A concentrated load 1 kN is acting at a distance of 1.2m from the left support. If the bending stress at a section 1.8 m from the left support is not to exceed  $3.25\text{ N/mm}^2$  find the load  $w$

14M 3 B1

OR

6. Derive the expression for the shear stress in circular section of radius  $R$  & also derive the maximum & average shear stress.

14M 3 B1

**UNIT-IV**

7. A simply supported beam of span 8.0 m is carrying a point load of 45 kN at the centre in addition to self-weight of  $3\text{ kN/m}$ . Determine the maximum slope and maximum deflection. Take  $EI = 1 \times 10^7\text{ kN-m}$

14M 4 B4

OR

8. Obtain an expression for normal and tangential stresses on an inclined plane when an element subjected to bi-axial direct stresses. Also obtain the expressions for resultant stress and their direction

14M 4 B4

**UNIT-V**

9. A rectangular block of a material is subjected to a tensile stress of  $100\text{N/mm}^2$  on one plane and a tensile stress of  $47\text{N/mm}^2$  on a plane right angle to the earlier, together with a shear stress of  $63\text{N/mm}^2$  on all the planes. Determine i) the magnitude of principal stresses ii) the orientation of principal planes and iii) the maximum shear stress. Use analytical method only.

14M 5 B4

OR

10. Derive the expression for maximum principal strain theory

14M 5 B1

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R-17

Code: 7G634

II B.Tech. I Semester Supplementary Examinations March/April 2023

Surveying  
(Civil Engineering)

Max. Marks: 70  
Time: 3 Hours  
Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )  
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UNIT-I

1. Describe the different types of chains used in survey indicate the relative advantages of each. 14M
- OR
2. Define the following:  
a) Whole circle bearing and reduced bearing,    b) Fore bearing and back bearing  
c) True meridian and magnetic meridian,        d) Magnetic declination.  
e) Dip of the magnetic needle, and                f) Local attraction. 14M

UNIT-II

3. Define the following: datum surface, line of collimation, reduced level, bench mark, change point, and parallax. 14M
- OR
4. The following perpendicular offsets were taken from a chain line to a hedge:  
Distance (m) - 0.00   5.00   10.00   15.00   20.00   30.00   40.00   50.00   65.00   80.00  
Offset(m)    -   3.40   4.25   2.60   3.70   2.90   1.80   3.20   4.50   3.70   2.80  
Calculate the area by: a. Trapezoidal rule, and    b. Simpson's rule. 14M

UNIT-III

5. The lengths and bearings of the sides of a closed traverse are represented below along with the latitudes and departures of known sides. Determine the bearing of AB and length of CD.  

Line	Length(m)	Bearing	Latitude	Departure
AB	725.0		--	--
BC	1060.0	N62°30'E	+498.45	+940.24
CD	L	N37°36'E	--	--
DE	945.0	S55°18'W	-537.99	-776.92
EA	577.2	S2°40'W	-576.63	-26.85

 14M
- OR
6. a) How is the closing error in a traverse balanced? 7M  
b) Describe the process of measuring the horizontal angle. 7M

UNIT-IV

7. A tacheometer fitted with an anallatic lens and having a multiplying constant of 100 was set up at R which is an intermediate point on a traverse leg AB. The following readings were taken with the staff held vertically.  

Staff section	Bearing	Vertical angle	Intercept	Axial Hair reading
A	40°35'	-4°24'	2.21	1.99
B	22°35'	-5°12'	2.02	1.90

  
Calculate the length AB and the level difference between A and B. 14M
- OR
8. What is a two-point problem? Explain with a neat sketch the procedure of solving a two-point problem in plane table surveying. 14M

UNIT-V

9. Draw a neat sketch of a circular curve and show the following notations there on:  
a) Back tangent                      b) forward tangent                      c) Point of commencement  
d) Point of tangency                e) Point of intersection                f) Angle of deflection  
g) Angle of intersection            h) Long chord                            i) Apex distance and  
j) Versed sine of curve 14M
- OR
10. Explain the different methods of overcoming the difficulties in setting out circular curves. 14M

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<b>R-17</b>
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**Code: 7G631**

II B.Tech. I Semester Supplementary Examinations March/April 2023

## Building Materials & Construction

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

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

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Marks

### UNIT-I

- |    |  |     |
|----|--|-----|
| 1. | Write the properties of building stones and their structural requirements. | 14M |
|----|--|-----|

**OR**

- |    |  |    |
|----|--|----|
| 2. | a) Briefly describe dressing of stone and preservation of stone? | 7M |
|    | b) Write the standards for good quality of bricks.               | 7M |

### UNIT-II

- |    |   |     |
|----|---|-----|
| 3. | Describe different types of cement and their uses. Define slurry, clinker and function of gypsum in cement. | 14M |
|----|---|-----|

**OR**

- |    |  |    |
|----|--|----|
| 4. | a) Enumerate the properties of aluminum? | 7M |
|    | b) Explain the ingredients of Cement?    | 7M |

### UNIT-III

- |    |  |    |
|----|--|----|
| 5. | a) Describe various parts of exogenous tree at any cross-section.            | 8M |
|    | b) Explain different methods of seasoning with advantages and disadvantages? | 6M |

**OR**

- |    |                                     |    |
|----|-------------------------------------|----|
| 6. | a) Explain the seasoning of timber? | 7M |
|    | b) Give the defects in timber?      | 7M |

### UNIT-IV

- |    |  |     |
|----|--|-----|
| 7. | Draw and explain the plan and elevation of a one and a half brick wall in English bond | 14M |
|----|--|-----|

**OR**

- |    |  |     |
|----|--|-----|
| 8. | Explain different types of shallow foundations used for different structures, in various conditions, with neat diagrams. | 14M |
|----|--|-----|

### UNIT-V

- |    |  |    |
|----|--|----|
| 9. | a) Explain about the king post truss with a neat sketch?                       | 7M |
|    | b) Write down the structural component of a building and explain each in brief | 7M |

**OR**

- |     |  |    |
|-----|--|----|
| 10. | a) State briefly the requirements of a good staircase. | 7M |
|     | b) Explain raft foundation with a sketch               | 7M |

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**R-17**

**Code: 7GC32**  
 II B.Tech. I Semester Supplementary Examinations March/April 2023  
**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)  
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Marks

**UNIT-I**

1. Use Milne's method to find  $y(0.3)$  from  $y' = x^2 + y^2$   $y(0) = 1$ . Find the initial values  $y(-0.1)$ ,  $y(0.1)$ ,  $y(0.2)$  from the Taylor's series method. 14M

**OR**

2. Find a real root of the equation  $3x = \cos x + 1$  by Newton-Raphson's method correct to four decimal places. 14M

**UNIT-II**

3. 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

**OR**

4. Estimate the value of  $f(22)$  and  $f(42)$  from the following table by Newton's forward and backward interpolation formula. 14M

x	20	25	30	35	40	45
y	354	332	291	260	231	204

**UNIT-III**

5. Form a partial differential equation by eliminating the arbitrary functions  $f(x)$  and  $g(y)$  from  $z = y f(x) + x g(y)$ . 14M

**OR**

6. Solve  $\frac{\partial^2 u}{\partial x^2} - 2 \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$  14M

**UNIT-IV**

7. Find the Fourier series to represent  $f(x) = |x|$  when  $-f < x < f$  and deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}$  14M

**OR**

8. Find the half range cosine series for the function  $f(x) = x$ , when  $0 < x < f$  hence show that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}$  14M

**UNIT-V**

9. If  $F(s)$  is the complex Fourier transform of  $f(x)$  then prove that  $F\{f(ax)\} = \frac{1}{a} F\left(\frac{s}{a}\right), a \neq 0$  14M

**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

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<b>R-17</b>
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**Code: 7G537**

II B.Tech. I Semester Supplementary Examinations March / April 2023

**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 = 70 Marks )

Use separate booklets for **Part-A & Part-B**

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**PART-A**

	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) State and explain the Ohm's Law?	7M	CO1	L1
b) Draw a neat sketches the construction of a Dc machine?	7M	CO1	L1
<b>OR</b>			
2. a) Explain the principle operation of DC generator?	7M	CO1	L1
b) Mention the applications of DC motor?	7M	CO1	L1
<b>UNIT-II</b>			
3. a) Enumerate the various losses in a transformer?	7M	CO2	L3
b) Explain the principle operation of single phase transformer?	7M	CO2	L3
<b>OR</b>			
4. a) Define the term of Efficiency and regulation of a transformer?	7M	CO2	L3
b) Explain the principle operation of three phase induction motor?	7M	CO2	L3
<b>PART-B</b>			
<b>UNIT-III</b>			
5. a) Why do we need a step Down Transformer in ARC Welding? Explain.	7M	CO3	L2
b) Illustrate the purpose of a flux and shielding gas in welding process.	7M	CO3	L3
<b>OR</b>			
6. a) Define welding? Classify the welding processes and also give the applications of welding processes.	7M	CO3	L2
b) Describe the process of Submerged arc welding stating its advantages and limitations.	7M	CO3	L2
<b>UNIT-IV</b>			
7. a) What do you mean by single stage and multi stage compression and discuss when you suggest single stage and multi stage compression in real time applications.	7M	CO4	L2
b) Explain working principle of Reciprocating Compressor with a neat sketch	7M	CO4	L2
<b>OR</b>			
8. a) Differentiate between two stroke with four stroke engines	7M	CO4	L2
b) Interpret the provision of Clearance Volume in IC Engines and discuss about its effect on cycle efficiency?	7M	CO4	L2
<b>UNIT-V</b>			
9. a) Contrast between air cooling and air conditioning	7M	CO5	L2
b) Mechanical compression process of vapor compression cycle is replaced by a thermal compression process in vapor absorption refrigeration system. Explain.	7M	CO5	L2
<b>OR</b>			
10. a) Explain any three refrigerants used in refrigeration systems with their properties.	7M	CO5	L2
b) Sketch the layout of an air conditioning system and explain the functions of each component in it.	7M	CO5	L3

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