B.L.D.E. Association's

VACHANA PITAMAHA DR.P.G.HALAKATTI

COLLEGE OF ENGINEERING AND TECHNOLOGY, VIJAYAPUR

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QUESTION PAPERS

1st & 4th .SEMESTER

M.TECH CIVIL

DEC.2019/JAN.2020

INDEX

CBCS SCHEME

USN | | | | | | | | | | |

18CSE11

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Computational Structural Mechanics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Find the static and kinematic indeterminary of structures shown in Fig. Q1 (a). **(12 Marks)**

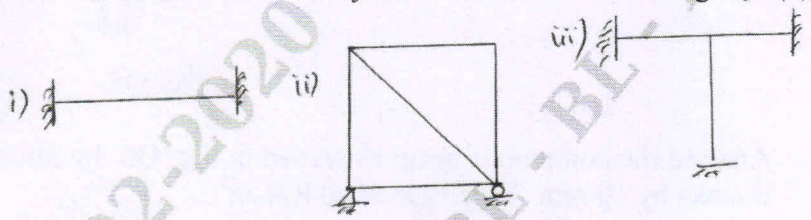

Fig. Q1 (a)

b. Explain the concept of principle of superposition. **(08 Marks)**

OR

2 a. Briefly explain the concept of strain energy. **(08 Marks)**

b. Solve the following system of linear equations by using Gauss elimination method,

$5x + 2y + z = 12$

$x + 6y + 2z = 19$

$2x + y + 4z = 16$ **(12 Marks)**

Module-2

3 a. Develop element stiffness matrix for the beam shown in Fig. Q3 (a).

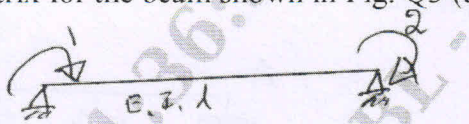

Fig. Q3 (a) **(08 Marks)**

b. Develop the global flexibility matrix for the frame shown in Fig. Q3 (b) using element flexibility method.

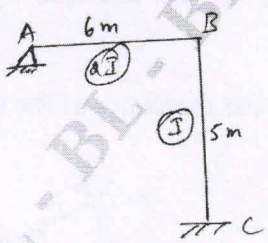

Fig. Q3 (b) **(12 Marks)**

OR

4 a. Explain the concept of flexibility and stiffness. **(08 Marks)**

b. Develop the global stiffness matrix for the beam shown in Fig. Q4 (b) using element stiffness method.

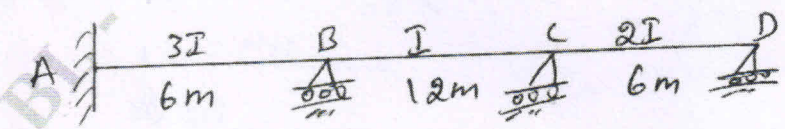

Fig. Q4 (b) **(12 Marks)**

Module-3

5 Analyse the frame shown in Fig. Q5 by flexibility method. Adopt element approach. Also draw bending moment diagram.

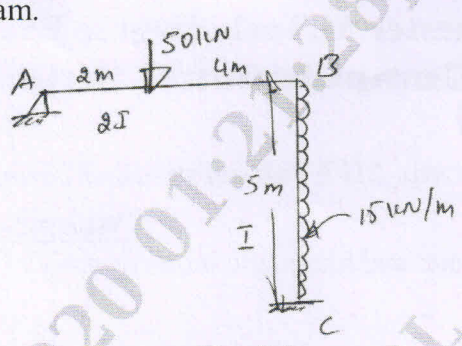

Fig. Q5 **(20 Marks)**

OR

6 Analyse the continuous beam as shown in Fig. Q6 by force transformation method. Support B sinks by 10 mm. Take EI = 4000 KN-m^2.

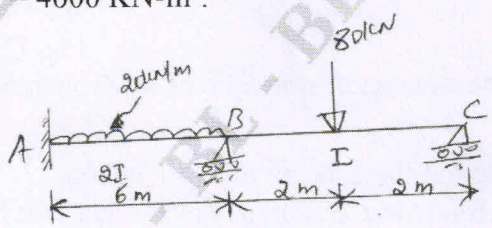

Fig. Q6 **(20 Marks)**

Module-4

7 Analyse the beam shown in Fig. Q7 using stiffness method. Adopt displacement transformation approach. The top and bottom surfaces of the continuous beam are heated to 20°C and 10°C respectively. Take $E = 2\times10^5$ N/mm^2, $\alpha = 1.2\times10^{-5}/^\circ C$. Draw bending moment diagram.

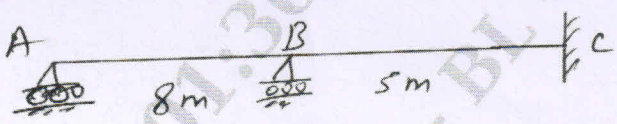

Fig. Q7

$I = 2\times10^8$ mm^4, $I = 5\times10^7$ mm^4, h = 400 mm, b = 200 mm. **(20 Marks)**

OR

8 Find the forces in the members of the truss shown in Fig. Q8 by displacement transformation method.

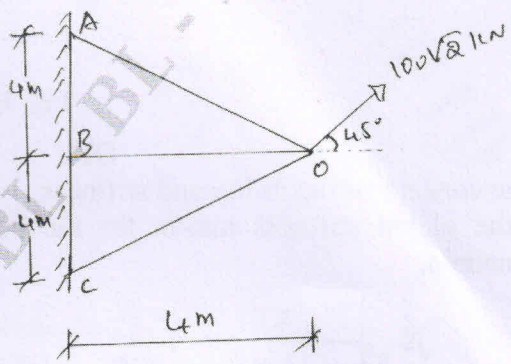

Fig. Q8

(20 Marks)

Module-5

9 a. Develop the stiffness matrix for the given beam element as shown in Fig. Q9 (a) by direct stiffness method. **(10 Marks)**

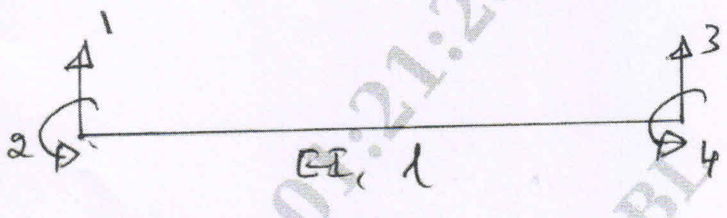

Fig. Q9 (a)

b. Derive global stiffness matrix for a plane truss member by direct stiffness method. **(10 Marks)**

OR

10 Analyse the continuous beam shown in Fig. Q10 by direct stiffness method and draw bending moment diagram.

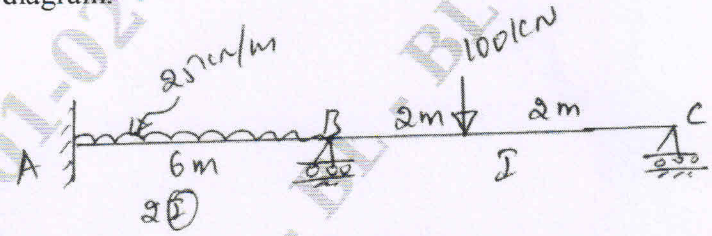

Fig. Q10

(20 Marks)

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CBCS SCHEME

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18CSE13

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Mechanics of Deformable Bodies

Time: 3 hrs. Max. Marks: 100

Note:* 1. *Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume suitable data if missing wherever necessary.

Module-1

1 a. Derive the differential equations of equilibrium in 3D problem Cartesian coordinate. **(10 Marks)**

b. Obtain the compatibility equation for plane stress problem in Cartesian form with body force interms of stress components. **(10 Marks)**

OR

2 a. Derive the equations of equilibrium in terms of polar coordinates in 2-dimension. **(10 Marks)**

b. The state of stress in 2-dimensional are as given below. Obtain the equation for shear stress in the absence of body force $\sigma_x = y^2 + \mu(x^2 - y^2)$, $\sigma_y = x^2 + \mu(y^2 - x^2)$ **(06 Marks)**

c. If the principal stresses at a point are 100, 100, –200 N/mm^2. Find the octahedral shear at this point. **(04 Marks)**

Module-2

3 a. The state of stress at a point for a reference x, y, z is given below as τ_{ij}. If a new set of axes x′, y′ and z′ is formed by rotating x, y, z through 60° about z-axis. Find new stress tensor τ_{ns}.

$$\tau_{ij} = \begin{bmatrix} 200 & 100 & 0 \\ 100 & 0 & 0 \\ 0 & 0 & 500 \end{bmatrix}$$ **(10 Marks)**

b. Derive the expression for principal strains and their directions in the case of rectangular strain rosette. **(10 Marks)**

OR

4 a. Derive expressions for octahedral normal and octahedral shear stresses. **(08 Marks)**

b. The state of stress at a point is given by the following array of terms:

$$\begin{bmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{bmatrix}$$

Determine: (i) Stress invariants
(ii) Principal stresses and their direction cosines **(12 Marks)**

Module-3

5 a. Obtain the expression for stress σ_x, σ_y and τ_{xy} for a cantilever beam of span 'ℓ', depth '2c' and thickness unity loaded by a concentrated load 'p' at free end. **(16 Marks)**

b. Prove that the following are Airy's stress functions and examine the stress distribution represented by them: (i) $\phi = Ax^2 + By^2$ (ii) $\phi = Ax^3$ **(04 Marks)**

OR

6 Discuss the effect of circular holes on stress distribution in plates for plate shown in Fig.Q6.

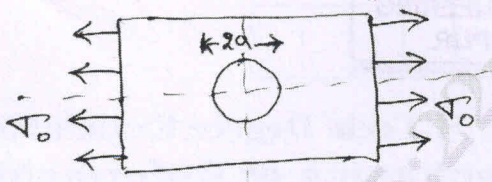

Fig.Q6 **(20 Marks)**

Module-4

7 a. Derive the differential equation $\frac{\partial^2\phi}{\partial x^2}+\frac{\partial^2\phi}{\partial y^2}=-2G\theta$ for a torsion problem in elasticity. When $\phi(x, y)$ is constant, along the boundary of the cross-section. **(10 Marks)**

b. Show that $\phi = m\left[\frac{x^2}{a^2}+\frac{y^2}{b^2}-1\right]$ is a stress function for the solution of a torsion problem of elliptical cross-section. Find the value of m and the torsional rigidity. **(10 Marks)**

OR

8 a. Determine the displacements in three dimensions for a stretching of a prismatic bar by its own weight. **(10 Marks)**

b. Two-cell tabular section whose wall thicknesses are as shown in Fig.Q8(b). If the member is subjected to a torque T, determine the shear flows and the angle of twist of the member per unit length.

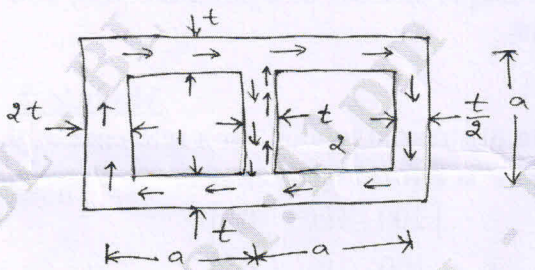

Fig.Q8(b) **(10 Marks)**

Module-5

9 a. What do you understand by yield criteria? Explain the two failure criteria commonly used. **(10 Marks)**

b. Write a note on Tresca and Von mises theory. **(10 Marks)**

OR

10 A force F = 45000 N is necessary to rotate the shaft shown in Fig.Q10 at uniform speed. The crank shaft is made of ductile steel whose elastic limit is 207000 kPa both in tension and compression with $E = 207 \times 10^6$ kPa, $\mu = 0.25$. Determine the diameter of the shaft using the octahedral shear stress theory and the maximum shear stress theory. Use a factor of safety N = 2. Consider a point on the periphery at section A for analysis.

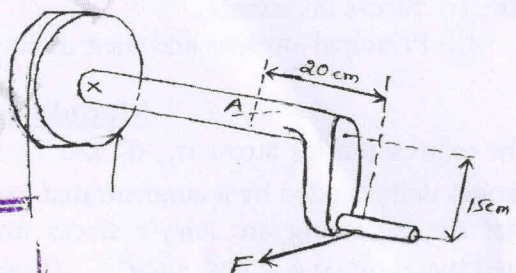

Fig.Q10 **(20 Marks)**

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CBCS SCHEME

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18CSE14

First Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Structural Dynamics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. State and explain D'Alembert's principle. **(05 Marks)**

b. What is damping? Explain different types of damping. **(07 Marks)**

c. Evaluate natural frequency for the structural system shown in Fig.Q1(c)(i) and Fig.Q1(c)(ii). Length of beam, L = 3.6 m; K = 40 kN/m, E = 22 GPa; I = 1.2×10^{-4} m^4; mass, m = 10 kN.

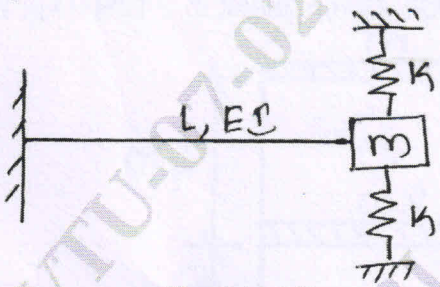

Fig.Q1(c)(i)

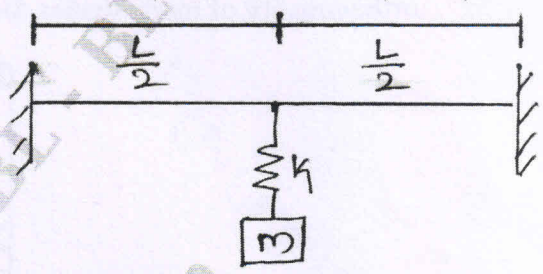

Fig.Q1(c)(ii) **(08 Marks)**

OR

2 a. Compute the natural frequency in the side sway for the frame shown in Fig.Q2(a). If the initial velocity is 20 mm/sec and initial displacement is 20 mm. Find the displacement at t = 2 secs. Damping 10% of critical. Cross section dimension of column = 230 × 300 mm. Grade of concrete = M20.

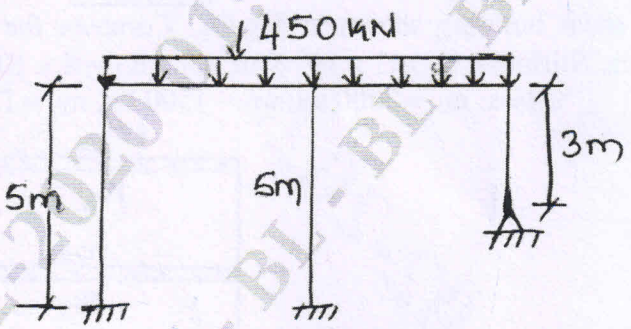

Fig.Q2(a) **(10 Marks)**

b. Derive the expression for motion x(t) of an underdamped with single degree of freedom system subjected to free vibration. **(10 Marks)**

Module-2

3 a. Write short notes on:
(i) Vibration isolation
(ii) Vibration measuring instruments **(10 Marks)**

b. A 100 kg machine is mounted on the spring of stiffness K = 12×10^5 N/m with damping factor of 20%. A 2 kg piston within the machine has reciprocating motion, with a stroke of 0.08 m and speed of 3500 cpm. Assuming motion of the piston to be harmonic, determine the steady state amplitude of vibration and force transmitted to the foundation. **(10 Marks)**

OR

4 a. Explain with a graph, the variation of transmissibility with the frequency ratio (η) for different values of damping ratio. **(10 Marks)**

b. Derive the expression for Duhamel's Integral for the response of single degree freedom system subjected to arbitrary excitation. **(10 Marks)**

Module-3

5 a. What is a shear building? Discuss the assumptions in multistory shear building. **(06 Marks)**

b. Derive the conditions for orthogonality principle and normality principle. **(14 Marks)**

OR

6 For the shear building, determine the natural frequencies and mode shapes. Check the orthogonality of mode shapes for Fig.Q6. Given: mass, m = 12800 kg; EI = 20000 kN-m^2.

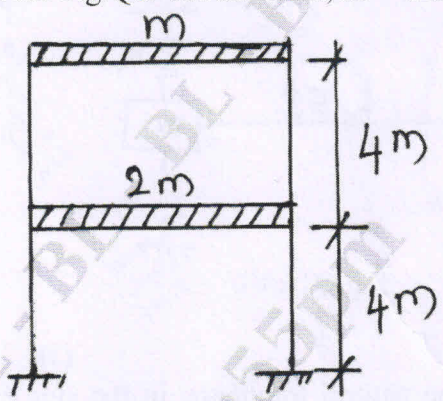

Fig.Q6 **(20 Marks)**

Module-4

7 For shear building shown in Fig.Q7. Compute the natural frequencies and mode shapes. Given: Stiffness: $K_1 = 3 \times 10^6$ N/m, $K_2 = K_3 = 4 \times 10^6$ N/m

Mass: $m_1 = 2000$ kg, $m_2 = 1500$ kg, $m_3 = 1000$ kg.

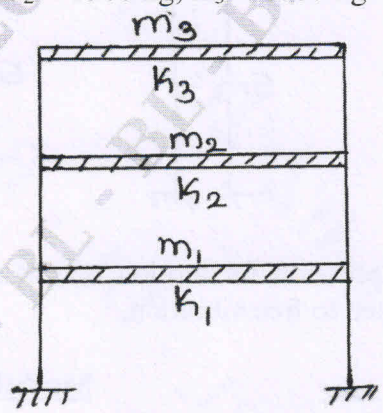

Fig.Q7 **(20 Marks)**

OR

8 Compute the steady state response of two storied shear building as shown in Fig.Q8. Take: Mass: $m_1 = 136 \times 10^3$ kg, $m_2 = 66 \times 10^3$ kg
Stiffness: $K_1 = 30700$ kN/m, $K_2 = 44300$ kN/m

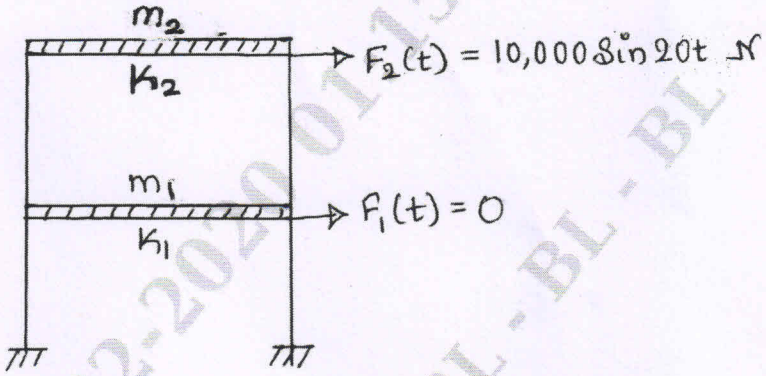

Fig.Q8 **(20 Marks)**

Module-5

9 Derive the differential equation of motion for free flexural vibration of the simply supported beam. Sketch the first three mode shapes. **(20 Marks)**

OR

10 Determine the fundamental natural frequency and modal vector for the system shown in Fig.Q10. Using Stoddola's method.

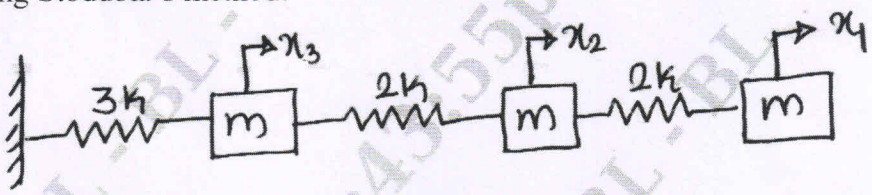

Fig.Q10 **(20 Marks)**

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CBCS SCHEME

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18CSE21

Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Advanced Design of Steel Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. *Answer FIVE full questions, choosing ONE full question from each module.*
2. *Use of IS 800: 2007, IS 801, IS 811, Steel tables is allowed.*
3. *Missing data if any, any be assumed suitably*

Module-1

1 a. Explain the various factors effecting lateral stability of laterally unrestrained beams in detail with neat sketch. **(06 Marks)**

b. Design a cantilever beam which is encased into a concrete wall and it is free at the top carriers a dead load of 20 kN/m and imposed load of 10kN/m. The span of the beam is 5m. Assume the effective length of bearing as 100mm. **(10 Marks)**

c. Explain the influence of cross sectional shape on lateral torsional buckling. **(04 Marks)**

OR

2 a. Write the design procedure to calculate the lateral torsinal buckling of prismatic members as per IS codal provisions. **(08 Marks)**

b. A simply supported beam of span 6m is subjected to end moments of 202 kNm clockwise and 112 kNm anticlockwise under factored applied loading. Check the adequacy of ISMB 450 with regard to lateral buckling. **(12 Marks)**

Module-2

3 a. Explain the possible modes of failure of beam columns. **(04 Marks)**

b. The column ISHB 300@ 618N/m in a framed building supports the beam as shown in Fig Q3(b) at its top end. The beams are welded to column flanges and transfer end reaction of 225kN(beam 1) and 375 kN (beam 2) and an axial compressive force of 675 kN from the top storey. The bottom end of the column has a similar to beam to column arrangement as well as loading. Check the adequency of the column if its effective length is 3.2m above the both axis. The beam reactions and loads have been computed from factored loads.

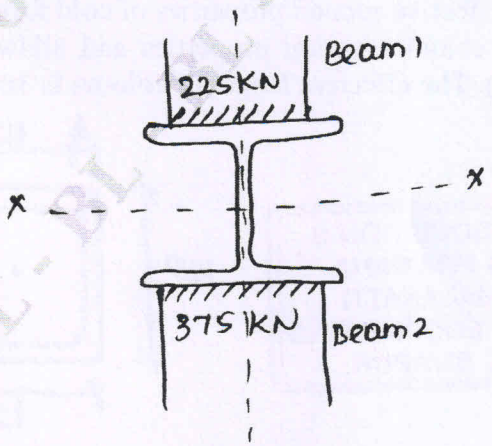

Fig Q3(b) **(16 Marks)**

OR

4 a. Design an I section truss member for the following data :
Length of member = 3.5m
Factored axial tension = 450 kN
Factored moment at 2 ends = 35kNm and 20 kNm
Use steel of grade Fe410 **(16 Marks)**

b. Explain the behavior of beam column under biaxial bending. **(04 Marks)**

Module-3

5 a. Mention the practical guidelines for web openings in steel beams. **(06 Marks)**

b. Design a castellated beam for an clear span of 16m to support a UDL of 15kN/m. Assume an angle of cut = 60°. Check the stresses for first hole. The beam is laterally restrained. **(14 Marks)**

OR

6 a. Vierendeel girder of span 12m has 6 bays of 2m each. The vertical members are 2m height and loads acting on the top boom are 20kN (factored) on each panel point except on the end 2 nodes. Analyse and design the member.

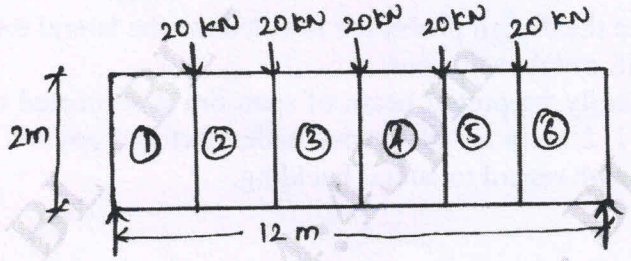

Fig Q6(a) **(12 Marks)**

b. Explain the force distribution and failure pattern at web opening in steel beams with neat sketch. **(08 Marks)**

Module-4

7 a. List out the advantages of cold formed steel sections a over hot rolled steel sections. **(06 Marks)**

b. Explain effective section properties of cold formed steel sections. **(04 Marks)**

c. Find the column section properties and allowable load for the column section shown in Fig Q7(c). The effective length of column is 3m. Take fy = 235 N/mm^2.

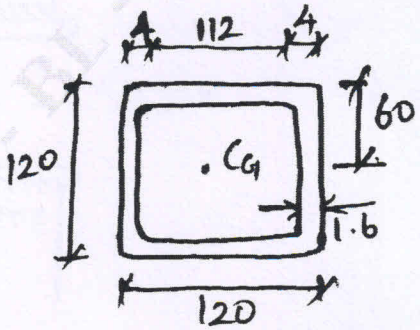

Fig Q7(c) **(10 Marks)**

OR

8 a. Explain the codal provision on local buckling of compressed plates. **(08 Marks)**

b. Determine the allowable load/m on a beam with cross section shown in Fig Q8(b). The beam has an effective span of 4m. The steel has a yield point of 235N/mm^2. Take E = 2×10^5 N/mm^2.

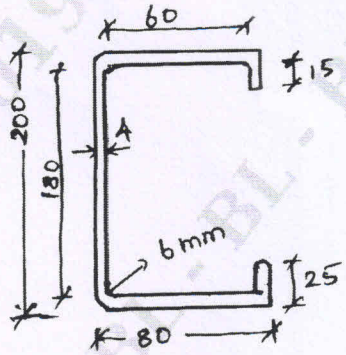

Fig Q8(b) **(12 Marks)**

Module-5

9 a. Explain the thermal properties of steel. **(06 Marks)**

b. Calculate the temperature rise on an ISMB 400 heated on four sides after exposure for 15 min to IS 834 fire. **(14 Marks)**

OR

10 a. Explain the calculation of temperature rise in protected steel member. **(08 Marks)**

b. An ISMB 500 supports a concrete floor. If 30 minute fire resistance is required, what fraction of its capacity can the beam safety carry? Assume the live load to dead load rates of 0.67 : 0.33 **(12 Marks)**

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CBCS SCHEME

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18CSE252

Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020

Design of High Rise Structures

Time: 3 hrs. Max. Marks: 100

Note:* 1. *Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of BIS codes IS:875 and IS:1893 is permitted.

Module-1

1 a. Mention the various design consideration while choosing the structural system for a fall building. Briefly describe any two. **(10 Marks)**

b. Explain:
(i) Sequential loading
(ii) Impact loading with respect to tall structures. **(10 Marks)**

OR

2 a. Write a note on gravity loading of tall structures. Discuss about live load reduction. **(08 Marks)**

b. Write short notes on:
(i) High performance concrete
(ii) Fibre reinforced concrete
(iii)Light weight concrete **(12 Marks)**

Module-2

3 a. What is wind tunnel experimentation method? Explain the structural properties required for wind tunnel data analysis. **(10 Marks)**

b. Brief the behavior of tall building during earthquake. **(10 Marks)**

OR

4 a. What are the external and internal sources those influence the damping of structures under earthquake loading? **(10 Marks)**

b. Describe the major types of winds. **(10 Marks)**

Module-3

5 a. Explain static method for calculating lateral forces due to earthquake. **(08 Marks)**

b. A 4 storeyed OMRF building with plan dimension 12 m × 12 m with column spacings 4 m in both direction. Storey height = 3m, DL = 4 kN/m^2, LL = 3 kN/m^2, softsoil, location = Delhi, size of column and beam are 300 × 600 mm. Determine design seismic loads on the structure by static analysis. **(12 Marks)**

OR

6 a. Explain behavior of braced frames with examples. **(10 Marks)**

b. Explain rigid frame structures. **(10 Marks)**

Module-4

7 a. What are the assumptions made in the model analysis? (10 Marks)

b. Write short note on:

(i) High-rise behavior

(ii) Coupled shear wall structures (10 Marks)

OR

8 a. Explain Drieft and twist. (10 Marks)

b. Explain the step by step procedure to analyse member forces. (10 Marks)

Module-5

9 a. Describe the overall buckling analysis of frames. (10 Marks)

b. Explain iterative gravity load P delta analysis. (10 Marks)

OR

10 a. Explain the effects of foundation rotation with an example. (10 Marks)

b. Explain the analytical method of overall buckling analysis for wall frames. (10 Marks)

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CBCS SCHEME

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18CSE242

Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Stability of Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 Derive the deflection equation for a beam-column of length 'ℓ' on the two simple supports and carrying lateral concentrated load 'Q' and axial load 'P'. Also determine maximum deflection. **(20 Marks)**

OR

2 Using fourth order differential equation obtain the first three critical loads for:
(i) Pinned-pinned column
(ii) Fixed-free column **(20 Marks)**

Module-2

3 Determine the critical load for a cantilever column subjected to tip load, using energy method. **(20 Marks)**

OR

4 Determine the buckling load for a bar on elastic foundation. **(20 Marks)**

Module-3

5 Determine the critical load for a fixed column by discritizing into two elements. Compare the answer with the closed form solution. Take length of column = 2m and EI = 2 N-m^2. **(20 Marks)**

OR

6 Determine the shape function for a two nodded Euler-Bernoulli's beam. **(20 Marks)**

Module-4

7 Determine the critical load for lateral buckling of cantilever beam subjected to tip load. **(20 Marks)**

OR

8 Determine the critical moment for a simply supported I-beam with central concentrated load. **(20 Marks)**

Module-5

9 Determine the buckling load and stress for a simply supported rectangular plate subjected to uniaxial in plane compression N. **(20 Marks)**

OR

10 Determine the buckling load of a square plate with opposite edges y = ±a/2 built in and other sides simply supported carries compressive loads. **(20 Marks)**

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CBCS SCHEME

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18CSE22

Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Finite Element Method of Analysis

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the terms plane stress and plain strain method with relevant equations. **(10 Marks)**

b. Obtain an expression for deflection at free end for a cantilever beam fo span 'ℓ' mt subjected to a point load at free end, using Rayleigh–Ritz method choose polynomial as a trial function. **(10 Marks)**

OR

2 a. Explain the steps involved in FEM of structural analysis. **(12 Marks)**

b. Explain the principle of minimum potential energy. **(04 Marks)**

c. Explain briefly element aspect ratio. **(04 Marks)**

Module-2

3 a. Derive the shape function for a 3 – noded bar element and 5 – noded bar element using Lagrange's interpolation plot the variation of shape functions. **(12 Marks)**

b. What are the shape functions? Write down the conditions to be satisfied by such functions. **(08 Marks)**

OR

4 a. What are the convergence requirements for a good displacement function? Explain. **(08 Marks)**

b. Explain the following :
i) Local coordinates ii) Global coordinates iii) Natural coordinates. **(08 Marks)**

c. Write a note on geometric invariance. **(04 Marks)**

Module-3

5 a. Explain isoparametric, super – parametric and sub – parametric elements. **(06 Marks)**

b. Determine the Cartesian coordinate of the point P($\xi = 0.8$, $\eta = 0.9$) as shown in Fig.Q5(b). **(07 Marks)**

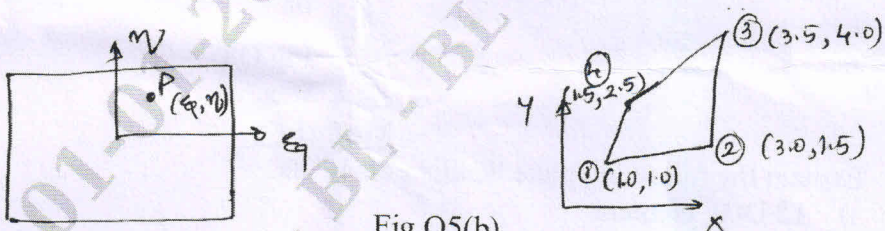

Fig.Q5(b)

c. Evaluate the shape function at a point 'p' within the element whose co-ordinates at the nodes are respectively (1.5, 2), (7, 3.5) and (4, 7) at the point 'P' the coordinates are (3.85, 4.5) also determine area of the triangle. (Ref. Fig.Q5(c)). **(07 Marks)**

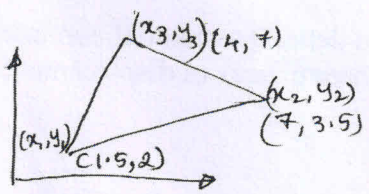

Fig.Q5©

OR

6 a. Using serendipity concept derive the shape function for 8 noded rectangular element. **(14 Marks)**

b. Determine the Jacobian for x, y and ξ, η transformation for a triangle element whose co-ordinates are node 1(3, 2), node 2(12, 5) and node 3(7, 9) also find area of the triangle as shown in Fig.6(b). **(06 Marks)**

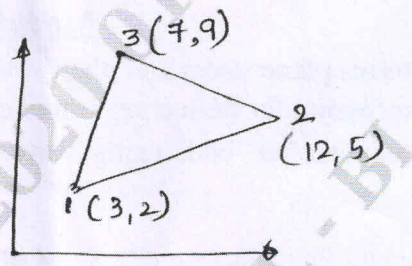

Fig.6(b)

Module-4

7 For the two bar truss shown in Fig.Q7 determine the nodal displacement and the stress in each member. Also find the support reaction. $E = 2 \times 10^5 N/mm^2$. **(20 Marks)**

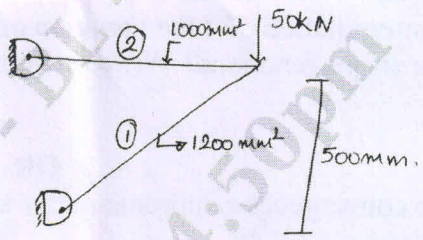

Fig.Q7

OR

8 Analyse the beam shown in Fig.8 by FEM and determine the reactions. **(20 Marks)**

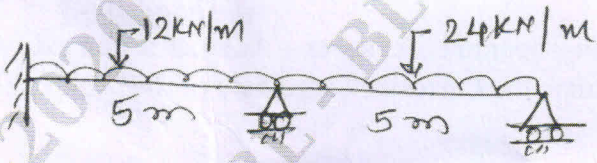

Fig.Q8

Module-5

9 Explain the following plate bending elements.
i) 12 DOF element
ii) 16 DOF element
iii) Mindlin's plate bending element. **(20 Marks)**

OR

10 a. Explain in detail the material non linearity and geometric non linearity. **(12 Marks)**

b. Discuss three classes of displacement functions used for plate bending problem. **(08 Marks)**

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18CSE31

Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Design of Concrete Bridges

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use IRC6 – 1966/2000, IRC21-1966/2000, IRC18-IS-456-2000 IS1343 codes are permitted.

Module-1

1 Design of reinforced concrete slab culvert for IRC class AA loads the following data:
Carriage way – Two lane (7.5 Wide)
Foot path – 1m on either side
Clear span – 6m
Wearing coat = 80mm
Width of bearing – 400mm
Materials – M_{25} Grade concrete and Fe415 Grade HYSD bars. Sketch the details of reinforcement in the longitudinal and cross-section of the slab. The design should confirm to the specification of IRC 6-2000 and IRC21-2000 codes. **(20 Marks)**

OR

2 How are the bridges classified briefly explain ideal site selection for bridges? **(20 Marks)**

Module-2

3 Design a reinforced concrete box culvert having a clear Ventway of 3m × 3m. The super imposed dead load on the culvert is 12.8kN/m^2. The live load on the culvert is 50kN/m^2. Density of soil 18kN/m^3, Angle of repose = 30°, Adopt M-20 grade concrete mix and Fe415 grade of steel sketch the details of reinforcement in the box culvert. **(20 Marks)**

OR

4 Write note on various load combinations of Box culvert. **(20 Marks)**

Module-3

5 Design a RCC Tee beam girder bridge for the following data:
Effective span = 16m, Live load – IRC class AA tracked vehicle, Materials M25 grade concrete and Fe415 steel. Spacing of cross girders 4m c/c width of carriage way = 7.5m thickness of wearing coat = 80mm, Kerbs on either side = 600mm, Wide × 300mm deep width of main girder = 300mm, width of cross girder = 300mm, spacing of main girder = 2.5m c/c. Sketch reinforcement details. **(20 Marks)**

OR

6 Design T beam bridge "cross girder" for the data given in Question number 5 sketch reinforcement details. **(20 Marks)**

Module-4

7 Design of post tensioned prestressed slab bridge deck for the following data clear span 10m, width of bearing 400mm clear width of roadway 7.5m footpath 1m on either side Kerbs 600mm wide thickness of wearing coat 80mm sketch reinforcement details. **(20 Marks)**

OR

8 Write a short note on pretensioned and posttensioned PSC bridge. **(20 Marks)**

Module-5

9 Design a double cantilever bridge to suit the following data:
Total length of the bridge = 77m
Road width = 1.5m b/w kerbs
Footpaths = 1.8m on either side
Spacing of the Teebeams = 1.8m
Loading IRC class AA tracked vehicle
Materials: M_{25} Grade concrete, Fe415 grade HYSD bars. Design the salient structural elements of the bridges and sketch the details of reinforcement. **(20 Marks)**

OR

10 Write a note on Balanced Cantilever Bridge. **(20 Marks)**

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18CSE332

Third Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Design of Masonry Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***IS 1905, BIS, NEW DELHI and SP20 (S & T), NEW DELHI is permitted.***
3. ***Assume missing data if any suitably.***

Module-1

1 a. What are the tests conducted on Brick Masonry? Explain in brief. **(10 Marks)**
b. Write briefly about desirable properties of mortar to be used in construction practice. **(10 Marks)**

OR

2 a. What are the types of mortar that are used in practice? Explain the criteria for selection of mortars for masonry. **(10 Marks)**
b. Explain about various properties of bricks for its suitability in construction works. **(10 Marks)**

Module-2

3 a. State the factors effecting strength of masonry. **(10 Marks)**
b. Write about strength of stone masonry in brief. **(10 Marks)**

OR

4 a. Discuss about effect of mortar joint thickness on strength of masonry. **(10 Marks)**
b. Explain about effect of workmanship on compressive strength of masonry. **(10 Marks)**

Module-3

5 What are the types of Bonds in Masonry? Briefly explain the test procedure for determining shear bond strength. **(20 Marks)**

OR

6 a. With the help of neat sketches, explain about Arching action in masonry. **(10 Marks)**
b. Write the step by step procedure for design of wall. Explain about Indian standard codal provisions for design of walls. **(10 Marks)**

Module-4

7 a. Design an interior cavity wall of a three storeyed building the ceiling height of each storey being 3.5m. The wall is stiffened by intersecting walls of 200mm thick at 3600mm centre to centre. Assume the loading as 16kN/m. **(10 Marks)**
b. Design an interior wall of a three storeyed wall carrying concrete slabs with storey height of 3.5m. The wall is stiffened by 100mm thick intersecting walls at 3600mm C/C. The wall also has door of opening size 900 × 2000mm at a distance 200mm from intersecting wall. Assume loading as : From roof = 15kN/m, from floor = 12.5 kN/m. **(10 Marks)**

OR

8 With the help of neat sketches, explain the design concepts of masonry related to various Eccentricity conditions. **(20 Marks)**

Module-5

9 Explain the procedure to be followed for Seismic Design of Masonry Structures. **(20 Marks)**

OR

10 Briefly explain Classification and construction procedures for masonry Arches. **(20 Marks)**

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