Sub Code: RCE502

Paper Id: 100525 Roll No: | | | | | | | | | | | | | |

B. TECH
(SEM V) THEORY EXAMINATION 2019-20
DESIGN OF STRUCTURE I

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Define flexibility and stiffness coefficients.
b.	Find moment in member OA, OB and OC due to applied moment 'M' at joint O in fig1.
c.	Find rotation of joint 'O' due to applied moment M. Take EI and length 'L' as constant for all members in fig2.
d.	List three methods of structural analysis using force method concept and 3 methods of displacement concept.
e.	State lower bound theorem.
f.	What is plastic hinge and plastic moment capacity?
g.	State Muller Breslau's principle.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	Analyze beam of fig3 by slope deflection method. Take EI as constant and consider the down ward settlement of support B&C by 24/EI & 12/EI respectively.
b.	A two hinged parabolic arch of rise 4m and span 20m is loaded by a point load of 50 kN at 6m from left support. Find H, NT & RS at 5m from left support.
c.	A suspension bridge of 100m span has two three hinged stiffening girders supported by two cables having central dip 10m. The width of the road way is 8m. The roadway carries a dead load of 1kN/m^2 extending over the whole span and a live load of 2 kN/m^2 extending over the left half of the bridge. Find B.M. and S.F. at a section 25m and 80m from the left hinge. Also calculate the maximum tension in the cable.
d.	Generate stiffness & flexibility matrix for frame in fig4. Take EI as constant.
e.	A propped cantilever of span 'L' is loaded with udl of intensity w/m upon entire span. Find collapse load for this beam.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Using RB as unknown find reaction in beam of fig5. Take EI as constant use strain energy method.
(b)	Analyze beam of fig 6 by slope deflection method if support 'C' sinks by 10mm. Take E=2x10^5N/mm^2.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	A two hinged parabolic arch of span 30m & rise 6m is loaded by two loads of magnitude 60kN each at 7.5m & 15m from left support. Find horizontal thrust & maximum positive & negative BM in arch.
(b)	Construct ILD from BM at 4m from 'A' in the beam of fig7.

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5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	A uniformly distributed load of 2000 Kg/m, 6m long crosses over a girder simply supported at ends over a span of 10m from left to right. Calculate maximum BM in girder at a point 4.5m from left hand end using Influence line. ,
(b)	A suspension cable 140 m span and 14m central dip carries a load of 1 kN/m. Calculate the maximum and minimum tension in the cable. Find the horizontal and vertical forces in each pier under the following conditions: (a) If the cable passes over a frictionless rollers on top of the piers (b) If the cable is firmly clamped to saddles carried in frictionless rollers on top of the piers. In each case of back stay in unlined at 30^0 with the horizontal.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Analyze the beam by stiffness matrix method as shown in fig8.
(b)	Analyze the beam of fig8 by flexibility matrix method. Take Mb & Mc as unknown.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Find shape factor of T section of fig9.
(b)	Find shape factor of triangulate section of fig10.

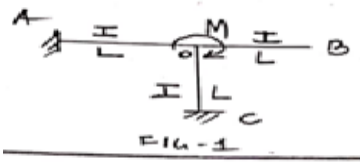

FIG-1

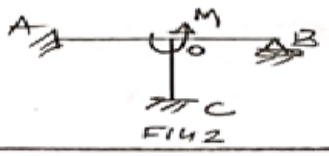

FIG 2

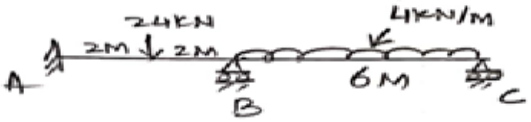

FIG-3

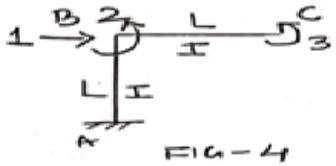

FIG-4

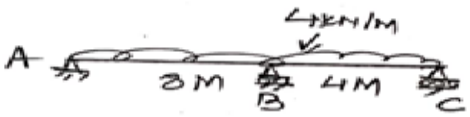

FIG-5

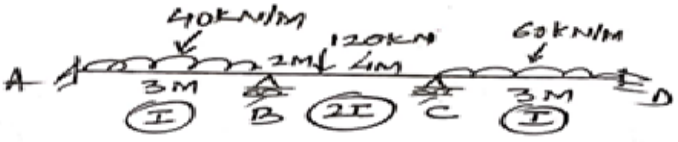

FIG-6

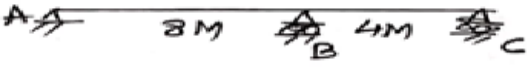

FIG-7

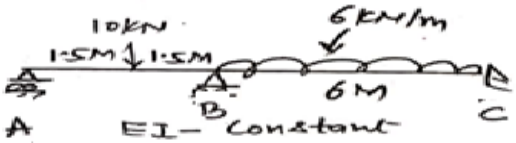

FIG-8