

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary Examination – Summer 2022 Course: B. Tech. Branch : Civil Engineering Semester :IV Subject Code & Name: Mechanics of Solids (BTCVC302) Max Marks: 60 Date: 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.		
A)	Plot stress strain diagram for mild steel. Explain its salient features.	CO1	06
B)	A metal wire of diameter 3 mm is subjected to an axial tensile force of 2 kN. The extension measured was 4 mm over a length of 1500 mm. Find the modulus of elasticity of the metal. Using the calculated value of modulus of elasticity; find the maximum axial tensile force that can be applied on the wire if the strain is limited to 0.001.	CO1	06
C)	Define the following terms a) Poissons's ratio b)Elasticity c)Hooks law	CO1	06
Q.2	Solve Any Two of the following.		
A)	A 10 m long simply supported beam carries two point loads of 10kN and 6kN at 2m and 9m respectively from the left end. It also carries a uniformly distributed load of 4kN/m run for the length between 4m to 7m from the left end. Draw shears force and bending moment diagrams.	CO2	06
B)	A cantilever beam of span L, fixed at the left end, carries a gradually varied load from zero at free end to w per m length at fixed end. Draw the SFD and BMD.	CO2	06
C)	Obtain the relationship between bending moment, shear force and load intensity at any section of a beam.	CO4	06
Q. 3	Solve Any Two of the following.		
A)	A masonry pillar square in section 600 mm x 600 mm is subjected to point load of 1800 kN at an eccentricity of 200 mm along one of the centroidal axis of cross section. Find the stresses at four corners. Also determine the maximum eccentricity, if the permissible tensile stress in masonry is limited to 2 N/mm ² .	CO3	06
B)	Find the diameter of a solid shaft which will transmit 150 kW power at 200 r.p.m. if the permissible shear stress is 60 N/mm ² . Find also the length of shaft, if the permissible angle of twist is 1° over the entire length. Take, shear modulus = 80 x 10 ³ N/mm ²	CO3	06

C)	A hollow shaft is of external diameter 70 mm and diameter ratio 0.8. It transmits a power of 2 HP at 25 rpm. If the maximum torque exceeds the average torque by 25%, draw the shear stress distribution across the section of the shaft indicating the values.	CO3	06
Q.4	Solve Any Two of the following.		
A)	Derive Rankine's formula for finding the critical load of columns.	CO4	06
B)	A circular bar is subjected to a tensile force of 20 kN along with a transverse shear force of 10 kN. Determine the diameter of bar using Maximum Principal Stress, Maximum Principal Strain, and Maximum Shear Stress failure theory. Take: Yield strength = 250MPa, factor of safety = 2, and Poisson's ratio = 0.3	CO3	06
C)	Using Euler's equation for long columns, determine the critical stresses for a compression member of slenderness ratio 80, 120, 160, and 200. The compression member has following end conditions (i) both ends hinged, and (ii) one end hinged and other end fixed. $E = 2 \times 10^5 \text{ N/mm}^2$.	CO4	06
Q. 5	Solve Any Two of the following.		
A)	An elemental cube is subjected to tensile stresses of 30N/mm ² and 15N/mm ² acting on two mutually perpendicular planes and a shear stress of 25N/mm ² on these planes. Determine magnitude and directions of principal stresses.	CO4	06
B)	Find analytically Principal stresses and Principal planes for an element. The element is subjected to two mutually perpendicular stresses 100 N/mm ² and 50 N/mm ² both tensile in X and Y direction, respectively along with a shear stress of 30 N/mm ² (upwards on a plane of 100 N/mm ² stress). Find also the maximum shear stress.	CO4	06
C)	Explain: The Rankine's failure theory.	CO1	06
	*** End ***		

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Supplementary Examination – Summer 2022

Course :B.Tech.

Branch : Civil Engg.

Semester : III

Subject Code & Name : BTCVC303 Building Construction and drawing

Max Marks : 60

Date : / /

Duration: 3 Hr.

Instructions to the Students:

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3. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
Q.1 Solve Any Two of the Following		
A) Draw the labeled plan and cross section of uncoursed Rubble masonry?	CO1	06
B) Describe the following with sketches (a) Header stone (b) Queen closer (c) Mitred closer (d) Through stone	CO1	06
C) Explain various type of brick bond	CO1	06
Q.2 Solve Any Two of the Following		
A) What are the properties of hardened concrete?	CO2	06
B) Write a short note on cohesion and segregation.	CO2	06
C) Enlist various type of admixture and Explain any two admixture	CO2	06
Q.3 Solve Any Two of the Following		
A) Explain the types of Lintels and discuss about of two.	CO2	06
B) Draw the figure of arch & define any six technical terms in arch.	CO1	06
C) Describe primary and secondary and continuous beam.	CO2	06
Q.4 Solve Any two of the Following		
A) What is requirements of a good stair	CO4	06
B) Enlist various type of staircase and draw dog legged staircase plan and elevation with technical term.	CO4	06
C) What is type of elevators and their use?	CO2	06

Q.5 Solve Any Two of the Following

- | | | | |
|----|--|-----|----|
| A) | State step by step procedure to construct concrete flooring for an industrial building | CO2 | 06 |
| B) | Write down the construction details for the tile flooring. | CO2 | 06 |
| C) | What are the advantages and disadvantages of precast structure? | CO2 | 06 |

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Semester Examination –2023**

Course: B. Tech in Civil Engineering
Subject Name: Building Construction & Drawing
Max Marks: 60 Date: 13/03/2023

Sem: III
Subject Code: BTCVC303
Duration: 3 Hr.

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** question of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. Assume suitable data wherever necessary and mention it clearly.
5. All sketches should be labeled, neat and proportionate

		(Marks)
Q.1.	Solve Any Two of the following.	
	a) What are the general principles observed in brick masonry?	(CO 1) 06
	b) State the comparative merits and demerits of stone masonry and brick masonry?	(CO 1) 06
	c) What are the general principles observed in Stone masonry?	(CO 1) 06
Q.2.	Solve Any Two of the following.	
	a) What are the ingredients of concrete? Enlist the properties of fresh & Hardened Concrete	(CO 2) 06
	b) Explain type of Admixtures & their necessity.	(CO 2) 06
	c) What are the chief ingredients of plain cement concrete? Describe in detail the properties of each?	(CO 2) 06
Q.3.	Solve Any One of the following.	
	a) Explain type formwork for RCC elements -Slab, Beam, Column,	(CO 3) 12
	b) Sketch a semicircular arch showing all technical terms used in arch? Sketch the entire arrangement showing the details of centering work?	(CO 3) 12
Q.4.	Solve Any Two of the following.	
	a) Draw a neat sketch of RCC stair showing all components?	(CO 4) 6
	b) Draw a neat sketch of Casement window?	(CO 4) 6
	c) Draw a neat sketch of Frame and Panelled door? (plan , section & elevation)	(CO 4) 6
Q.5.	Solve Any One of the following.	
	a) Explain king post truss and its joints with neat sketches?	(CO 5) 12
	b) Explain Queen post truss and its joints with neat sketches?	(CO 5) 12
Q.6.	Solve Any two of the following.	
	a) Explain merits and demerits of prefabrication?	(CO 5) 6
	b) Explain type of Flooring	(CO 5) 6
	c) Describe various guidelines for transportation and erection in prefabrication?	(CO 5) 6

*** End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE			
Supplementary Examination – Summer 2022			
Course: B. Tech.	Branch : Civil Engg		Semester :III
Subject Code & Name: Surveying –I (BTCVC304)			
Max Marks: 60	Date:	Duration: 3 Hr.	
Instructions to the Students:			
<ol style="list-style-type: none"> 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. (This is just a sample instruction)		12
A)	Explain chaining ,ranging ,offsetting in details.		CO1 6
B)	What is meant by well conditioned and ill conditioned triangles?		CO1 6
C)	Explain principle of chain surveying with classification of chaining.		CO1 6
Q.2	Solve Any Two of the following. (This is just a sample instruction)		12
A)	The Bearing of line AB is $153^{\circ}30'$ and angle ABC is $135^{\circ}40'$.What is bearing of BC.		CO1 6
B)	Explain with diagram prismatic compass and surveyor compass in detail.		CO1 6
C)	Define- 1. Whole circle bearing 2. Reduced bearing 3. Fore bearing 4. Back bearing		CO1 6
Q. 3	Solve Any Two of the following. (This is just a sample instruction)		12
A)	Explain the intersection method & resection method of plane table survey.		CO2 6
B)	State any six advantages and disadvantages of plane table survey.		CO2 6
C)	Explain principle of plane table surveying and write down instrument used in this survey.		CO2 6
Q.4	Solve Any Two of the following. (This is just a sample instruction)		12
A)	Explain types of bench marks.		CO2 6
B)	Write characteristics and uses of contours .		CO2 6
C)	Explain in detail types of planimeter.		CO2 6
Q. 5	Solve Any Two of the following. (This is just a sample instruction)		12
A)	Explain types of engineering survey in detail.		CO3 6
B)	Explain Mine surveying and Route surveying in detail.		CO3 6

C)	Explain temporary and permanent adjustment of theodolite.	CO3	6
*** End ***			

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Supplementary Examination – Summer 2022

Course :B.Tech.

Branch : Civil Engg.

Semester : III

Subject Code & Name : BTCVC304 Hydraulics-1

Max Marks : 60

Date : / /

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		
A) Explain the terms specific volume, specific gravity and density.	CO2	06
B) State the newton's law of viscosity and give examples of its applications.	CO2	06
C) Calculate the density, specific weight and weight of one liter of petrol of specific gravity =0.7	CO2	06
Q.2 Solve Any Two of the Following		
A) Explain flow net and its uses?	CO2	06
B) Derive Euler's equation of motion?	CO2	06
C) A 30 cm diameter pipe conveying water, branches into two pipe of diameter 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in this pipe, also determine the velocity in the 15 cm pipe if the average velocity in a 20 cm diameter pipe is 2 m/s?	CO3	06
Q.3 Solve Any Two of the Following		
A) Derive fully developed laminar flow between infinite parallel plate when both plates are stationary?	CO1	06
B) Explain Prandtl mixing length theory?	CO2	06
C) What is the boundary layer? Explain in detail.	CO2	06
Q.4 Solve Any two of the Following		
A) Derive Darcy-Weisbach equation.	CO2	06
B) Explain the terms prototype, model analysis and hydraulic similitude.	CO4	06
C) State and explain Buckingham's Pi theorem.	CO2	06

Q.5 Solve Any Two of the Following

- | | | | |
|----|--|-----|----|
| A) | What is major loss in flow through pipe and what causes the major loss ?
Derive the equation for the major loss. | CO3 | 06 |
| B) | Three pipes of lengths 800m, 500m and 400m and of diameters 500 mm, 400mm and 300mm respectively are connected in series. These pipes are to be replaced by single pipes of length 1700 m. Find the diameter of the single pipe. | CO3 | 06 |
| C) | Define and explain the terms : (i) Hydraulic gradient line and (ii) Total energy line | CO1 | 06 |

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,**LONERE Winter Examination – 2022****Course: B. Tech. Branch : Civil Engineering Semester : III****Subject Code & Name: BTCVC304 Hydraulics-I****Max Marks: 60****Date:15-03-2023****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)	Explain the different applications in Hydraulics Engineering	CO2	6
B)	A Liquid has a Specific gravity of 1.9 and kinematic Viscosity of 6 stokes. What is its dynamic viscosity?	CO2	6
C)	A rectangular plate 3m long and 1m wide is immersed vertically in water in such a Way that its 3m side is parallel to the water surface and is 1m below it. Find: i) Total Pressure on the plate ii) Position of Centre of Pressure	CO2	6
Q.2	Solve Any Two of the following.		12
A)	What is flow-net? Enumerate the methods of drawing flow nets. Also Define a) Velocity Potential Function b) Stream Function.	CO1	6
B)	List the Flow Measuring Devices and Explain with neat Sketch U-Tube Differential Manometer	CO1	6
C)	The water is flowing through a tapering pipe having diameters 300mm and 150mm at sections 1 and 2 respectively. The discharge through the pipe is 40litre/sec. The section is 10m above datum and section2 is 6m above datum. Find the intensity of Pressure at section2 if that a section1 is 400KN/m ² .	CO2	6

Q. 3	Solve Any Two of the following.		12
A)	What do you meant by Prandtl mixing length theory? Find an expression for shear stress due to Prandtl.	CO4	6
B)	Derive an expression for Euler's equation of motion.	CO4	6
C)	Define Boundary layer and describe effect of pressure gradient on boundary layer separation with neat sketch	CO4	6

Q.4	Solve Any Two of the following.		12
A)	State Buckingham's - theorem. What do you mean by repeating variables? How are the repeating variables selected in dimensional analysis?	CO4	6
B)	Explain the concept of Water Hammer and write a note on Surge Tank	CO3	6
C)	Write short note on Non-dimensional numbers- i) Froude Number ii) Weber Number iii) Reynolds Number	CO4	6

Q. 5	Solve Any Two of the following.		12
A)	Explain With neat sketch Hydraulic gradient and Total energy Line	CO2	6
B)	What is Compound Pipe? What will be loss of head when pipes are connected in series?	CO3	6
C)	The rate of flow of water through a horizontal pipe is $0.25\text{m}^3/\text{s}$. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is $11.772 \times 10^4 \text{N/m}^2$. Determine i) loss of head due to sudden enlargement ii) Pressure intensity in larger pipe	CO3	6
*** End ***			

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary Examination – Summer 2022 Course: B. Tech. Branch : Semester :III Subject Code & Name: Building Construction (BTCVC305) Max Marks: 60 Date: Duration: 3 Hr.			
<i>Instructions to the Students:</i> <i>1. All the questions are compulsory.</i> <i>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.</i> <i>3. Use of non-programmable scientific calculators is allowed.</i> <i>4. Assume suitable data wherever necessary and mention it clearly.</i>			
		(Level/CO)	Marks
Q. 1	Solve Any Two of the following.		
A)	Enlist various types of bonds in brick masonry. Explain with neat sketch any two bonds.	CO1	6
B)	Draw a neat sketch of uncoursed rubble masonry and explain it in brief.	CO1	6
C)	Explain the various chemical admixtures used in concrete.	CO2	6
Q.2	Solve Any Two of the following.		
A)	Explain the properties of i) Fresh concrete ii)Hardened concrete	CO2	6
B)	Write down the functions and requirements of good formwork.	CO3	6
C)	Draw a detailed labelled diagram of arch and explain components of arch.	CO3	6
Q. 3	Solve Any Two of the following.		
A)	Write short note on: i)Brick lintel ii)RCC lintel	CO3	6
B)	Enlist the types of doors. Explain any one type of door in detail with sketch.	CO3	6
C)	Explain with neat sketch Louvered window.	CO3	6
Q.4	Solve Any Two of the following.		
A)	Enlist the different types of stairs and explain any one with neat sketch.	CO3	6
B)	Describe the Escalator with neat sketch.	CO3	6
C)	State the various factors affecting the selection of flooring material.	CO3	6
Q. 5	Solve Any Two of the following.		
A)	Explain the Queen-post roof truss by sketch.	CO4	6
B)	State the various precautions and safety measures to be taken on	CO4	6

	construction site.		
C)	Explain the methods of Pre-fabrication.	CO4	6
	*** End ***		

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Winter Examination – 2022

Course: B. Tech.

Branch :CIVIL

Semester :III

Subject Code & Name:BTCVC305 SURVEYING

Max Marks: 60

Date:

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) Write short note on Metric Chain.	6
B) Write short note on: types of cross staff	6
C) Write short note on: Advantages & disadvantages of Chain.	6
Q.2 Solve Any Two of the following.	12
A) Explain Local attraction? How it is detected?	6
B) Write instruments used in Plane table Surveying.	6
C) Convert following reduce bearings to Whole circle bearing. 1) S70° 40' W 2) N 55° W 3) S 24° 15' E	6
Q. 3 Solve Any Two of the following.	12
A) What are the instruments used in levelling.	6
B) Define bench mark. Explain types of bench mark in brief.	6
C) Write note on Characteristics and uses of contours.	6
Q.4 Solve Any Two of the following.	12
A) Enlist various fundamental lines of a transit (20") theodolite & explain the relation between them.	6
B) Explain measurement of horizontal angle by repetition method.	6
C) Write short note on: Gales traverse table	6
Q. 5 Solve Any Two of the following.	12
A) Explain Preliminary Survey.	6
B) Write short note on Mine Surveying.	6
C) Write short note on Instruments used during tunnel Surveying.	6

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE			
Supplementary Examination – Summer 2022			
Course: B. Tech.		Branch: CIVIL	Semester: III
Subject Code & Name: BTCVC306 & ENGINEERING GEOLOGY			
Max Marks: 60		Date:	Duration: 3 Hr.
<i>Instructions to the Students:</i>			
<ol style="list-style-type: none"> 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.		
A)	Described Silica group of mineral	CO2	6
B)	Explain type of Volcano and its products.	CO4	6
C)	Write a note on Interior Structure of the earth with neat labeled diagram.	CO1	6
Q.2	Solve Any Two of the following.		
A)	Explained various dressing methods of building stones.	CO2	6
B)	Described types of Aquifer with neat labeled diagram.	CO1	6
C)	What is clastic and non clastic sedimentary rock? Described their structures.	CO2	6
Q. 3	Solve Any One of the following.		
A)	Give details of importance of geological structures for reservoir site.	CO4	6
B)	Define and described fault and classification with its role in Civil engineering	CO3	6
C)	Define Mountain. Describe in detail various types of Mountain	CO1	6
Q.4	Solve Any Two of the following.		
A)	Illustrate important of geological requirements considered in the selection of dam site	CO4	6
B)	Define fold and described classification of fold with neat labeled diagram.	CO3	6
C)	Describe in detail various types of drilling techniques	CO4	6
Q. 5	Solve Any One of the following.		
A)	What are the purposes of tunneling? Explain effects of tunneling on the ground	CO4	6
B)	Described procedure of measurement and calculations of Rock Quality Designation (RQD) and its uses in constructions	CO3	6

C)	Explain the various steps in preliminary geological investigations for any Engineering site.	CO4	6
*** End ***			

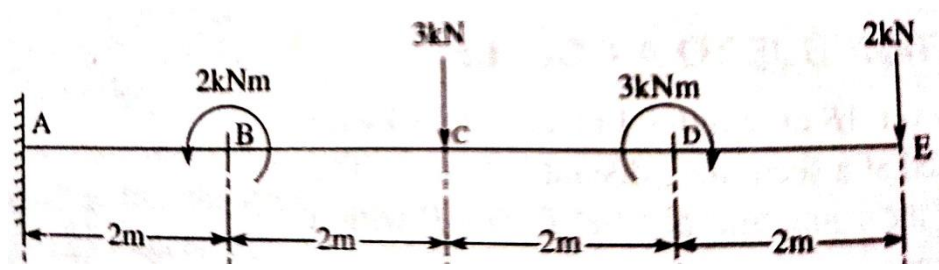
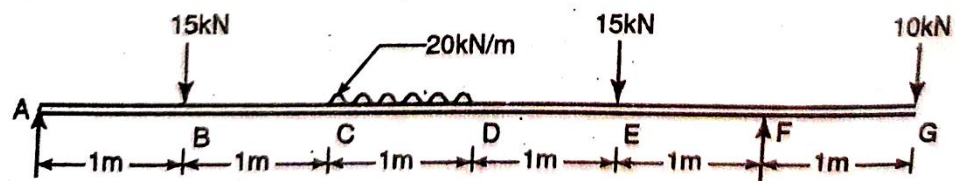
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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE			
Supplementary Examination – Summer 2022			
Course: B. Tech.		Branch: CIVIL	Semester: III
Subject Code & Name: BTCVC306 & ENGINEERING GEOLOGY			
Max Marks: 60		Date:	Duration: 3 Hr.
<i>Instructions to the Students:</i>			
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B)	Explain type of Volcano and its products.	CO4	6
C)	Write a note on Interior Structure of the earth with neat labeled diagram.	CO1	6
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A)	Explained various dressing methods of building stones.	CO2	6
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B)	Described procedure of measurement and calculations of Rock Quality Designation (RQD) and its uses in constructions	CO3	6

C)	Explain the various steps in preliminary geological investigations for any Engineering site.	CO4	6
*** End ***			

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Winter Examination – 2022 Course: B. Tech. Branch : Civil Engineering Semester :III Subject Code & Name: BTCVES302 Mechanics of Solids Max Marks: 60 Date: 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)	A specimen of steel 25mm diameter with a gauge length of 200mm is tested to destruction. It has an extension of 0.16mm under a load of 80 kN and the load at elastic limit is 160 kN. The maximum load is 180 kN. The total extension at fracture is 56mm and diameter at neck is 18mm. Calculate i) The stress at elastic limit ii) Young's Modulus iii) Percentage elongation iv) Ultimate tensile stress	L3/CO1 6
C)	Fig. shows a copper rod AB of length 600mm. When the temperature of the rod is 24 ⁰ C, the gap of BC is 0.48 mm. Determine i) Thermal stress at 40 ⁰ C ii) The temperature at which the gap just close iii) Stress and strain in the rod when its temperature is 88 ⁰ C Take E = 100 GPa and $\alpha = 16 \times 10^{-6}$ per ⁰ C	L3/CO1 6

Q.2	Solve Any Two of the following.		12
A)	Draw SFD and BMD for a simply supported beam carrying point load at center	L3/CO2	6
B)	Draw Shear force and Bending moment diagram for the beam shown in figure 	L3/CO2	6
C)	Draw the SF and BM diagrams for the beam shown in fig. and mark the salient points. Find the point of contra flexure 	L3/CO2	6
Q. 3	Solve Any Two of the following.		12
A)	Write the assumptions made in the theory of pure bending	L1/CO3	6
B)	Derive and draw the shear stress distribution diagram for the rectangular cross section of the beam	L2/CO3	6
C)	A hollow shaft of 60mm outer diameter transmits 180 kW of power while rotating at a frequency of 25 hertz. Find the thickness of the shaft so that the shear stress does not exceed 60 N/mm ²	L3CO3	6
Q.4	Solve Any Two of the following.		12
A)	Define effective length of column, give its values for various end conditions of column and state the importance of effective length in Euler's formula	L1/CO3	6
B)	A 1.5m long column has a circular cross section of 50mm diameter, one of the end of the column is fixed in direction and position and the other is free. Taking factor of safety as 3. Calculate the safe load using i) Rankine's Formula with $f_c = 560\text{N/mm}^2$ and $a = 1/1600$ for Pinned end ii) Euler's Formula with E for column = $1.2 \times 10^5 \text{ N/mm}^2$.	L3CO4	6

C)	Evaluate the ratio of the buckling strengths of two circular columns one hollow and the other solid. Both the columns are made of the same material and have the same length, cross-sectional area and end conditions. The internal diameter of the hollow column is half of its external diameter.	L3/CO4	6
Q. 5 Solve Any Two of the following.			12
A)	What is Mohr's stress circle? How is it useful in the solution of stress analysis problems.	L2/CO1	6
B)	At a point in a piece of elastic material the normal stresses on two mutually perpendicular planes are 80 N/mm^2 tensile and 60 N/mm^2 compressive. These planes also carry shear stresses of 65 N/mm^2 . Determine the principal planes and the principal stresses	L3/CO1	6
C)	A solid circular shaft is subjected to a bending moment of 40 kN-m and a torque of 10 kN-m . Design the diameter of the shaft according to i) Maximum principal stress theory ii) Maximum shear stress theory Take $\mu = 0.25$, stress at elastic limit = 200 N/mm^2 and factor of safety = 2.	L3/CO1	6
*** End ***			

The grid and the borders of the table will be hidden before final printing.