	DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE **Regular & Supplementary Winter Examination-2023** **Course: B. Tech. Branch: ALL Semester: III** **Subject Code & Name: BTBS301/ BTES 301 Engineering Mathematics-III** **Max Marks: 60 Date: 02.01.2024 Duration: 3 Hr.**		
	Instructions to the Students: 1. *All the questions are compulsory.* 2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.* 3. *Use of non-programmable scientific calculators is allowed.* 4. *Assume suitable data wherever necessary and mention it clearly.*		
		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Find the Laplace transform of $\boldsymbol{f(t) = t^2 \sin 2t}$	**Understand/ CO1**	**6**
B)	Find Laplace transform of $\boldsymbol{F(t) = \int_0^t \frac{e^{-at}-e^{-bt}}{t} dt}$	**Understand /CO1**	**6**
C)	Find the Laplace transforms of $\boldsymbol{f(t) = \frac{t}{T}}$, **for** $\boldsymbol{0 < t < T}$ (saw - tooth wave function of period T)	**Apply/CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Find inverse Laplace transform of $\boldsymbol{\cot^{-1}\left(\frac{s+3}{2}\right)}$	**Understand /CO2**	**6**
B)	By using Partial fraction expansion to find inverse Laplace transform of $\boldsymbol{F(s) = \frac{s}{(s^2+1)(s^2+4)}}$	**Understand /CO2**	**6**
C)	Using the Laplace transform, solve the differential equation $\boldsymbol{\frac{d^2x}{dt^2} + 9x = \cos 2t}$; **if** $\boldsymbol{x(0) = 1,\ x\left(\frac{\pi}{2}\right) = -1}$.	**Apply/CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Express the function $\boldsymbol{f(x) = \begin{cases} 1 \text{ for } \lvert x\rvert \le 1 \\ 0 \text{ for } \lvert x\rvert > 1 \end{cases}}$ as a Fourier integral.	**Understand /CO3**	**6**
B)	Find the Fourier sine transform of $\boldsymbol{f(x) = e^{-\lvert x\rvert}}$, and hence show that $\boldsymbol{\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2},\ m > 0}$.	**Understand /CO3**	**6**
C)	Using Parseval's identity, show that $\boldsymbol{\int_0^\infty \frac{t^2}{(4+t^2)(9+t^2)} dt = \frac{\pi}{10}}$	**Apply/CO3**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Solve the following partial differential equations $\boldsymbol{(mz - ny)p + (nx - lz)q = ly - mx}$	**Understand /CO4**	**6**

B)	A string is stretched and fastened to two points $\boldsymbol{l}$ apart. Motion is started by replacing the string in the form $\boldsymbol{y = A \sin \frac{\pi x}{l}}$ from which it is released at time $\boldsymbol{t = 0}$. Show that the displacement of a point at a distance x from one end at time t is given by $\boldsymbol{y(x,t) = A \sin \frac{\pi x}{l} \cos \frac{\pi ct}{l}}$.	**Apply/CO4**	**6**
C)	Solve the following equation by the method of separation of variables: $\boldsymbol{\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x}$, given that $\boldsymbol{u = 0}$ when $\boldsymbol{t = 0}$ and $\boldsymbol{\frac{\partial u}{\partial t} = 0}$ when $\boldsymbol{x = 0}$.	**Apply /CO4**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	If $\boldsymbol{f(z)}$ is analytic, show that $\boldsymbol{\left[\frac{\partial \lvert f(z) \rvert}{\partial x}\right]^2 + \left[\frac{\partial \lvert f(z) \rvert}{\partial y}\right]^2 = \left\lvert f'(z) \right\rvert^2}$.	**Understand /CO5**	**6**
B)	Apply Cauchy's integral Formula to evaluate $\oint_C \frac{e^{-z}}{z+1}\, dz$, where **C** is the circle **(a)** $\boldsymbol{\lvert z \rvert = 2}$ and **(b)** $\boldsymbol{\lvert z \rvert = \frac{1}{2}}$.	**Apply/CO5**	**6**
C)	State Cauchy's residue theorem and evaluate $\oint_C \boldsymbol{\tan z\, dz}$, where C is the circle $\boldsymbol{\lvert z \rvert = 2}$.	**Apply /CO5**	**6**
	***** End *****		

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination-2023

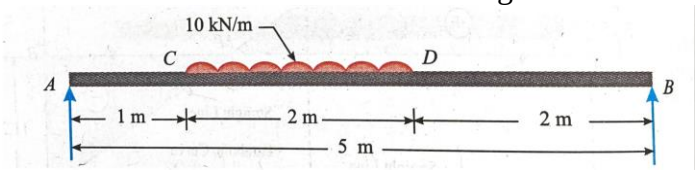
Course: B. Tech. **Branch: Civil Engineering/Civil & Environmental Engg**

Subject Code & Name: BTCECS302/BTCVES302 & Mechanics of Solids **Semester: III**

Max Marks: 60 **Date: 04/01/2024** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Derive the relationship between modulus of elasticity and modulus of rigidity.	**L2/CO1**	**6**
B)	An Aluminum block 50 mm long placed over a Steel block 150 mm long. Both blocks have same cross-sectional area A = 900 mm^2. The assembly carries a load P which deforms it by 0.30 mm. Determine the load P. Take $E_{aluminium} = 7\times10^4$ N/mm^2 and $E_{steel} = 2\times10^5$ N/mm^2.	**L3/CO1**	**6**
C)	A rectangular bar 300 mm long, 80 mm wide and 20 mm thick is loaded with an axial tensile load of 180 kN; together with a normal compressive force of 1800 kN on 80 mm × 300 mm face and tensile force of 300 kN on 20 mm × 300 mm face. Calculate change in length, width, thickness and volume. Assume E=200 GPa and μ = 0.3	**L3/CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Draw the shear force diagram and bending moment diagram for a cantilever beam carrying a uniformly distributed load from its free end to mid-point.	**L3/CO2**	**6**
B)	A horizontal beam AD, 15 m long carries a udl of 1.6 kN/m over whole span AD together with a concentrated load of 4 kN at the left end A. The beam is supported at a point B which is 1 m from A and at C which is 11 m from left end A. Draw SFD and BMD for this beam.	**L3/CO2**	**6**
C)	Draw SFD and BMD for the beam shown in the figure below: 	**L3/CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Define the neutral axis in the context of pure bending. Discuss how it relates to the distribution of bending stress.	**L2/CO3**	**6**

B)	A 2.5 mm thick high strength copper strip 2.5 m long is bend into a circle and held with its ends just in contact. Find the maximum bending stress in the strip. How does this stress change if the thickness of the strip is increased?	**L3/CO3**	**6**
C)	A hollow shaft is to transmit 400 kW at 160 r.p.m. If the shear stress is not to exceed 120 MPa and internal diameter is 0.6 of the external diameter, find the diameters of the shaft.	**L3/CO3**	**6**

Q.4 Solve Any Two of the following. **12**

A)	Define the terms "slenderness ratio" and "effective length" in the context of columns.	**L1/CO4**	**6**
B)	A short length of tube 36 mm outside diameter and 24 mm inside diameter is tested under axial compression. In this test, tube failed at a load of 175 kN without buckling. When the tube of same section was tested as a strut with L=1500 mm both ends hinged, the Euler's load noted was 75 kN. Determine Rankine's constant.	**L3/CO4**	**6**
C)	A hollow cast iron column whose outer diameter is 200 mm has a thickness of 20 mm. It is 4.5 meters long and is fixed at both the ends. Calculate the safe load by Rankine's formula using a factor of safety of 4. Calculate the slenderness ratio and the ratio of Euler's and Rankine's critical loads. For cast iron take F_c = 550 N/mm^2 and Rankine's constant = 1/1600 and E = 80 GPa	**L3/CO4**	**6**

Q. 5 Solve Any Two of the following. **12**

A)	Explain the maximum principal stress theory.	**L2/CO1**	**6**
B)	A plane element in a boiler is subjected to tensile stresses of 400 MPa on one plane and 150 MPa on the other at right angles to the former. Each of the above stresses is accompanied by a shear stress of 100 MPa such that when associated with the minor tensile stress tends to rotate the element in anticlockwise direction. Find **i.** Principal stresses and their directions **ii.** Maximum shearing stresses and the directions of the plane on which they act	**L3/CO1**	**6**
C)	The stresses at a point of a machine components are 150 MPa and 50 MPa both tensile. Find the intensities of normal, shear and resultant stresses on a plane inclined at an angle of 55° with the axis of major tensile stress. Also find the magnitude of the maximum shear stresses in the components.	**L3/CO1**	**6**

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular and Supplementary Winter Examination– 2023

Course: B. Tech in Civil Engineering **Sem: III**

Subject Name: Building Construction & Drawing **Subject Code: BTCVC303**

Max Marks: 60 **Date: 6/1/2024** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Describe general principles to be observed in stone masonry construction?	**CO1**	**6**
B)	Draw a plan of 'L' shaped 1½ thk brick wall in English bond?	**CO1**	**6**
C)	Explain any two types of partition walls with sketch?	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Draw a plan & section of a typical column with reinforcement?	**CO2**	**6**
B)	Describe workability test of concrete with sketch?	**CO2**	**6**
C)	Describe importance of chemical admixtures with an example?	**CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Draw a sketch of semicircular arch & label all its parts?	**CO2**	**6**
B)	Explain different types of formworks?	**CO2**	**6**
C)	Explain any two types of lintels with sketch?	**CO2**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Draw a sketch of louvered window?	**CO3**	**6**
B)	Explain any three types of flooring?	**CO3**	**6**
C)	Describe the role of Ramp with sketch?	**CO3**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	Draw a sketch of king post truss?	**CO4**	**6**
B)	What are the advantages and disadvantages of prefabricated structure?	**CO4**	**6**
C)	Explain the term 'Tolerance 'in prefabrication?	**CO4**	**6**

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination - 2023

Course: Second Year B. Tech. (Sem III) **Branch: Civil Engineering**

Subject Name: Hydraulics-I **Subject Code: BTCVC304**

Max Marks: 60 **Duration: 3 Hrs.** **Date: 09/01/2024**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	(1) Explain the phenomenon of the capillarity. Obtain the expression of capillary rise of a liquid. (2) At a certain point in castor oil the shear stress is 0.432 N/m^2 and the velocity gradient 0.216 s^{-1}. If the mass density of castor oil is 959.42 kg/m^3, find kinematic viscosity.	**CO2**	**6**
B)	An inverted U-tube differential manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axes of these pipes is 30 cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre of the pipe) are found to be same i.e. 35cm. Determine the pressure between the pipe.	**CO2**	**6**
C)	Define buoyancy and centre of buoyancy. Derive an expression for the metacentric height of a floating body.	**CO2**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	**CO1**	**6**
B)	The velocity potential function is given by an expression of $\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$ a. Find the velocity components in x and y directions respectively. b. Show that ϕ represents a possible case of flow.	**CO1**	**6**
C)	Derive Euler's equation of motion. Explain how this is integrated to get Bernoulli's equation.	**CO1**	**6**

Q. 3	**Solve Any Two of the following.**		**12**
A)	Derive the expression for shear stress distribution and velocity distribution in fully developed laminar flow through pipe.	**CO4**	**6**
B)	Write a short note on Boundary Layer Theory.	**CO4**	**6**
C)	What is Prandtl mixing length theory? Find an expression for shear stress due to Prandtl.	**CO4**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	Explain concept of Rayleigh's method and find an expression for the time period using Rayleigh's method, where time period *(t)* of a pendulum depends upon the length *(L)* of the pendulum and acceleration due to gravity *(g)*.	**CO4**	**6**
B)	Give short explanation about following non-dimensional numbers – (i) Froude number, (ii) Euler Number, (iii) Reynold's Number, (iv) Mach number, (v) Weber number	**CO4**	**6**
C)	Compare between distorted and undistorted models with the suitable example.	**CO4**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	What is Compound Pipe? What will be loss of head when pipes are connected in series?	**CO3**	**6**
B)	Describe Water Hammer and write a note on Surge Tank.	**CO3**	**6**
C)	What are the uses of Nomogram and Moody's chart?	**CO3**	**6**

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular and Supplementary Winter Examination – 2023

Course: B. Tech. **Branch: Civil & Allieed Engineering** **Semester: III**

Subject Code & Name: BTCIC305/BTCEC305/BTCVC305 Surveying

Max Marks: 60 **Date: 11/01/2024** **Duration: 3 Hr.**

Instructions to the Students:

1. *All the questions are compulsory.*
2. *The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Two of the following.**		**12**
A)	Define surveying. Write down applications of surveying. State Principle of Surveying.	**CO1**	**6**
B)	Explain different methods of linear measurement.	**CO1**	**6**
C)	Differentiate between plane surveying and geodetic surveying.	**CO1**	**6**
Q.2	**Solve Any Two of the following.**		**12**
A)	Explain the various accessories used in plane table surveying with neat labelled diagram.	**CO2**	**6**
B)	Define the following: (any three) a. Open traverse and closed traverse b. Fore bearing and Back bearing c. True meridian and Magnetic Meridian d. True bearing and Magnetic meridian	**CO2**	**6**
C)	Convert the following WCB's to QB's a. WCB of AB = 45°30' b. WCB of CD = 108°45' c. WCB of GH = 75°50' d. WCB of HK = 145°20' e. WCB of ML= 340°10' f. WCB of DE = 60°10'	**CO2**	**6**
Q. 3	**Solve Any Two of the following.**		**12**
A)	Write down the characteristics of contour lines.	**CO3**	**6**
B)	The following staff readings were taken successfully with level, the instrument having been move forward after the second, fourth and eighth reading:	**CO3**	**6**

	0.0875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.765 The first reading was taken on a benchmark of elevation 132.135 Enter the reading in level book form and reduced level. Calculate the reduced level by rise and fall method.		
C)	Enlist the various types of leveling. Explain any one with neat labelled diagram.	**CO3**	**6**
Q.4	**Solve Any Two of the following.**		**12**
A)	State the functions of following parts of Theodolite: 1. Eyepiece 2. Bubble tube 3. Lower Tangent screw 4. Index Frame 5. Telescope	**CO4**	**6**
B)	What are the different methods of traversing? Explain any one in detail.	**CO4**	**6**
C)	Define (any three): 1. Transiting of Theodolite 2. Swinging 3. Line of Collimation 4. Telescope Normal 5. Face left	**CO4**	**6**
Q. 5	**Solve Any Two of the following.**		**12**
A)	Explain project survey on Railway Engineering.	**CO4**	**6**
B)	Write a Short note on Mine Surveying.	**CO4**	**6**
C)	Explain the steps involved while carrying out Engineering Survey	**CO1**	**6**

***** End *****