SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

ENDSEM- REEXAMINATION APRIL2023

Course Code: BS-BTC301 *J. Y. 1 Such (C)* **Maximum Points: 100**

Course Name: ENGINEERING MATHEMATICS-III   **Semester: III**

- Attempt any five out of seven questions
- Use of scientific calculator is allowed.

QN O.	QUESTION	PO IN TS	CO	BL	PI
Q1 a)	Obtain Laplace transforms of $\left\{ \sinh\left(\dfrac{t}{2}\right)\sin\left(\dfrac{\sqrt{3}t}{2}\right) \right\}$	06	1	2	2.1.3
Q1 b)	Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = i, 0, -i$.	06	2	3,5	1.1.1
Q1 c)	Find for what values of k the set of equations $2x - 3y + 6z - 5t = 3,\ y - 4z + t = 1,\ 4x - 5y + 8z - 9t = k$ has (i) no solution (ii) infinite number of solutions.	08	3	1	1.1.2
Q2 a)	Find the eigen values and eigenvectors of the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$	10	3	2	2.1.4
Q2b)	Evaluate $\displaystyle\int_{0}^{\infty} \dfrac{\cos 6t - \cos 4t}{t}\, dt$	10	1	2	2.3.1
Q3 a)	Verify that the equation $w = \dfrac{1+iz}{1+z}$ maps the exterior of the circle $|z| = 1$ into the upper half plane $v > 0$.	10	2	2	1.1.1
Q3 b)	Solve $\dfrac{dy}{dt} + 2y + \displaystyle\int_{0}^{t} y\, dt = \sin t$ Given $y(0) = 1$	10	1	4,5	2.1.4
Q4 a)	If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$, find $f(z)$ in terms of z.	10	2	3	2.3.1
Q4 b)	Using convolution theorem to Prove that:	10	1	2	1.1.3

ENDSEM- REEXAMINATION APRIL2023

	$\mathcal{L}^{-1}\left\{\dfrac{1}{\left(s^2+a^2\right)^2}\right\}=\dfrac{1}{2a^3}\left(\sin at - at\cos at\right)$				
Q5a)	Evaluate $L^{-1}\left\{\dfrac{5S^2+8S-1}{(S+3)\left(S^2+1\right)}\right\}$	10	1	2	1.1.1
Q5 b)	Find the characteristic equation of the symmetric matrix $A=\begin{bmatrix}2 & -1 & 1\\ -1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$ and verify that it is satisfied by A and hence obtain A^{-1}. Express $A^6-6A^5+9A^4-2A^3-12A^2+23A-9I$ in linear polynomial in A.	10	3	2	2.3.4
Q6a)	Find non – singular matrices P and Q such that P E Q is in normal form $E=\begin{bmatrix}2 & 1 & 1 & 3\\ 1 & 0 & 1 & 2\\ 3 & 1 & 2 & 5\end{bmatrix}$ Hence find rank of E.	10	3	3	2.1.3
Q6 b)	Evaluate: $L^{-1}\left\{\dfrac{5S^2-15S-11}{(S+1)(S-2)^2}\right\}$	10	1	3	1.1.1
Q7 a)	Obtain Laplace transforms of $f(t)=\sin^5 t$	06	1	3	2.1.4
Q7 b)	Show that the function $e^x\left(\cos y + i\sin y\right)$ is an analytic function, find its derivative	06	2	2	1.1.3
Q7c)	Test for consistency and solve $x-2y+3t=2$ $2x+y+z+t=-4$ $4x-3y+z+7t=8$	08	3	3,5	2.1.3

END SEMESTER RE EXAMINATION APRIL 2023

Program: B. Tech Civil Engineering

Course Code: ES BTC302   _S. Y. A. Tech (C)_
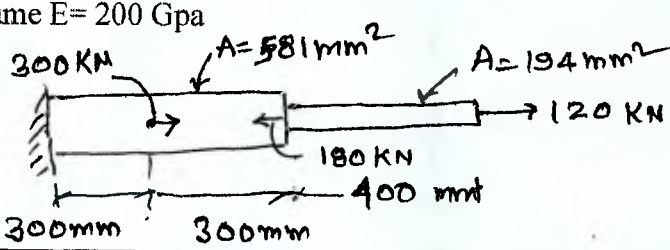
Course Name: Mechanics of Materials   _Sem III_

Semester: III

Duration: 3 Hr.

Maximum Points: 100

24/4/23

NOTE- SOLVE ANY 5 QUESTIONS.

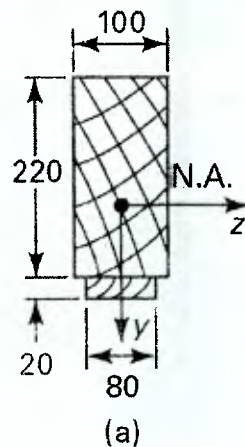| Q.No.	Questions	Points	CO	BL	Module No.
1(a)	A 500 mm long , 16 mm dia rod is made up of homogeneous isotropic material. When subjected to 12 Kn tesile force it is observed to elongate by 300 μm and to decrease in diameter by 2.4 μm . Determine modulus of elasticity and poisson's ratio for the material	07	2	3	1
1(b)	Determine the deformation of the steel rod under the given loads. Assume E= 200 Gpa	13	2	3	1
2(a)	A cylindrical thin drum 60cm in diameter and 3m long has a shell thickness of 8 mm. If the drum is subjected to an internal pressure of 2.0 N/mm2 , determine (i) change in diameter (ii) change in length and (iii) change in volume $E=2\times10^5 N/mm2$ and poissons ratio=0.3	10	3	3	7
2(b)	As shown in Fig., there is a gap between the aluminum bar and the rigid slab that is supported by two copper bars. At 10°C, $\Delta = 0.18$ mm. Neglecting the mass of the slab, calculate the stress in each rod when the temperature in the assembly is increased to 95°C.	10	2	3	1

(a)

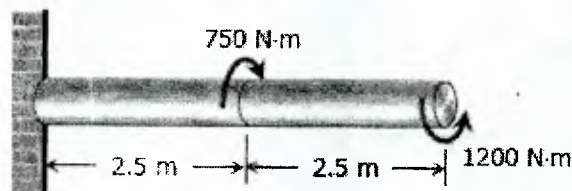|					
4(a)	A 2.5 m long steel shaft of 30 mm dia rotates at a frequency of 30 Hz. Determine the maximum power that the shaft can transmit. knowing that G=77.2 Gpa and the allowable shearing stress is 50 Mpa. The angle of twist must not exceed 7.5 ^{0}.	10	1	04	1
4(b)	A solid steel shaft is loaded as shown in Fig. Using G = 83 GPa, determine the required diameter of the shaft if the shearing stress is limited to 60 MPa and the angle of rotation at the free end is not to exceed 4 deg.	10			
5(a)	A wide flange section is formed by bolting together three planks, each 80 mm by 200 mm, arranged as shown in Fig. If each bolt can withstand a shearing force of 8 kN, determine the pitch if the beam is loaded so as to cause a maximum shearing stress of 1.4 MPa.	07			

80 mm × 200 mm
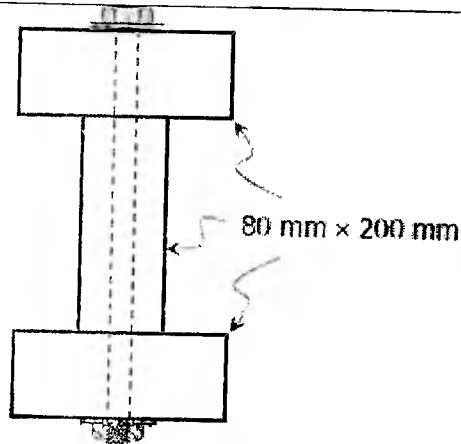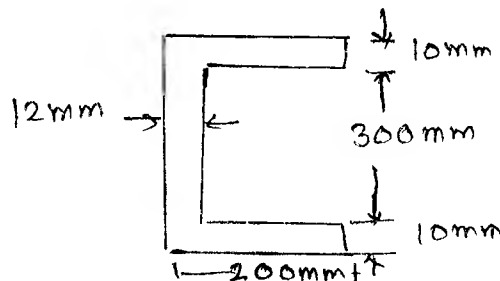
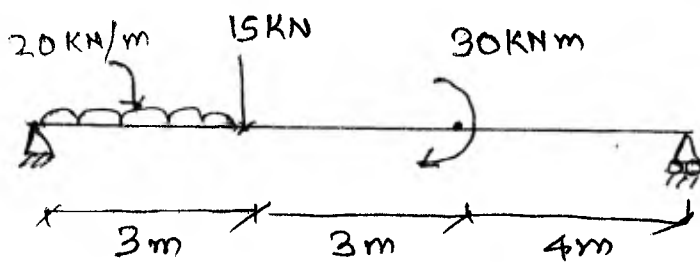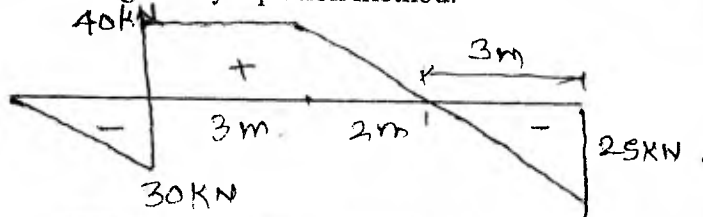|					
5(b)	Calculate shear center for channel section shown and Calculate shear stress distribution for channel, if maximum shear force is 70 Kn. 10mm, 12mm, 300mm, 10mm, 200mm	13			
6(a)	For the beam shown, draw shear force diagram and bending moment diagram **using equation method OR area method** 20 KN/m, 15KN, 30KNm, 3m, 3m, 4m	12	1	3	2
6 (b)	For the given shear force diagram, draw loading diagram and draw bending moment diagram by equation method. 40KN, 3m, 3m, 2m, 25KN, 30KN	08	1	3	2
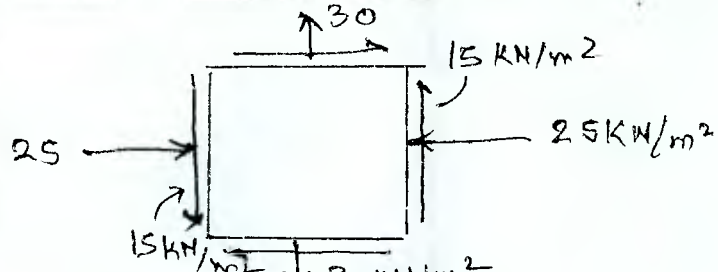
7(a)	For the given element with stresses as shown, calculate state of stress if an element is rotated by 30 ^{0} clockwise. Use transformation equations	13	2	04	2
7(b)	For the element with state of stress given as $$[\sigma] = \begin{bmatrix} 85 & -40 \\ -40 & -70 \end{bmatrix} mpa$$ Find state of stress if an element is rotated by 45 ^{0} anticlockwise using Mohr's circle. Also find out values of principle stresses and maximum shear stress.	07	2	04	2

Program: B. Tech. Civil Engineering

Duration: 3 hrs.

Course Code: PE-BTC303

Maximum Points: 100

Course Name: Basics of Surveying

Semester: III

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1** is compulsory. Solve any FOUR from remaining six questions.
3. Write **answer to each question on a new page.**
4. Answers to be accompanied with **appropriate sketches/facts** & figures/table or **chart/graph/diagram/flowchart** wherever necessary or required.
5. Assume suitable data wherever needed and state it clearly.

Q.No.	Questions	Points	CO	BL	PI
1	**Answer the following: (Any 5 – 4 points each)** 1. Draw a neat labelled sketch of a theodolite. 2. List the fundamental lines of theodolite. State the desired relationship between these lines. 3. Give the difference between Auto level and Dumpy level. 4. Define the terms latitude and departure and explain how they are calculated. 5. Explain the Rise and Fall method of reduction of levels 6. Give the difference between trapezoidal formula and Simpson's formula for area computation. 7. Describe the temporary adjustments of a level in a field. 8. With a neat sketch define and explain the term contour interval and horizontal equivalent.	20	1	1	
2.A	The following bearings were observed for a closed traverse at a place where local attraction was suspected. Find the amount of local attraction at different stations (3) and corrected bearings of the lines (3), and the included angles (2). Draw a sketch of the plot assuming PQ = 180m, QR =120m, RS=60m and show all the included angles in it (2).	10	2	3	

Line	Fore bearing (FB)	Back bearing (BB)
PQ	59° 00'	239° 00'
QR	139° 30'	317° 00'
RS	215° 15'	36° 30'
ST	208° 00'	29° 00'
TP	318° 30'	138° 45'

Q.No.	Questions	Points	CO	BL	PI
2.B	With a neat sketch, describe the procedure of measurement of an horizontal angle by repetition method.	10	3	1	

3.A	Explain with a neat sketch, the procedure of measurement of horizontal angle by reiteration method.	10	3	1			
3.B	Explain with a neat sketch the procedure for 'Profile levelling' and 'Cross sectioning'.	10	3	3			
4.A	The following consecutive readings were taken with a level and a 4-metre levelling staff on a continuously sloping ground at common intervals of 15m: 0.915, 1.255, 1.725, 3.055, 1.025, 2.625, 2.935, 3.155, 0.575, 1.505, 2.165 The instrument was shifted after the fourth and eighth readings. The chainage and Reduced level (RL) of the first point was 180m and 18.315m respectively. Prepare a field book (2). Determine the RLs of all points (5). Apply usual checks (2). Draw the longitudinal section of the profile (3). Determine the gradient between the first and the last point (3).	15	2	3			
4.B	State different methods of plane table surveying (2). Describe the method of intersection (3).	05	2	3			
5.A	A single level section has a formation width of 7.5m and side slopes 2:1. The depth of cutting at the center at 30m intervals are 1.8m, 2.175m, 2.55m, 2.925m and 3m. Find the volume of earthwork in the length of 120m by prismoidal formula. Draw neat sketch of the section.	10	2	3			
5.B	When would you recommend reciprocal levelling (3). Describe the procedure of reciprocal levelling with a neat sketch (6).	10	2	3			
6.A	State different methods of Contouring (2). Describe the radial contouring method with proper sketch (8).	10	2	3			
6.B	Write short notes on: (any one) a) Permanent adjustments of a level on the field b) Bowditch rule for correction of traverse correction.	10	3	1			
7.A	Answer the following: (3 points each) 1. Classify Surveying on the basis of instruments used. 2. Differentiate between line of collimation and height of instrument 3. Write in short: GTS and temporary benchmark 4. With neat sketch define Closed traverse and Open traverse.	12	1	1			
7.B	The following observations were taken from stations P and Q. Calculate the length and bearing of AB and also angle PAB and angle QAB.	08	2	3			

Line	Bearing	Length (m)
PA	S 60° 30' W	125.00
PQ	N 30° 30' W	200.00
QB	N 50° 15' W	150.50

RE- EXAMINATION-April-2023

Program: Civil Engineering

Course Code: ES-BTC-304

Course Name: Building Drawing with CAD

Duration: 3.00 hrs.

Maximum Points: 100

Semester: III

S. Y. B Tech (Civil) Sem III   *24/4/23*

Notes:

1. Q.1 is compulsory & attempts any four out of remaining six.
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

Q.No.	Questions	Marks	BL	CO	PO	PI Code
1.	A) Draw to a suitable scale developed plan for ground floor of G+1 storey bungalow for an Artist in a site of the data given below. 　1. Plot size: 16M x 20M. (FSI: 1.0) 　2. Requirements of an Artist 　　a. Office room 　　b. Master bed room 　　c. Living room 　　d. Children bed room 　　e. Kitchen cum dining room 　　f. Guest bed room 　　g. Staircase/bath/WC/store/verandah are to be provided B) Draw line plan of terrace plan for above question	15+05	L4	1-5	1/3/5	1.6.1/5.4.2/ 3.8.1
2	A. Draw to a suitable scale line plan of first floor for Q.1A. B. State: Built up area, carpet area, super built up area, FSI for Q.1A.	15+05	L2	1-5	1/5	1.6.1/5.4.2/ 3.8.1
3	A. Draw to a suitable scale line plan of post office building in a site of size 20 M X 25 M	20	L3	2-5	1,2	1.6.1/5.4.2/ 3.8.1
4	A. Explain the duties & responsibilities of Contractor/Builder & buyer under Real estate regulation act, 2016. B. Explain how grouping and Privacy is to be maintained in a planning of residential building.	10+10	L2	2	1	1.6.1
5	A. Explain byelaws for setback projections, minimum requirements of units & building heights . OR A. Draw a sectional elevational plan for Q.1A	10+10	L2/3	2-5	1/3/5	1.6.1/ 1.2.1/5.4.2/ 3.8.1
6	A. Draw to a suitable scale Foundation plan for Q.1A. B. Draw to a suitable scale site plan for Q.1A.	15+05	L3	1-3	1/3/5	1.6.1/5.4.2/ 3.8.1

7	A. Draw to a suitable scale Water supply & Drainage plan for Q.1A. B. Draw to a suitable scale Electricity& Furniture plan for Q.1A.	10+10	L3	1-3	1/3/5	1.6.1/5.4.2/3.8.1

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examinations (Re-exam): April 2023

Program: SYC-Sem-III   **Duration: 3 hours**

Course Code: BS -BTC 305   **Maximum Points: 100**

Course Name: Engineering Geology

Notes:

- Question No. 1 is compulsory
- Solve any four out of remaining 5 questions
- Answer to all sub questions should be grouped together.
- Figure to right indicates full marks.
- Draw labeled diagram whenever necessary
- Submit the answer sheet as per the guidelines by the examination section

		Points	CO	BL	PI
Q.1a (i) (ii) (iii) (iv) (v)	Write the identifying properties and economic use of the following minerals: Talc, Orthoclase, Asbestos, Quartz, Corundum	10	3	2	1.5.1
Q.1b (i) (ii) (iii) (iv) (v)	Explain with labeled diagram: Pedestrian Rocks, Types of joints, Parts of fold, Concordant and discordant igneous intrusion, Focus and epicenter	10	2,3	2	
Q.2(a)	Explain internal factors that are responsible for modification of Earth's surface.	10	1	2	1.5.1
(b)	What is weathering? Explain effect of physical and chemical weathering on rocks	10	2	2	
Q.3(a)	Explain chemical classification of igneous rocks with suitable examples	10	3	3	1.5.1
(b)	What are the shallow water structures of sedimentary rocks?	10	3	3	
Q.4(a)	What are Faults? Explain classification of faults on the basis of apparent movement.	10	4	3	1.5.1
(b)	What are confined and unconfined aquifers? Explain What are the two properties required for the rocks to be an aquifer	10	6	2	
Q.5(a)	Describe the geological conditions for site selection of dam and with help of diagram explain various forces acting on a dam.	10	5	3	1.5.1
(b)	Define RQD and Core Recovery, Calculate RQD and Core Recovery from the given data and comment on the suitability of rocks for foundation purpose. Total run 2m.	10	4	4	

Sample No.	Length of the core in cms	Nature of the lower end of the core sample	Sample No.	Length of the core in cms	Nature of the lower end of the core sample
a	16	N	i	29	N
b	10	N	j	10	N
c	15	N	k	19	N
d	09	M	l	18	N
e	8	N	m	8	M
f	09	M	n	10	M
g	12	N	o	03	N
h	16	N	p	05	N

Q.6 (i) (ii) (iii) (iv) (v) (vi)	Write short notes on any four of the following Earthquake zone of India Tectonic cause of earthquake Ox bow lake Desert pavement Controlling factors of landslide Types of geological investigation	20	3,4,6	2	1.5.1

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Re- Examinations March 2023

Program: Civil Engineering *J. Y. B. Tech Civil* **Duration:** 3hr

Course Code: PC-BTC306 *Sem III* **Maximum Points:** 100

Course Name: Fluid Mechanics **Semester: III**

Instructions

1. **Attempt any 5 questions out of 7 questions.**
2. Neat diagrams must be drawn wherever necessary.
3. Assume Suitable data if necessary and state it clearly.

Q. No.	Questions	Points	CO	BL	PI
1a	Define surface tension.	8	CO1	BL3	2.3.1
	Mention any 4 examples involving surface tension. Derive expression for determining pressure difference between inside and outside of a soap bubble.				
1b	Calculate the specific weight, density, and specific gravity of 1 lit. of liquid which weighs 10 N.	6	CO1	BL1	1.3.1
1c	Calculate the pressure in N/m2 corresponding to a) 6m of water column b) 10 cm of mercury column c) 40cm of column of a fluid having G=0.7	6	CO3	BL3	1.2.1
2a	A hydraulic press has a ram of 20 cm diameter.	8	CO1	BL3	1.3.1
	And a plunger of 3 cm diameter. It is used for lifting a weight of 30 kN. Find the force required at the plunger.				
2b	State and explain Newton's law of viscosity and derive the equation for the same	6	CO1	BL2	1.2.1
2c	An open tank contains water up to a depth of 2m.	6	CO1	BL2	1.2.1
	Above it an oil of Sp. Gr=0.9 for a depth of 2m. Find the pressure intensity (a) At the interface of the two liquids and (b) At the bottom of the tank				
3a	The diameter of pipe at section 1 is 10 cm and section 2 is 15 cm.	6	CO3	BL2	1.2.1
	Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5m/s. Also determine velocity at section 2.				
3b	Explain in detail classification of fluid flow.	8	CO2	BL4	2.4.1
3c	Define metacenter and metacenter along with different conditions of equilibrium.	6	CO2	BL1	1.2.1
4a	The following cases represent the two velocity components	8	CO2	BL4	1.4.1
	$$u = y^2 + z^2 + x^2 \;,v = xy^2 - yz^2 + xy,$$ $$v = 2y^2 \quad w = 2xyz$$				

	Determine the third component of velocity such that they satisfy the continuity equation.				
4b	Determine the total pressure on one face of the plate and position of the center of pressure.	7	CO1	BL3	
	A circular plate of 3m dia is immersed in water in such a way that its greatest and least depth below the free surface are 4m and 1.5m respectively.				
4c	Define coefficient of discharge, coefficient of velocity and coefficient of contraction and derive relation between them	5	CO2	BL2	1.2.1
5a	Find the metacentric height of the cylinder when it is floating in water with its axis vertical.	7	CO1	BL3	1.4.1
	A solid cylinder of diameter 4,0m has height of 3.0m. The specific gravity of the cylinder=0.6				
5b	Write down the Bernoulli's equation for the real fluid and state the assumptions made in the derivation of Bernoulli's theorem.	5	CO1	BL2	1.2.1
5c	Discuss the methods of preventing the separation of boundary layer.	8	CO3	BL2	1.3.1
6a	Discuss with diagram stream tube, stream line and streak line.	6	CO1	BL2	1.3.1
6b	Find total head or total energy per unit weight of the water at a cross section, which is 5m above the datum line.	6	CO2	BL3	1.4.1
	Water is flowing through a pipe of 5 cm diameter under a pressure of $29.43 N/cm^2$ (gauge) and with mean velocity of 2.0 m/s.				
6c	Discuss laminar boundary layer, turbulent boundary layer, laminar sub layer and boundary layer thickness.	8	CO1	BL2	2.1.2
7a	Discuss the characteristics of turbulent flow.	6	CO1	BL2	2.1.2
7b	Explain displacement thickness and derive expression for the same.	6	CO1	BL2	2.1.2
7c	Determine the rate of flow. Cd=0.98	8	CO2	BL3	1.4.1
	A horizontal venturimeter with inlet & throat diameter 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury.				

SY-CIVIL, RE- EXAMINATION ~~APRIL~~ May 2023

Program: B.Tech. Civil Engineering ∫, 4, 1. Frey (C)   **Duration: Three hours**

Course Code: PC-BTC307   Jun III   **Maximum Points: 100**

Course Name: Building Materials and Construction   **Semester: III**

Instructions:
1. Attempt any five out of seven Questions
2. Draw neat diagrams wherever required
3. Assume suitable data if necessary and state them clearly.

Q. No.	Questions	Points	CO	BL	PI
1					
a	Explain the defects due to conversion of timber with neat sketch.	06	1	1	2.3.2
b	What is reinforced brick lintel? How it is different than RCC lintel?	04	1	2	1.3.1
c	Explain different types of lime with their suitability.	06	3	2	2.3.1
d	Differentiate between OPC and PPC	04	1	2	1.3.1
2.	Discuss the various methods of preservation of timber.	08	2	1	1.3.1
a	What are the impurities present in the aggregates and how it	04	3	3	2.3.2
b	is tested?				
c	What are the qualities of good mortar?	08	2	1	1.2.1
3					
a	What are the characteristics of good building stone?	08	2	2	1.2.1
b	Explain different types of paints used in construction industry with their suitability.	06	1	1	1.3.1
c	What are the factors casing dampness in the building?	06	1	3	1.2.1
4	Describe the stages involved in the construction of non-load bearing Cavity wall with neat sketch	10	1	1	2.3.2
a					
b	What are the field tests to be conducted to test the quality of brick?	06	1	1	1.3.1
c	Differentiate between the load bearing and non-load bearing wall	04	4	2	2.3.1
5	Draw neat sketch of Raking shore and explain different components with their functions.	08	2	1	1.2.1
a					
b.	What are the requirement of good stair?	07	4	2	2.3.1
c.	It is proposed to carryout repair work of RCC footing of an existing building. Suggest the procedure for the same.	05	2	2	1.3.1

SY-CIVIL, RE- EXAMINATION ~~APRIL~~ May 2023

6					
a.	Explain in detail the procedure for carrying out internal plaster for a residential building.	08	3	2	2.3.1
b.	Describe in short different methods of waterproofing.	06	2	2	1.2.1
c.	Discuss the advantages and disadvantages of steel formwork over timber.	06	3	1	1.1.2
7	*Write short Notes on (Any four)*				
a	Sulphate attack in concrete	05	1	3	1.3.1
b	Defects in timber due to insects	05	1	1	1.3.1
c	Geotechnical investigation	05	2	2	1.3.1
d	Low heat cement	05	1	2	1.3.1
e	Mud mortar	05	2	2	1.3.1
f	Chemical compounds in cement	05	2	2	1.3.1

ENDSEM- EXAMINATION FEB2023

Program: CIVIL

S.Y. B.Tech (C) Sem III **Duration: 03 Hours**

Course Code: BS-BTC301

Maximum Points: 100

Course Name: ENGINEERING MATHEMATICS-III

Semester: III

- Attempt any five out of seven questions
- Use of scientific calculator is allowed.

QN O.	QUESTION	PO IN TS	CO	BL	PI
QI a)	Obtain Laplace transforms of $f(t) = \sqrt{1 + \sin t}$	06	1	2	2.1.3
QI b)	Find the bilinear transformation which maps $1, i-1$ to $2, i, -2$ respectively. Find the fixed points of the transformation.	06	2	3,5	1.1.1
QI c)	Find for what values of k the set of equations $2x - 3y + 6z - 5t = 3,\ y - 4z + t = 1,\ 4x - 5y + 8z - 9t = k$ has (i) no solution (ii) infinite number of solutions.	08	3	1	1.1.2
QII a)	Find the eigen values and eigenvectors of the matrix $$A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$$	10	3	2	2.1.4
QII b)	Prove that $\displaystyle\int_{0}^{\infty} \frac{\sin 2t + \sin 3t}{te^t} dt = \frac{3\pi}{4}$ using Laplace transforms	10	1	2	2.3.1
QIII a)	. Find the bilinear transformation that maps the point $z_1 = -i,\ z_2 = 0,\ z_3 = i$ into the points $w_1 = -1,\ w_2 = i,\ w_3 = 1$ respectively. Into what curve the y – axis is transformed to this transformation?	10	2	2	1.1.1
QIII b)	Solve $y'' + y = t$ Given $y(0) = 1$ $y'(0) = -2$	10	1	4,5	2.1.4

ENDSEM- EXAMINATION FEB2023

QIV a)	If f (z) = u + iv is an analytic function of $z = x + iy$ and $u - v = \dfrac{e^y - \cos x + \sin x}{\cosh y - \cos x}$, find f (z) subject to the condition that $f\left(\dfrac{\pi}{2}\right) = \dfrac{3-i}{2}$	10	2	3	2.3.1
QIV b)	Evaluate: $\mathcal{L}^{-1}\left\{\dfrac{s}{\left(s^2 + 4\right)\left(s^2 + 1\right)}\right\}$ using convolution theorem	10	1	2	1.1.3
QV a)	Evaluate $L^{-1}\left\{\dfrac{5S^2 + 8S - 1}{(S+3)(S^2+1)}\right\}$	10	1	2	1.1.1
QV b)	Find the characteristic equation of the symmetric matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and verify that it is satisfied by A and hence obtain A^{-1}. Express $A^6 - 6A^5 + 9A^4 - 2A^3 - 12A^2 + 23A - 9I$ in linear polynomial in A.	10	3	2	2.3.4
QVI a)	Find non – singular matrices P and Q such that P A Q is in normal form $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix}$ Hence find rank of A.	10	3	3	2.1.3
QVI b)	Evaluate: $L^{-1}\left\{\dfrac{s^2 + 2s + 3}{\left(s^2 + 2s + 2\right)\left(s^2 + 2s + 5\right)}\right\}$	10	1	3	1.1.1
QVII a)	Obtain Laplace transforms of $L\left\{\sin 2t \sin 4t \sinh t\right\}$	06	1	3	2.1.4
QVII b)	Show that the function $e^x\left(\cos y + i \sin y\right)$ is an analytic function, find its derivative	06	2	2	1.1.3

ENDSEM- EXAMINATION FEB2023

QVI Ic)	Test for consistency and solve $x - 2y + 3t = 2$ $2x + y + z + t = -4$ $4x - 3y + z + 7t = 8$	08	3	3,5	2.1.3

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEMESTER EXAMINATION FEBRUARY 2023

Program: B. Tech Civil Engineering   **Duration: 3 Hr.**
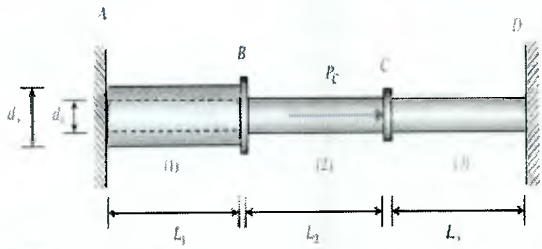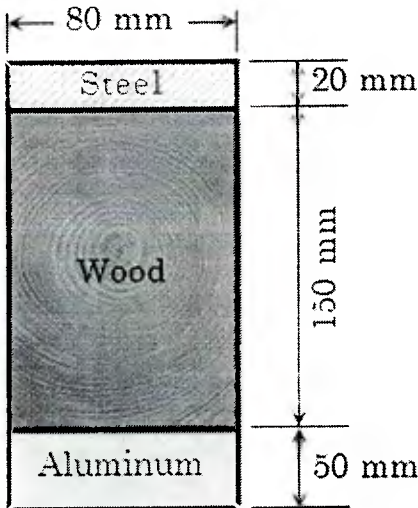
Course Code: ES BTC302   **Maximum Points: 100**

Course Name: Mechanics of Materials

Semester: III

Notes: Solve any 5 questions

Q.No.	Questions	Points	CO	BL	Module No.
1(a)	A solid cylinder of diameter d carries an axial load P. Show that its change in diameter is $4Pv / \pi Ed$.	07	2	3	1
1(b)	A steel pipe with an outer diameter do and inner diameter di , and a solid aluminum-alloy rod of diameter d form a three-segment system that undergoes axial deformation due to a single load PC acting on a collar at point C, as shown in the figure. Calculate the axial stresses in the three segments, and determine the displacements at connectors B and C. L1 = 4 m , L2 = 3 m, L3 = 2 m For rod AB – do = 60 mm and di =40 mm For rod BC and CD – d = 50 mm Load Pc = 3000 N E= 2 x 10⁵ MPa	13	2	3	1
2(a)	A cylindrical thin drum 80cm in diameter and 3m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5 N/mm2 , determine (i) change in diameter (ii) change in length and (iii) change in volume E=2×105N/mm2 and poison's ratio=0.25	10	3	3	7

2(b)	Steel railroads 10 m long are laid with a clearance of 3 mm at a temperature of 15°C. At what temperature will the rails just touch? What stress would be induced in the rails at that temperature if there were no initial clearance? Assume $\alpha = 11.7$ μm/(m·°C) and E = 200 GPa	10	2	3	1
3(a)	Calculate beam depth to be provided if width of beam is 200 mm for a simply supported beam of span 6.0 m which is subjected to point load of 50 Kn at centre of span. Permissible stress in flexure is 100 MPa and shear stress 10 MPa.	10	2	3	3-4
3(b)	Steel and aluminum plates are used to strengthen an 80 mm by 150 mm timber beam. The three materials are fastened firmly as shown so that there will be no relative movement between them Given the following material properties: 	Allowable Bending Stress, F_b	Modulus of Elasticity, E	 	Steel = 120 MPa	Steel = 200 GPa	 	Aluminum = 80 MPa	Aluminum = 70 GPa	 	Wood = 10 MPa	Wood = 10 GPa	 **Find the safe resisting moment of the beam in kN·m.**	10	2	3	3
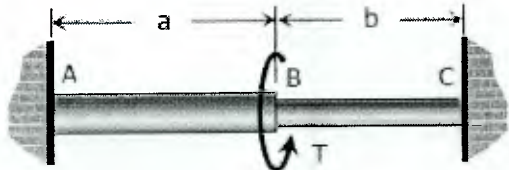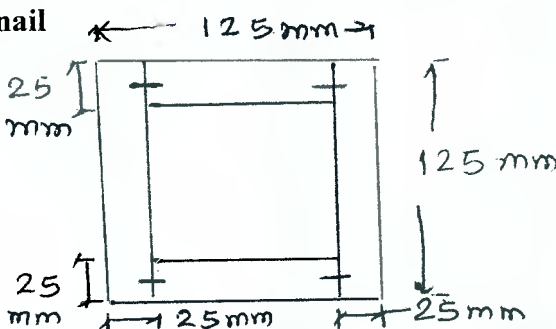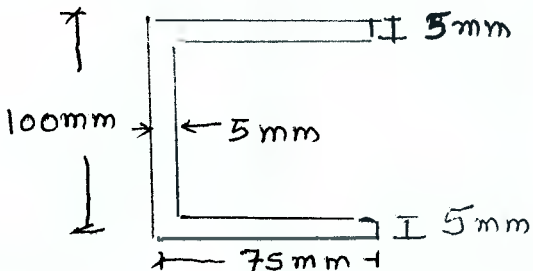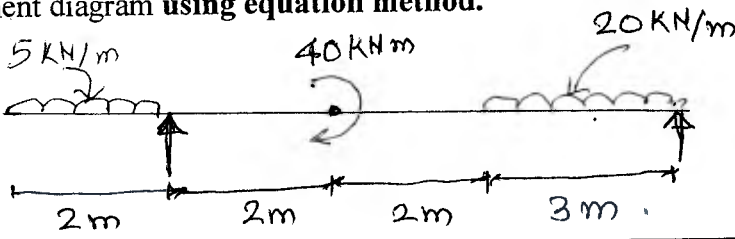
END SEMESTER EXAMINATION FEBRUARY 2023

4(a)	A solid steel shaft 5 m long is stressed at 80 MPa when twisted through 4°. Using G = 83 GPa, compute the shaft diameter. What power can be transmitted by the shaft at 20 Hz .	10	2	3	5
4(b)	The compound shaft shown is attached to rigid supports. For the bronze segment AB, the diameter is 75 mm, $\tau \le 60$ MPa, and G = 35 GPa. For the steel segment BC, the diameter is 50 mm, $\tau \le 80$ MPa, and G = 83 GPa. If a = 2 m and b = 1.5 m, **compute the maximum torque T that can be applied.**	10	2	3	5
5(a)	Square box beam constructed from four planks. Spacing between nails is 60 mm. Vertical shear force V = 10.0 kN. **Find shearing force in each nail**	07	2	3	4
5(b)	Calculate shear center for channel section shown and Calculate shear stress distribution for channel, if maximum shear force is 70 Kn.	13	4	3	4

6(a)	For the beam shown, draw shear force diagram and bending moment diagram **using equation method.**	10	1	3	2
6 (b)	For the given shear force diagram, draw loading diagram and draw bending moment diagram **by area method**.	10	1	3	2
7(a)	For the given element with stresses as shown, calculate state of stress if an element is rotated by 30^0 clockwise. Use transformation equations	08	2	3	6
7(b)	For the element with state of stress given as $$\sigma = \begin{bmatrix} 30 & -45 \\ -45 & 50 \end{bmatrix} MPa$$ Find state of stress if an element is rotated by 60^0 anticlockwise using Mohr's circle. Also find out values of principle stresses and maximum shear stress.	12	2	3	6

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
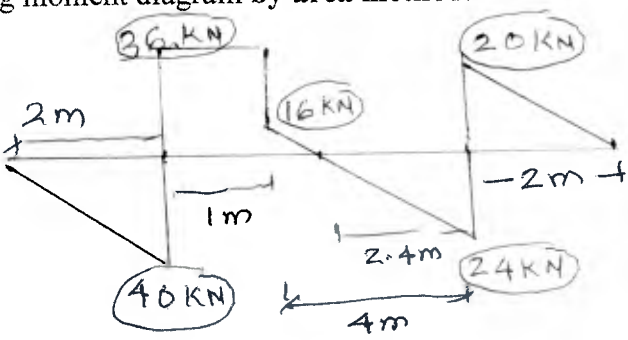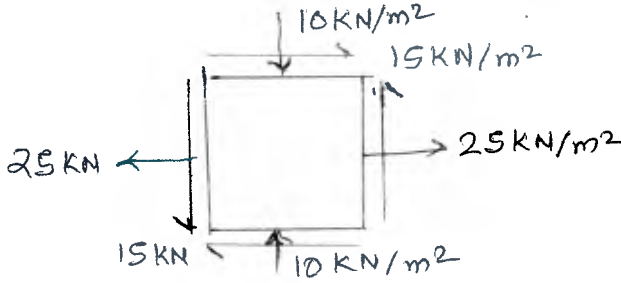
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examinations: February 2023

(2022-23)

Program: SYC Sem-III
Course Code: BS -BTC 305
Course Name: Engineering Geology

Duration: 3 Hrs.
Maximum Points: 100

Notes:
- Question No. 1 is compulsory
- Solve any four out of remaining 5 questions
- Answer to all sub questions should be grouped together.
- Figure to right indicates full marks.
- Draw labeled diagram whenever necessary
- Submit the answer sheet as per the guidelines by the examination section

		Points	CO	BL	PI
Q.1a	Write the identifying properties and economic use of the following minerals	10	3	2	1.2.1
(i)	Pyrite				
(ii)	Gypsum				
(iii)	Quartz				
(iv)	Muscovite				
(v)	Diamond				
Q.1b	Explain with labelled diagram	10	2,3	2	
(i)	Types of folds				
(ii)	Dip and strike				
(iii)	Angular unconformity				
(iv)	Seismic waves				
(v)	Sill and Dyke				
Q.2(a)	Explain theory of plate tectonics with suitable diagram.	10	1	2	1.2.1
(b)	What is weathering? Explain Chemical weathering and its engineering consideration.	10	2	2	
Q.3(a)	Explain mineralogical and textural classification of igneous rocks	10	3	3	1.2.1
(b)	What are the agent of metamorphism? Describe Dynamic metamorphism in detail.	10	3	3	
Q.4(a)	What are Folds? Explain classification of folds on the basis of position Plane	10	4	3	1.2.1
(b)	What are confined and unconfined aquifer? Explain cone of depression ground water.	10	6	2	
Q.5(a)	Describe the geological conditions for site selection of dam and explain how Geological structures create favorable and unfavorable conditions at a dam site?	10	5	3	1.2.1
(b)	Define RQD and Core Recovery, Calculate RQD and Core Recovery from the given data and comment on the suitability of rocks for foundation purpose. Total run 2m.	10	4	4	

Sample No.	Length of the core in cms	Nature of the lower end of the core sample	Sample No.	Length of the core in cms	Nature of the lower end of the core sample				
a	12	N	i	26	N				
b	16	N	j	10	N				
c	11	N	k	17	N				
d	09	M	l	18	N				
e	9	N	m	8	M				
f	02	N	n	10	N				
g	12	N	o	09	N				
h	16	N	p	05	N				

Q.6 (i) (ii) (iii) (iv) (v) (vi)	Write short notes on any four of the following- Types and causes of landslide Aquifer Normal fault Products of volcano Cause of earthquake Pedestal Rock	20	3,4,6,7	2	1.2.1

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END SEMESTER EXAMINATION-FEB-2023

Program: Civil Engineering   **Duration: 3.00 hrs.**

Course Code: ES-BTC-304   **Maximum Points: 100**

Course Name: Building Drawing with CAD   **Semester: III**

Notes: *S. Y. A, Tech (C) Sem III*

1. Q.1 is compulsory & attempts any four out of remaining six.
2. Illustrate answer with neat sketches wherever required.
3. Make suitable assumptions where necessary and state them clearly.

Q.No.	Questions	Marks	BL	CO	PO	PI Code
● 1.	A) Draw to a suitable scale developed plan for ground floor of G+1 storey bungalow for an Executive Engineer in a site of the data given below. 　1. Plot size: 20M x 25M. (FSI: 1.2) 　2. Road is on south side parallel to 20 M direction 　3. Wind direction is E-SW-W & climatic zone is cold 　4. Requirements of Engineer 　　a. Office room 　　b. Master bed room 　　c. Living room 　　d. Children bed room 　　e. Kitchen cum dining room 　　f. Guest bed room 　　g. Staircase/bath/WC/store/verandah are to be provided B) Draw line plan of terrace plan for above question	15+05	L4	1-5	1/3/5	1.3.1/5.3.2/ 3.4.1
●	A. Draw to a suitable scale line plan of first floor for Q.1A. B. State: Built up area, carpet area, super built up area, FSI for Q.1A.	15+05	L2	1-5	1/5	1.3.1/5.3.2/
3	A. Draw to a suitable scale line plan of public building in a site given below 　1. Hostel (30m x 50m) – Roll No. 1-10 & 51-60 　2. School (2 guntha land)– Roll No. 11-20 & 61-70 　3. Market Building (20 acre) – Roll No.21-30 　4. Bank (2500 sq.ft)- Roll No.31-40 　5. Auditorium (2000 sq.ft)- Roll No.41-50.	20	L3	2-5	1,2	1.3.1/5.3.2/ 3.4.1
4	A. Explain the duties & responsibilities of Contractor/Builder & buyer under Real estate regulation act, 2016. B. Explain how Circulation and Prospect is to be maintained in a planning of residential building as per National Building Code.	10+10	L2	2	1/3	1.3.1/3.1.4

5	A. Explain Perspective Drawing and its types. B. Explain how to fix a height of building and byelaws for Frontage. OR A. Draw a sectional elevational plan for Q.1A	10+10	L2/3	2-5	1/3/5	1.3.1/5.3.2 3.4.1
6	A. Draw to a suitable scale Foundation plan for Q.1A. B. Draw to a suitable scale site plan for Q.1A.	15+05	L3	1-3	1/3/5	1.3.1/5.3.2 3.4.1
7	A. Draw to a suitable scale Water supply & Drainage plan for Q.1A. B. Draw to a suitable scale Electricity& Furniture plan for Q.1A.	10+10	L3	1-3	1/3/5	1.3.1/5.3.2 3.4.1

SY-CIVIL, END SEMESTER EXAMINATION MARCH 2023

Program: B.Tech. Civil Engineering   *S. Y. B. Tech*   **Duration: Three hours**

Course Code: PC-BTC307   *(Civil) Sem / III*   **Maximum Points: 100**

Course Name: Building Materials and Construction   **Semester: III**

Instructions:
1. Attempt any five out of seven Questions
2. Draw neat diagrams wherever required
3. Assume suitable data if necessary and state them clearly.

Q. No.	Questions	Points	CO	BL	PI
1					
a	What are the qualities of good Timber?	08	1	1	2.3.2
b	Draw neat sketch of Arch; label various components and discuss their functions.	07	1	2	1.3.1
c	Differentiate between Hydraulic and Non-hydraulic lime	05	3	2	2.3.1
2.					
a	Explain the process of natural seasoning of Timber.	08	2	1	1.3.1
b	What are the properties of aggregates to be tested to find their suitability in construction?	07	3	3	2.3.2
c	State the importance of Alkali silica reaction?	05	2	1	1.2.1
3					
a	Why dressing of stone is required? Explain any four types of dressing with neat sketches.	10	2	2	1.2.1
b	What are the constituents of paint, explain in brief?	06	1	1	1.3.1
c	Explain in brief about any sustainable construction materials you have learned with their applications.	04	1	3	1.2.1
4					
a	What are the good qualities of clay burnt bricks?	08	1	1	2.3.2
b	What are the different types of materials used for the construction of partition wall?	06	1	1	1.3.1
c	Draw neat sketch of dead shore and explain different components.	08	4	2	2.3.1
5	What are the requirement of good foundation? Highlight the importance of geotechnical investigation.	08	2	1	1.2.1
a					
b.	What is underpinning? Explain any one method in detail with its suitability.	07	4	2	2.3.1
c.	Explain advantages of AsCu treatment.	05	2	2	1.3.1

SY-CIVIL, END SEMESTER EXAMINATION MARCH 2023

6					
a.	State the advantages and disadvantages of Cavity wall.	08	2	2	2.3.1
b.	Differentiate between Plastering and Pointing	04	2	2	1.2.1
c.	Explain different types of formwork used in construction.	08	3	1	1.1.2
7	*Write short Notes on (Any four)*				
a	Causes of dampness	05	1	3	1.3.1
b	Safe bearing capacity	05	1	1	1.3.1
c	Preservation of Stone	05	2	2	1.3.1
d	Block board and laminates	05	1	2	1.3.1
e	Types of defects in bricks	05	2	2	1.3.1
f		05	2	2	1.3.1