

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

END SEMESTER EXAMINATION

Second Year B.Tech (Civil Engg.) – Feb/Mar-2023

Course Code : CED201

Course Name : Strength of Material

Duration : 2 Hrs Max. Marks : 50

Date :

Instructions :

- i) All questions are compulsory
 ii) Assume suitable data wherever necessary and clearly state it
 iii) Figures to right indicate full marks

Q. 1	Answer any five (Marks:10)	Marks	CO	BL	PI
a)	Define 'Principal plane and Principal stresses'.	2	1	1	1.3.1
b)	What do you mean by Poisson's ratio?	2	1	2	1.3.1
c)	Explain meaning of the term: Bending moment.	2	1	2	1.3.1
d)	Draw bending stress distribution diagram for a cantilever beam subjected to downward loading.	2	1	2	1.3.1
e)	Draw shear stress distribution diagram for a simply supported beam in the form of T-section.	2	1	2	1.3.1
f)	Identify the type of load exerted by wheels of a landing airplane on runway?	3	1	1	1.3.1
g)	Explain strain energy in brief.	2	1	1	1.3.1
h)	Differentiate between column and strut.	2	1	2	1.3.1
Q.2	Calculate the change in length of bar ABCD as shown in figure 1. Take $E=210$ GPa and cross sectional area is 600 mm ² .	8	2	3	1.4.1

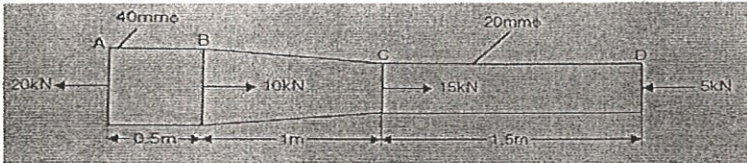


Figure 1
OR (optional)

A rectangular RCC column 230mmx 300mm in size is subjected to an axial compressive load of 1000 kN. It is reinforced with 8 steel bars of 16 mm diameter. Calculate the stresses produced in concrete and steel. If Young's modulus of steel is 15 times that of concrete.

Q.3	<p>A simply supported beam ABCD of 6m span, is subjected to two point loads of 50 kN and 60kN at a distance of 2m and 4m respectively from the left support A. Portion CD of beam is subjected to u.d.l of 20kN/m. D is right support of beam. Draw SFD and BMD for the beam.</p> <p style="text-align: center;">OR (optional)</p> <p>Write assumptions made in theory of simple bending. Prove that: $dF/dx=w$ and $M/dx=-F$.Also explain meaning of each equation.</p>	8	3	4	1.4.1
Q.4	<p>A cantilever beam 2m long is subjected to a u.d.l of 20 kN/m over its entire length. The cross-section of beam is in the form of T- section. Size of flange is 200 mm x 20 mm and that of web is 20 mm x 150 mm. Calculate the maximum tensile bending stress induced in the beam. Also draw a diagram</p> <p style="text-align: center;">OR (optional)</p> <p>Prove that: $M/I = D /y =E/R$</p>	8	4	4	1.4.1
Q.5	<p>A simply supported beam of 4m span, is subjected to two point loads of 50 kN and 60kN at a distance of 1m and 2m respectively from the left support A. Beam is in the form of symmetrical I-section. Size of top and bottom flange is 200 mm x 20 mm and that of web is 20 mm x 300 mm. Calculate shear stresses across the section and draw shear stress distribution diagram.</p> <p style="text-align: center;">OR (optional)</p> <p>A steel shaft of solid circular section has to transmit 375 Kw AT 210 r.p.m. the maximum shear stress is not to exceed 50MPa and angle of twist must not be more than 1° in a length of 3m. Design a suitable diameter for the shaft. Take $G=80$ GPa.</p>	8	5	4	1.4.1
Q.6	<p>A concrete cube of side 150 mm is subjected to a compressive load of 250 kN. Calculate the magnitude of normal and shear stresses acting on an inclined plane AC if its inclination with vertical is 0°, 45° and 90°. Also identify the principal plane. Draw neat sketches. Show failure pattern of cube.</p> <p style="text-align: center;">OR (optional)</p> <p>A column has hollow circular cross section with outer diameter 150mm and metal thickness is 30mm.Height of column is 43. it is hinged at both the ends. Find buckling load by Euler's formula. Take $E=200$ GPa .</p>	8	6	4	1.4.1