Hall Ticket Number :										

R-20

Code: 20A133T

II B.Tech. I Semester Regular Examinations March 2022

Fluid Mechanics and Hydraulic Engineering

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What is difference between gauge pressure and absolute pressure	CO1	L1
b)	Explain the stream line, stream tube and streak line	CO2	L2
c)	What are the advantages of Triangular notch over rectangular notch	CO3	L1
d)	Explain the water hammer in water supply penstock	CO4	L2
e)	What are root causes of cavitation in turbine? State its remedies	CO5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	Blooms Level
	UNIT–I			
2. a)	State Newton's Law of Viscosity. Explain the impact of temperature on viscosity of liquids and gases	6M	CO1	L2
b)	A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right-limb is open to the atmosphere. The centre of the pipe is 100 mm below the level of mercury (specific gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 160mm, determine the absolute pressure of the oil in the pipe line	6M	CO1	L4
	OR			
3. a)	What is centre of pressure? Derive an expression for total pressure and centre of pressure acting on submerged inclined plane body	6M	CO1	L3
b)	A 1m wide and 1.5 m deep rectangular plane surface lies in water in such a way that its plane makes an angle of 30°with the free water surface. Determine the total pressure and position of centre of pressure when the upper edge is 0.75 m below the free water surface.	6M	CO1	L4
	UNIT–II			
4. a)	Explain the different types of fluid flows with practical examples in daily life.	6M	CO2	L2

b) In a two-dimensional incompressible flow, the fluid velocity components are given by u = x – 4y and v=–y-4x. Show that velocity potential exists and determine its form as well as stream function. 6M CO2 L4

OR

5. a) What is stream function? Derive relation between stream function and velocity potential function. 6M CO2 L3

b) In an incompressible flow, the velocity vector is given by: $V = (6xt + yz^2) i + (3t + xy^2) j + (xy – 2xyz – 6 tz) k$ (i) Verify whether the continuity equation is satisfied. (ii) Determine the acceleration vector at point L (2, 2, 2) at t = 2.0. 6M CO2 L4

UNIT–III

6. a) What is a Pitot tube? How is it used to measure velocity of flow at any point in a pipe or channel? 6M CO3 L2

b) A Venturimeter with inlet and throat diameters 300 mm and 150 mm respectively is attached in a vertical pipe in which flow occurs from bottom to top. The distance between the point of entrance and to the point of throat of the Venturimeter is 750 mm. If the difference of mercury levels in the two limbs of differential gauge is 220 mm, find the discharge passing through the vertical pipe. Take co-efficient of discharge, C_d = 0.98. 6M CO3 L4

OR

7. a) What is momentum correction factor? Explain the applications of Momentum equation in the field. 6M CO3 L3

b) A rectangular channel 1·5 m wide has a discharge of 0·2m^3 /s, which is measured by a right-angled V-notch-weir. Find the position of the apex of the notch from the bed of the channel if the maximum depth of water is not to exceed 1 m. Assume C_d = 0·62 6M CO3 L4

UNIT–IV

8. a) Derive Hagen-Poiseuille equation and state the assumptions made. 6M CO4 L3

b) Two sharp ended pipes of diameters 50mm and 100mm respectively, each of length 100m respectively, are connected in parallel between two reservoirs which have a difference of level of 10 m. If the friction factor for each pipe is 0·32, calculate : (i) Rate of flow for each pipe, and (ii) The diameter of a single pipe 100 m long which would give the same discharge, if it were substituted for the original two pipes. 6M CO4 L4

OR

9. a) Explain the hydraulic gradient line and total energy gradient line with neat sketches and mention their practical applications 6M CO4 L3

b) Water is to be supplied to the inhabitants of a college campus through a supply main. The following data is given :
Distance of the reservoir from the campus = 3000 m
Number of inhabitants = 4000
Consumption of water per day of each inhabitant = 180 litres
Loss of head due to friction = 18 m
Co-efficient of friction for the pipe, f = 0·007
If the half of the daily supply is pumped in 8 hours, determine the size of the supply main. 6M CO4 L4

UNIT–V

10. a) A Pelton wheel of 1.1 m mean bucket diameter works under a head of 500 m. The deflection of jet is 165° and its relative velocity is reduced over the bucket by 15 per cent due to friction. If the diameter of jet is 100 mm and the water is to leave the bucket without any whirl, determine
i) Rotational speed of wheel, (ii) Ratio of bucket speed to jet velocity, (iii) Impulsive force and power developed by the wheel, (iv) Available power (water power), (v) Power input to buckets, and (vi) Efficiency of the wheel with power input to bucket as reference input. Take Cv = 0.97. 6M CO5 L5

b) Draw a schematic diagram of a Francis turbine and explain briefly its construction and working 6M CO5 L2

OR

11. a) Explain briefly the following efficiencies of a centrifugal pump: (i) Manometric efficiency, (ii) Volumetric efficiency, (iii) Mechanical efficiency, and (iv) Overall efficiency. 6M CO5 2

b) A centrifugal pump delivers water against a net head of 14·5 m and a design speed of 1000 r.p.m. The vanes are curved back to an angle of 30° with the periphery. The impeller diameter is 300 mm and outlet width 50 mm. Determine the discharge of the pump if manometric efficiency is 95% 6M CO5 L5

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC36T

II B.Tech. I Semester Regular Examinations March 2022

Managerial Economics and Financial Analysis

(Common to CE & ECE)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

			CO	Blooms Level
1.	Answer ***all*** the following short answer questions	(5 X 2 = 10M)		
a)	Scope of managerial economics		CO2	L1
b)	Internal and external economies of scale		CO1	L1
c)	Characteristics of perfect competition.		CO2	L2
d)	Significance of capital		CO3	L3
e)	Purpose of ratio analysis		CO3	L3

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	Blooms Level
		UNIT–I			
2.	a)	Illustrate the measurement of elasticity of demand.	7M	CO3	L1
	b)	Explain the significance of elasticity of demand.	5M	CO2	L1
		OR			
3.		Define demand forecasting. Explain the quantitative methods of demand forecasting.	12M	CO3	L1
		UNIT–II			
4.	a)	State the objectives of break-even analysis.	6M	CO1	L2
	b)	Highlight the assumptions of break-even analysis.	6M	CO3	L2
		OR			
5.	a)	Define cost. Explain different cost concepts used in the process of cost analysis.	6M	CO3	L2
	b)	Discuss the properties of Cobb-Douglas production function.	6M	CO2	L2
		UNIT–III			
6.	a)	State the features of monopoly.	4M	CO1	L2
	b)	Analyse the firm's revenue curves under monopoly.	8M	CO3	L2

OR

7.		Discuss about various forms of private sector business organizations.	12M	CO2	L2

UNIT–IV

8.	a)	Explain the advantages and limitations of Net Present Value (NPV) technique in capital budgeting.	8M	CO2	L3
	b)	A project will cost '200,000 and will generate annual cash flows of '70,000. What is the project's payback period	4M	CO2	L3

OR

9.		Illustrate the procedure of calculating accounting rate of return (ARR). Discuss its limitations.	12M	CO3	L3

UNIT–V

10.	a)	Define trial balance. Explain the objectives in preparing it.	5M	CO3	L3
	b)	Prepare a trial balance for the month ending 31st August 2021:			

Cash a/c	50,500
Madhu capital a/c	30,000
Interest from bank	3,000
Discount (credit)	250
Sales	35,000
David a/c	3,000
Purchase returns a/c	500
Bank a/c	10,500
Rent a/c	2,500
Salaries a/c	500
Entertainment expenses	150
Purchase a/c	2,000
Sales returns a/c	300

7M CO3 L4

OR

11.	a)	Define 'ratio'. Discuss the importance of ratio analysis.	6M	CO2	L3
	b)	Classify the ratios and explain uses of each group.	6M	CO2	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Regular Examinations March 2022

Partial Differential Equations and Numerical Methods

(Common to CE and ME)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Write merits and demerits of Bisection method.	CO1	L1
b)	Define backward differences.	CO2	L2
c)	Write formulas for first and second derivatives using Newton's forward interpolation formula.	CO3	L3
d)	Explain Taylor's series method for solving IVP $\frac{dy}{dx} = f(x,y) \;\; with \;\; y(x_0) = y_0$.	CO4	L2
e)	Write One dimensional wave equation with boundary and initial conditions.	CO5	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	Blooms Level
	UNIT–I			
2. a)	Using bisection method, compute the real root of the equation $x^3 - 2x - 5 = 0$.	7M	CO1	L4
b)	Develop an Iterative formula to find the square root of a positive number N .Using Newton-Raphson method.	5M	CO1	L3
	(OR)			
3. a)	Find a real root of the equation $xe^x - 3 = 0$, Using False position method.	6M	CO1	L3
b)	Find a real root of the equation $\log_{10} x = 3$ using iteration method.	6M	CO1	L4
	UNIT–II			
4. a)	Evaluate $\Delta^2 \left(\tan^{-1} x \right)$.	4M	CO2	L3

b) Using Newton's forward formula, find the value of $f(1.2)$ if

x	1	1.4	1.8	2.2
$f(x)$	3.49	4.82	5.96	6.5

8M CO2 L4

(OR)

5. a) Compute $f(27)$ Using Lagrange's formula from the following table:

x	14	17	31	35
$f(x)$	68.7	64.0	44.0	39.1

5M CO2 L3

b) Construct Newton's backward interpolation formula for the following data and hence find the value of y for $x =$ 9.

x	4	6	8	10
y	1	3	8	16

5M CO2 L4

UNIT–III

6. a) Determine $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x = 0$ from the following data

x	0	1	2	3	4	5
y	4	8	15	7	6	2

6M CO3 L4

b) Compute the value of $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule.

6M CO3 L3

(OR)

7. a) Evaluate $\int_0^{0.6} e^{-x^2} dx$ by using Simpson's $\frac{1}{3}$ rd rule taking seven ordinates.

6M CO3 L3

b) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's $\frac{3}{8}$ th rule.

6M CO3 L3

UNIT–IV

8. a) Using Taylor's method find $y(0.2)$ from $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0.$

6M CO4 L2

b) Using the fourth order Runge – Kutta formula, find $y(0.2)\ and\ y(0.4)$ given that $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}, y(0)=1.$ — 6M CO4 L3

(OR)

9. a) Apply Euler's method to solve $\frac{dy}{dx}= x+y$ with $y(0)=0$, Choosing the step length $h= 0.2$ to estimate y at $x = 0.2,\ 0.4, 0.6.$ — 6M CO4 L3

b) Find the value of $y\ at\ x=0.1$ by Picard's method, given that $\frac{dy}{dx}=\frac{y-x}{y+x},\ y(0)=1.$ — 6M CO4 L3

UNIT–V

10. A tightly stretched string with fixed end points $x=0$ and $x=L$ is initially in a position given by $y=y_0\sin^3\left(\frac{®x}{L}\right)$ if it is released from rest from this position, find the displacement $y(x,t).$ — 12M CO5 L2

OR

11. Solve the heat equation $\frac{\partial u}{\partial t}=c^2\frac{\partial^2 u}{\partial x^2}$ under the conditions — 12M CO5 L3

$u(0,t)=0$, $u(L,t)=0$ for all t;

$u(x,0)= f(x)\ \ , 0<x<L$.

*** End ***

Hall Ticket Number :										

R-20

Code: 20A132T

II B.Tech. I Semester Regular Examinations March 2022

Strength of Materials

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

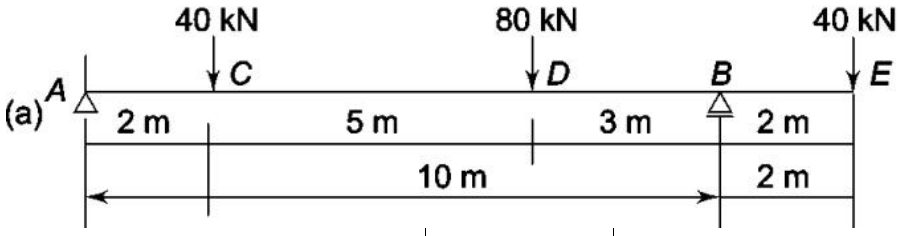
		CO	Blooms Level
1.	Answer ***all*** the following short answer questions **(** 5 X 2 = 10M)		
a)	A steel bar of 40 mm × 40 mm square cross-section is subjected to an axial compressive load of 200 kN. If the length of the bar is 2 m and E=200GPa, the elongation of the bar will be_____	CO1	2
b)	Define point of contraflexure.	CO2	2
c)	A Steel rod 200 mm diameter is to be bent into a circular arc section. Find radius of curvature. Take f = 120N/mm^2 & E = 2×10^5 N/mm^2.	CO3	2
d)	Slope is maximum at _____ in simply supported beams.	CO4	1
e)	The ratio of hoop stress to maximum shear stress is _____	CO5	2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	Blooms Level
	UNIT–I			
2.	A 400 mm long bar has rectangular cross-section 10 mm × 30 mm. This bar is subjected to (i)15 kN tensile force on 10mm × 30 mm faces, (ii)80 kN compressive force on 10mm × 400 mm faces, and (iii)180 kN tensile force on 30mm × 400 mm faces. Find the change in volume if E=2×105 N/mm2 and μ = 0.3.	12M	CO1	2
	OR			
3.	A bar, 20 mm diameter and fixed at A, is stretched with a force of 10kN to bring to support B and fix it. Length AB=2m. Temperature is 27°C. Determine at what temperature will the stress become zero? What will be the stress in the bar if the temperature rises to (i) 40°C and (ii) 50 ^{0}C?	12M	CO1	2
	UNIT–II			
4.	A beam of length 8 m is simply supported at its ends. It carries a uniformly distributed load of 40 kN/m. Draw the shear force and bending moment diagrams	12M	CO2	3
	OR			

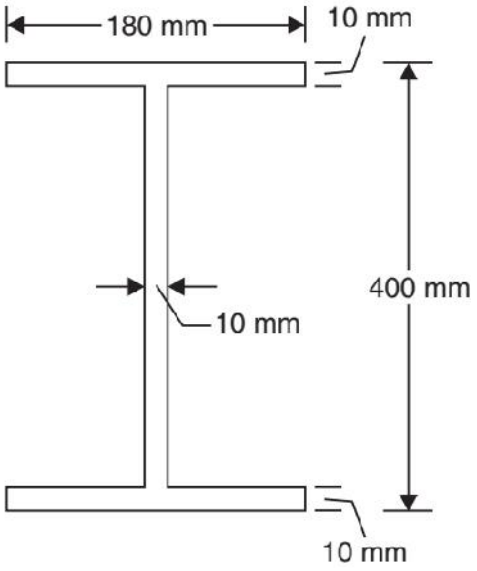
5. An overhanging beam is loaded as shown in Fig. Determine the maximum shear force and bending moment acting upon the beam.



12M CO2 3

UNIT–III

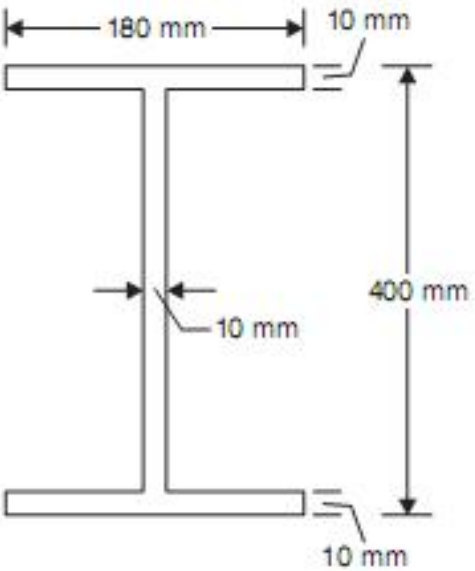
6. Compare the moment carrying capacity of the section given in example 4 with equivalent section of the same area but
(i) square section
(ii) rectangular section with depth twice the width and
(iii) a circular section.



12M CO3 3

OR

7. Figure shows the cross-section of a cantilever beam of 2.5m span. Material used is steel for which maximum permissible stress is 150 N/mm^2. What is the maximum uniformly distributed load this beam can carry?



12M CO3 3

UNIT–IV

8. A simple supported beam of span 4 m carries a point load of 3 kN at a distance of 1m each end. If E = 2 x 10^5 N/mm^2 and I = $10^8$$mm^4$ for the beam, then using conjugate beam method determine: (i) slope at each end and under each load, (ii) deflection at the centre. 12M CO4 3

OR

9. A horizontal beam AB is simply supported at A and B, 6 m apart. The beam is subjected to a clockwise couple of 300kNm at a distance of 4m from the left end. If E=2x10^5N/mm^2 and I = 2 x10^6 mm^4, determine deflection at the point where couple is acting and the maximum deflection. 12M CO4 3

UNIT–V

10. Four columns of same material and same length are of rectangular cross-section of same breadth b. The depth of the cross-section and the end conditions are, however, different are given as follows:

Column	Depth	End conditions
1	0.6 b	Fixed-Fixed
2	0.8 b	Fixed-hinged
3	1.0 b	Hinged-Hinged
4	2.6 b	Fixed-Free

Which of the above columns Euler buckling load maximum? 12M CO5 3

OR

11. At a point in a beam the normal stress along the length is 80N/mm2.The shear stress at that point is positive of magnitude 35 N/mm^2. Find the stresses on a plane whose normal is inclined at 300 to the longitudinal axis. Also find the principal stresses and planes on which they act. 12M CO5 3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A131T

II B.Tech. I Semester Regular Examinations March 2022

Advanced Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BTL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Compare Geodetic survey and plane survey.	3	3
b)	List general methods for determining area.	4	2
c)	Define parallex and explain steps to remove parallex.	1	2
d)	Classify various systems of tacheometric survey.	2	3
e)	Mention the advantage of total station over theodolite.	5	2

PART-B

Answer *five* questions by choosing one full question from each unit (5x12 = 60 Marks)

			Marks	CO	BTL
		UNIT–I			
2.	a)	A distance of 2000m was measured by a 30m chain. Later it was detected that the chain was 0.1m too long. Another 500m was measured and it was detected that the chain was 0.15m too long. If the chain was correct initially, determine the exact length that was measured.	6M	1	3
	b)	Define orientation and explain the methods for orientation of plane table.	6M	3	2
		OR			
3.	a)	Explain the parts of a metric chain with neat sketch.	6M	1	2
	b)	Following bearings were observed with a compass. Calculate interior angles.	6M	2	3

Line	Fore Bearing	Line	Fore Bearing
AB	60^0 30’	DE	205^0 30’
BC	122^0 00’	EA	300^0 00’
CD	46^0 ^{0}0’		

		UNIT–II			
4.	a)	Calculate the RL value for given staff readings. 1.225, 3.225, 2.23, 2.43, 1.545, 1.64, 1.43, 1.123, 1.523, 2.224, 3.224 was shifted third, sixth, ninth stations by H.I. Method. R.L for first reading is 100.	6M	2	3
	b)	Enumerate the characteristics of contours with neat sketches.	6M	3	2
		OR			
5.	a)	List methods adopted to determine the areas and explain DMD and DPD	8M	4	3
	b)	A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 meters in the following order. 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m. Compute area between the chain line, the curved boundary and the end offsets by (i) Average ordinate rule (ii) Trapezoidal rule and (iii) Simpson’s rule.	4M	4	3

UNIT–III

6.	a)	Explain the method of measuring horizontal angle by reiteration with table for recording readings	8M	2	2
	b)	Compare repetition and reiteration method of horizontal angle measurement.	4M	2	2

OR

7.	a)	Explain the method of vertical angle measurement with table using theodolite.	6M	2	2
	b)	A closed traverse was conducted round an obstacle and the following observations were made. Work out the missing quantities.	6M	4	3

Side	Length (m)	Azimuth
AB	500	98°30’
BC	620	30°20’
CD	468	298°30’

Side	Length (m)	Azimuth
DE	?	230°0’
EA	?	150°10’

UNIT–IV

8.	a)	Two tangents intersect at chainage 59+60 and the deflection angle being 50° 30’, Calculate the necessary data for setting out a curve of 15 chains radius to connect two tangents if it is intended to set out the simple circular curve by offset from chords produced. Take the peg intervals equal to 100 links, the length of the chain being equal to 20m (100 links).	6M	5	4
	b)	A tacheometer was set up at a station A and the readings on a vertically held staff at B were 2.235, 2.635 and 2.965, the line of sight being at an inclination of +8°24’. Another observation on the vertically held staff at BM gave readings 1.650, 1.930 and 2.250, the inclination of the line of sight being +1°6’. Calculate the horizontal distance between A and B and the elevation of B if the RL of BM is 418.685 meters. The constants of instruments were 100 and 0.3	6M	2	4

OR

9.	a)	Explain the procedure of setting out a simple circular curve by offsets from long chord method with neat sketch.	6M	5	2
	b)	Enumerate the conditions under which tacheometric survey is advantageous.	6M	1	2

UNIT–V

10.	a)	Enumerate the working principle of DGPS	6M	5	2
	b)	Explain briefly the functions of total station	6M	5	2

OR

11.	a)	List the advantages and disadvantages of ground radar penetration survey	6M	5	2
	b)	Explain safe alignment of road using DGPS	6M	5	2

*** End ***