Enrollment No……

Master of Technology
First Semester Main Examination, Dec-2020
Advance Mathematics and Numerical Analysis [MTSE101]

Time: 3:00 Hrs **Max Marks 70**

Note : All questions carry equal marks.
Attempt any five questions.
Assume suitable data if necessary and state them clearly.

Q.1 Show that the geodesics on a plane are straight lines.

Q.2 Express $f(x) = x^4 + 3x^3 — x^2 + 5x-2$ in terms of Legendre polynomials.

Q.3 Solve in series the equation $9x(1-x)\frac{d^2-1}{dx^2} - \frac{12dy}{dx} + 4y = 0$

Q.4 A tightly stretched string of length 1 with fixed ends is initially in equilibrium position. It is set vibrating by giving each point a velocity $v_o \sin^{3217c}$. Find the displacement y(x,t)

Q.5 Using Crank Nicholson method solve $u_x, = 16u_t$, 0 x 1, t 0 given $u(x, 0) = 0$, $u(0, t) = 0$ $u(1, t) = 50t$. Compute u for 2 steps in t direction taking h=1/4

Q.6 A covariant tensor has components $2x - z, x^2 y, yz$ in Cartesian co-ordinate system find its components in spherical co-ordinates.

Q.7 A professor wishes to select a good text from four different ones available. He has 37 students whom he distributes at random into four groups of 9, 10,11 and 7 students assigning the books at random to the groups. After the course is over, all the students take the same test obtaining scores as given in table. Explain if any of the four books is to be preferred over the others.

Text books	A	B	C	D
Scores obtained in the test	68	41	54	44
	68	47	44	51
	69	54	51	69
	60	65	56	59
	73	32	47	59
	64	73	61	55
	71	44	59	66
	67	48	49	
	75	64	41	
		54	31	
			73	

Enrollment No……

Master of Technology

First Semester Main Examination, Dec-2020

Theory of Elasticity and Introduction to Plasticity [MTSE102]

Time: 3:00 Hrs **Max Marks 70**

Note : All questions carry equal marks.
Attempt any five questions out of eight.
Assume suitable data if necessary and state them clearly.

Q.1 Write short note on any two:-
(i) Boundary conditions
(ii) Solution of torsional problems
(iii) Strain components in polar co- ordinates.

Q.2 Explain The Importance Of Using Polar Co-Ordinate System?

Q.3 Write A Detailed Note On Torsion Of Rolled Section?

Q.4 Derive The Six Equation Of Compatibility?

Q.5 An open ended thick wall cylinder (internal radius $=R_1$, external radius R_2) is subjected to both internal and external pressure P_1 and P_2 respectively. Compute tangential and radial stresses.

Q.6 Derive The Six Equation Of Compatibility?

Q.7 Discuss Generalized Hook's Law?

Q.8 What are Effects of Loading, Unloading and Reloading in Plastic Range?

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Master of Technology

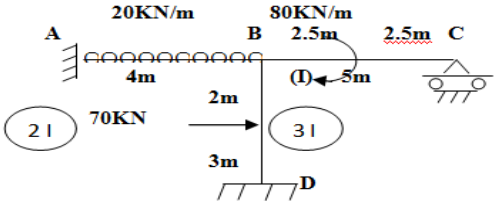
First Semester Main Examination, Dec-2020

Advance Structural Analysis [MTSE103]

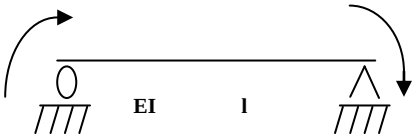
Time: 3:00 Hrs **Max Marks 70**

Note: (i) Attempt any five questions out of eight.
(ii) All questions carry equal marks.
(ii)Assume suitable data if necessary and state them clearly.

Q.1 Using the displacement method analyzes the frame.



Q.2 Generate the flexibility matrix of the beam with the co-ordinates as shown below:



Q.3 What decides the sizes of flexibility and stiffness matrix for a structure?

Q.4 Discuss why the released structure which minimizes the magnitudes of Redundants generality leads to the maximum accuracy.

Q.5 Establish the relationship between flexibility and stiffness matrices.

Q.6 How flexibility matrix is generated? Explain its characteristics.

Q.7 (a) Explain principle of contragradience?
(b) Compare flexibility & stiffness method.
(c) Explain local & global co-ordinate system.

Q.8 Explain the steps followed in the stiffness method of analysis

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Master of Technology
First Semester Main Examination, Dec-2020
Design of Concrete Structures (MTSE 104)

Time: 3:00 Hrs **Max Marks 70**

Note: (i) Attempt any five questions out of eight.
(ii) All question carry equal marks.
(iii) Assume suitable data if necessary and stale them clearly.

Q.1 (a) Write down step by step procedure for seismic analysis of a four strayed RC building As per IS 1893 (Part-I): 2016 by equivalent static lateral force method.
(b) Write down components of flat slab construction with diagrams.

Q.2 (a) Design a rectangular tank of 6mX4mX3m size resting on firm ground.
(b) Discuss the design of underground water tanks.

Q.3 (a) What is prestressed concrete? What are different types of losses encountered in prestressing concrete?
(b) a prestressed concrete beam of section 200X300mm is used over an effective span of 6m to support an imposed load of 4KN/m. At central section of beam, find the magnitude of an eccentric prestressing force located 90mm from the bottom of the beam, which would nullify the bottom fibre stress due to loading.

Q.4 (a) Design a bunker of 2.5 X 2.5 X 3.0m (ht) to store coal. The height below bunker (clearance) is 3.0m. Design the supporting column. (4 nos.) Also.
(b) Write down difference between bunker and silo.

Q.5 (a) Describe in details the design of flat slab by coefficient method of IS-456.
(b) Describe analysis of grid floor by Timoshenko's plate theory.

Q.6 (a) Describe arrangements of live load on RCC framed of multistory building.
(b) Write down calculation of basic wind pressure for multistory building as per IS- 875.

Q.7 (a) Describe in details on IRC loading for bridge design.
(b) Explain seismic waves.

Q.8 Write short notes on following- (Marks-3.5 each)
(a) Write short note on Janssen's theory.
(b) Write down methods of post tensioning.
(c) Write short note on stress in anchorage zone.
(d) Explain minimum reinforcement and their spacing for water tank.

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Master of Technology
First Semester Main Examination, Dec-2020
Computer Aided Design (MTSE-105)

Time: 3:00 Hrs **Max Marks 70**

Note: Attempt any five questions.
Use of Relevant IS Code. Assume missing data.

Q.1 Write a programme to add two matrices in C++ programming language? Also explain 'Array'. (14)

Q.2 What do you understand by function in a C++ programming language? Also explain call by value and call by reference parameters. (14)

Q.3 Define various terms: (14)
(a) Classes
(b) Layer Command
(c) Pure Virtual Function and
(d) While and Do Loop

Q.4 **(a)** Explain co-ordinate systems used in generating drawing in CAD with the help of examples. (7)
(b) Explain various CAD applications in civil engineering. Explain features of 3D max software. (7)

Q.5 What do you understand by object oriented programming languages? Explain clearly. (14)

Q.6 How computer aided design software has a very important role in structural engineering? Give a list of various latest software used in civil engineering. (14)

Q.7 List out various commands of any latest software in sequence to draw a layout of school building (only ground floor) by assuming and suitable dimensions. (14)

Q.8 Write short notes on (any two): (14)
(a) Chamfer Command
(b) 3D commands in any 3D modeling software
(c) Modify Commands