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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

Semester: Mid Semester Examination

Summer Semester: 2022-23

Course No.: CEE 4413

Full Marks: 75

Course Title: Mechanics of Solids II

Time: 1.5 hours

There are three Questions. Answer all questions. All questions carry equal marks. Programmable calculators are not allowed. Do not write on this questions paper. The symbols have their usual meaning. Assume reasonable values for any missing information.

- 1(a) Discuss the boundary conditions related to the following support conditions: (10)  
 i) fixed support, ii) end roller support, iii) roller support in between two other roller supports, iv) internal hinge. [CO1  
 PO1]
- (b) Develop equation of deflection at midspan of the beam in Figure 1. The beam has span  $L$ , constant  $EI$ , and loading of  $w=mx+c$  ( $x=0$  at A and  $x=L$  at B). (15)  
 [CO1  
 PO1]



(Figure 1)

- 2(a) An 8-meter beam has two loads acting on it as shown on Figure 2. Find deflections at point B and D.  $E = 200 \text{ kN/mm}^2$ ,  $I = 4000 \times 10^4 \text{ mm}^4$ . Use any method. (15)  
 [CO2  
 PO2]



(Figure 2)

- (b) A 5-m long simply supported beam is supported at two ends and carries a trapezoidal load of  $5 \text{ kN/m}$  (at left end; lowest value) and  $10 \text{ kN/m}$  (at right end; maximum value). Find the maximum deflection using singularity function. (10)  
 [CO2  
 PO2]
- 3(a) A beam of 30-ft is supported by two fixed supports at ends. Find deflection at the midspan if there is a downward 40-kip load acting at 20-ft distance of left support. Use any method.  $EI = 5000 \text{ k-ft}^2$ . (15)  
 [CO2  
 PO2]
- (b) A concentrated load of 50 kip is acting at midspan of a 25-ft simply supported beam, which is additionally loaded over the whole span with uniformly distributed load of 2 kip/ft.  $E = 29000 \text{ ksi}$  and  $I = 250 \text{ in}^4$ . Find maximum deflection. Use any method. (10)  
 [CO2  
 PO2]