Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

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V SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

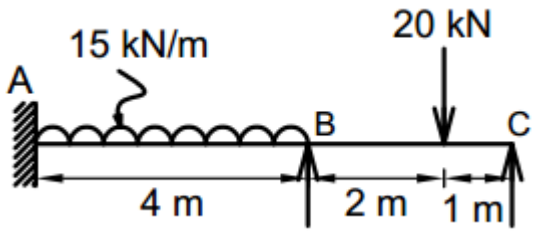
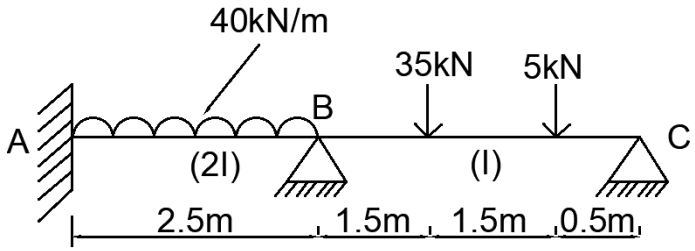
DECEMBER 2020

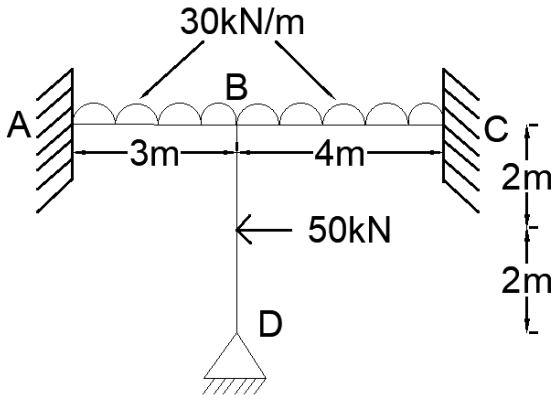
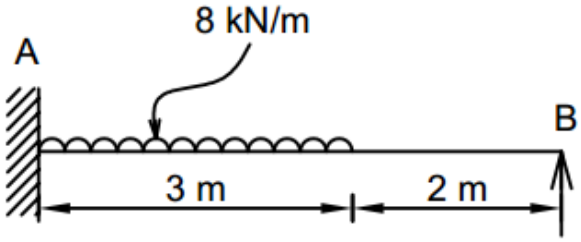
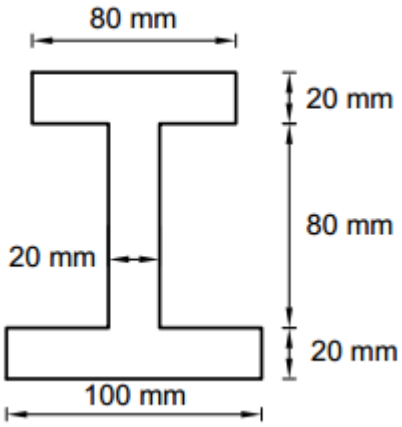
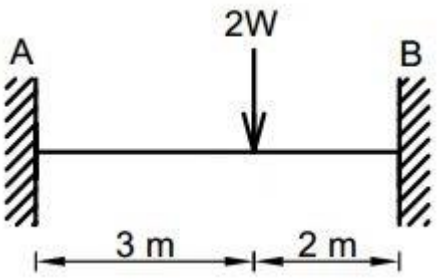
SUBJECT: ANALYSIS OF INDETERMINATE STRUCTURES [CIE 3151]

Date of Exam: Time of Exam: Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A.	Analyse the continuous beam ABC shown in the figure using Clapeyron's theorem. Draw BMD. 	**5**
1B.	A two hinged parabolic arch of rise 'h' and span 'l' is loaded with an udl of 'w' kN/m over the left/right half of the span. Show that horizontal thrust developed at the hinges is equal to ($wl^2/16h$).	**3**
1C.	A single rolling load of 20kN, rolls along a girder of 25m span. Draw SFD for maximum positive and negative values.	**2**
2A.	Analyse the continuous beam ABC shown in the figure for support moments using slope-deflection method if supports B and C sink by 10mm and 20mm respectively. Consider E = 210 GPa and I = 2 X 10^8 mm^4. 	**5**

2B.	Analyse the frame ABCD shown in the figure using moment distribution method for support moments. 	**3**
2C.	Define the terms w.r.t moment distribution method a) Carry over factor b) Distribution factor	**2**
3A.	Determine the support reaction at B for a propped cantilever beam AB shown in the figure using Castigliano's second theorem. Draw BMD. 	**5**
3B.	Determine the shape factor for an I section shown in the figure. 	**3**
3C.	Determine the collapse load for a fixed beam AB shown in the figure using principle of virtual work. Assume M_P as constant throughout. 	**2**

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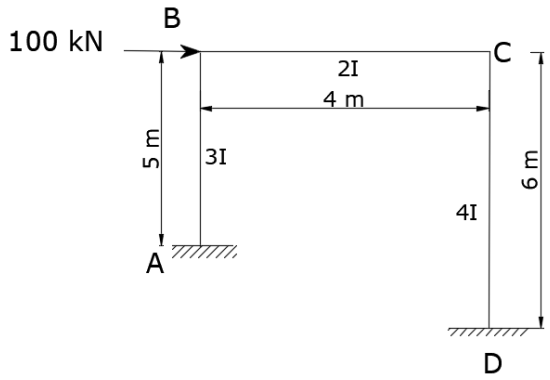
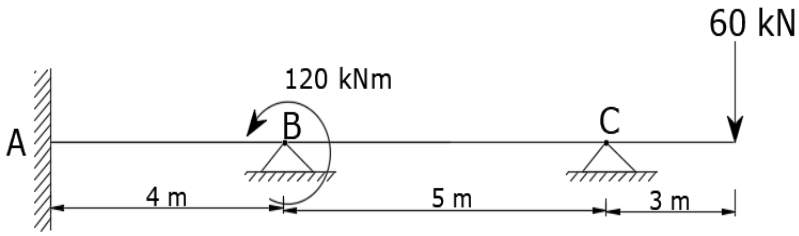
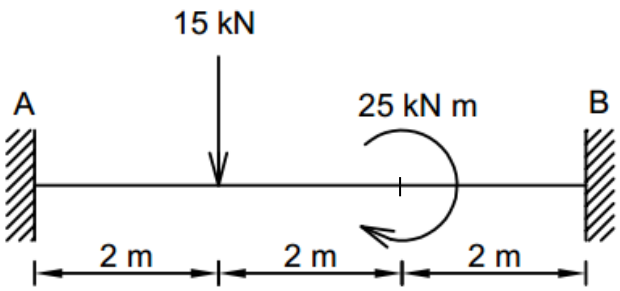
4A.	Determine the structural stiffness matrix for a frame ABCD shown in the figure using stiffness method. 	**5**
4B.	Derive the stiffness matrix for a cantilever beam AB shown in the figure using first principle. 	**3**
4C.	Derive the relationship between flexibility and stiffness of a material.	**2**
5A.	Determine the structural stiffness matrix for a continuous beam ABC shown in the figure using stiffness matrix method. 	**4**
5B.	Define (a) Influence line diagram (b) Muller Breslau principle	**2**
5C.	Determine support reactions for a fixed beam AB shown in the figure using Consistent deformation method. 	**4**