University of Mumbai
Examination 2021 under cluster __ (Lead College: ___KJSIEIT_____)
Examinations Commencing from 1 June 2021
Program: __Civil_____
Curriculum Scheme: Rev - 2019
Examination: SE Semester IV
Course Code: CEC 402 and Course Name: Structural Analysis

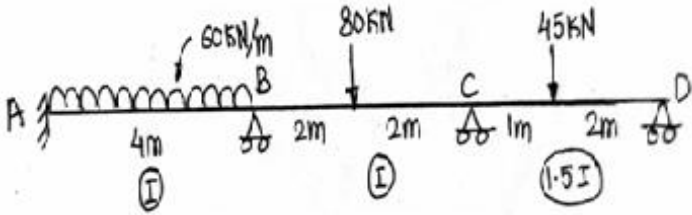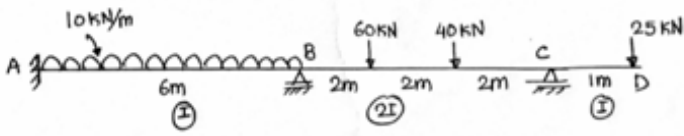Time: 2 hour   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In influence line diagrams (ILD)
Option A:	Points remain fixed, position of load changes
Option B:	Points change, position of load remains fixed
Option C:	Both point and position change
Option D:	Both are always fixed
2.	For stable structures, one of the important properties of flexibility and stiffness matrices is that the elements on the main diagonal i) of a stiffness matrix must be positive ii) of a stiffness matrix must be negative iii) of a flexibility matrix must be positive iv) of a flexibility matrix must be negative The correct answer is
Option A:	(ii) and (iii)
Option B:	(i) and (iii)
Option C:	(i) and (iv)
Option D:	(ii) and (iv)
3.	A rigid-jointed plane frame is stable and statically determinate if
Option A:	(m + r) = 2j
Option B:	(m + r) = 3j
Option C:	(3m + r) = 3j
Option D:	(m + 3r) = 3j
4.	A single rolling load of 8 kN rolls along a girder of 15 m span. The absolute maximum bending moment will be
Option A:	8 kN.m
Option B:	25 kN.m
Option C:	30 kN.m
Option D:	35 kN.m
5.	Shape factor for the triangular cross section of beam of base 'b' and height 'h' is
Option A:	3.34
Option B:	2.34
Option C:	1.69
Option D:	3.69

6.	What is B.M. diagram Area for Simply supported beam of span 5m and carrying UDL 12KN/m?
Option A:	125
Option B:	37.5
Option C:	150
Option D:	50
7.	Minimum number of members required in a perfect(stable) truss if number of joints = 6
Option A:	8
Option B:	9
Option C:	10
Option D:	11
8.	Any member of a pin jointed plane truss is subjected to
Option A:	shear force only
Option B:	bending moment only
Option C:	shear force and bending moment only
Option D:	axial force only
9.	Which of the following is formula to calculate shape factor, where Mp= plastic moment, My= Yield moment, Zp= plastic section modulus, Z= elastic modulus, fy= yield stress, Pu= collapse load, Pw= working load
Option A:	Mp / My
Option B:	My / Mp
Option C:	Z / Zp
Option D:	Pu / Pw
10.	The ratio of stiffness of any member to that of total stiffness of all members meeting at a joint is called
Option A:	stiffness factor
Option B:	distribution factor
Option C:	rotation factor
Option D:	carry over factor
11.	The absolute maximum bending moment in a simply supported beam of span 10 m due to a moving load of 40KN/m spanning over 5m is
Option A:	375 KNm at 2.5m from end A
Option B:	375 KNm at midpoint
Option C:	375 KNm at 3.7m from end A
Option D:	500 KNm at midpoint
12	A UDL of intensity 5kN/m and length 2m is passing through a simply supported beam of span 10m.The absolute maximum shear force at a section 4m from the left support is
Option A:	5KN
Option B:	10KN
Option C:	15KN
Option D:	20KN

13.	A UDL of intensity 5KN/m and length 2 m is passing through a simply supported beam of span 10 m. The absolute maximum bending moment at section 4 m from the left support is
Option A:	10.6KNm
Option B:	21.6KNm
Option C:	32.4KNm
Option D:	50.6KNm
14.	Mathematically redundant truss satisfies _____ where n= no of members and J= no of joints.
Option A:	n = 2j – 3
Option B:	n = 2j + 3
Option C:	n < 2j – 3
Option D:	n > 2j – 3
15.	In analysis of statically determinate plane trusses by method of joints, not more than _____ unknown forces can be determined at a particular joint.
Option A:	1
Option B:	2
Option C:	3
Option D:	4
16.	The number of unknowns to be determined in the stiffness method is equal to
Option A:	the static indeterminacy
Option B:	the kinematic indeterminacy
Option C:	the sum of static and kinematic indeterminacy
Option D:	three times number of supports
17.	A load P is applied at the middle of a simply supported beam of span L. If the beam is made of ductile material, and M_p is the plastic moment, what is the ultimate value of P?
Option A:	$M_p/4L$
Option B:	$2M_p/L$
Option C:	$2.5M_p/L$
Option D:	$4 M_p/L$
18.	The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in
Option A:	The direction in which the deflection is required
Option B:	Inclined direction always
Option C:	Horizontal direction always
Option D:	Vertical direction always
19.	If in a pin-jointed plane frame (m + r) > 2j, then the frame is (Where 'm' is number of members, 'r' is reaction components and 'j' is number of joints)
Option A:	Stable and statically determinate

Option B:	Stable and statically indeterminate
Option C:	Unstable
Option D:	Kinematically unstable
20.	The three moments equation is applicable only when
Option A:	The beam is prismatic
Option B:	There is no settlement of supports
Option C:	There is no discontinuity such as hinges within the span
Option D:	The spans are equal

Q2 . (20 Marks)	Solve any Two Questions out of Three each 10 marks
A	A three hinged symmetrical parabolic arch ADCEB having central rise 6m has a span of 40m. It is hinged at A, B and at crown C. Point D and E are 10m away from left and right support respectively. The arch carries an UDL of 20 KN/m over the portion DE. Find i) support reactions, ii) BM, Normal thrust at D iii) BM and radial shear force at E.
B	Analyse the beam using moment distribution method
C	Analyse the beam using three moment theorem

Q3. (20 Marks)	Solve any Two Questions out of Three each 10 marks
A	Analyse the frame using flexibility method and draw SFD BMD .

B

Analyse by using stiffness method draw SFD and BMD.

C

Find Static and Kinematic Indeterminacy (neglecting and considering axial deformation**).**