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T.E. (Civil) (Sem. – II) Examination, 2009
TRANSPORTATION ENGINEERING – I
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Answers to the **two** Sections should be written in **separate** books.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Black figures to the **right** indicate **full** marks.*
*4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) Assume suitable data, if **necessary**.*
*6) Solve Q. **1** or **2**, Q. **3** or **4**, Q. **5** or **6** from Section **I** and Q. **7** or **8**, Q. **9** or **10**, Q. **11** or **12** from Section **II**.*

SECTION – I

1. a) Draw a typical cross section of a permanent way and show various parts. Also state the various requirements of a good track. **6**

   b) Discuss the role of Indian Railways in the social and economic development of the Country. **4**

   c) Define gauge of a railway track. Enumerate the factors that influence the choice of gauge. **6**

OR

2. a) Define sleeper density. Explain in detail the meaning of M + x or N + x specification. **6**

   b) Why is it desirable to have a uniform gauge in a country ? How is this problem being solved in India ? **4**

   c) Explain the advantages of Flat Footed Rails over other types of rails. (Draw a neat sketch to illustrate your answer). **6**

P.T.O.

3. a) What is elastic fastenings ? What are the requirements of elastic fastenings ? **6**

   b) Mention the advantages and disadvantages of welded rails over fishplated rail joints. **4**

   c) If a 8° curve track diverges from a main curve of 5° in an opposite direction in the layout of a B.G. yard, calculate the superelevation and the speed on the branch line, if the maximum speed permitted on the main line is 45 kmph. **8**

OR

4. a) Explain in brief the necessity of Geometric Design of a railway track. **6**

   b) Differentiate between the following : **4**

      1) Facing points and Trailing points.
      2) Angle of crossing and Number of crossing.

   c) Define ruling gradient.

      If the ruling gradient is 1 in 150 on a particular section of a Broad Gauge and at the same time a curve of 4° is situated on this ruling gradient, what should be the allowable ruling gradient ? **8**

5. a) What are the functions of a Railway station ? Discuss the various requirements of a railway station. **6**

   b) Draw a neat sketches of the following : **6**

      1) A single line wayside station.
      2) Wayside station with signals.

   c) Write a short note on Measured Shovel Packing. **4**

OR

6. Write a short notes on : **(4×4=16)**

   1) Turntable.
   2) Modernization in Railways.
   3) ON and OFF Track Tamping Machines.
   4) Classification and types of signals.

SECTION – II

7. a) Explain with the help of neat sketches, the difference between the following : **6**
   1) Egg Shaped Tunnel and Horse Shoe Shaped Tunnel.
   2) Shaft and Pilot Tunnel.

   b) Briefly describe how you would transfer the centre-line of a proposed tunnel from the ground surface to the tunnel interior. **6**

   c) State and explain the factors which affect the choice of tunnelling method in soft grounds. **6**

OR

8. a) State the popular methods of tunnelling adopted in rock and explain any one in detail. **6**

   b) Mention the sequence of operations for tunnelling in rock. **6**

   c) What are twin tunnels ? What are their advantages ? **6**

9. a) State the objects of providing proper ventilation to the tunnel interior during construction. What are the air requirements in tunnel work ? **6**

   b) State and explain the objects in providing lining to tunnel interior. **4**

   c) Distinguish between the following : **6**
   1) Grass Hopper and Cherry Picker.
   2) Mucking and Hauling.

OR

10. Write short notes on : **(4×4=16)**

   1) Tunnel lining.

   2) Drainage of tunnels.

   3) Mechanical ventilation.

   4) Safety precautions in rock tunneling.

11. a) Write a detail note on water transportation. **4**

    b) Define Port. What are the requirements of a good port ? **4**

    c) Mention the factors which govern the choice of site for a harbour. **4**

    d) Differentiate between Natural and Seminatural Harbour. (Draw a neat sketch to illustrate your answer). **4**

OR

12. Write short notes on following : **(4×4=16)**

    a) Dry Dock.

    b) Transit Shed.

    c) Dolphin.

    d) Port Facilities.

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T.E. (Civil) (Sem. – II) Examination, 2009
ENVIRONMENTAL ENGINEERING – I
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Solve Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** from Section **I** and Q. **7** or Q. **8**, Q. **9** or Q. **10**, Q. **11** or Q. **12** from Section **II**.*

*2) Answers to the **two** Sections should be written in **separate** books.*

*3) **Neat** diagrams must be drawn **wherever** necessary.*

*4) Figures to the **right** indicate **full** marks.*

*5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*

*6) Assume suitable data, if **necessary**.*

SECTION – I

1. a) Explain the sources of noise. **6**

   b) Explain various techniques used to control noise pollution. **6**

   c) Explain :
      i) Air pollution and
      ii) Water pollution. **4**

OR

2. a) State various methods used for disposal of solid waste. Explain any one in detail. **6**

   b) Explain on-site handling, storage and processing of solid wastes. **6**

   c) State the factors which affect the generation rate of solid wastes. **4**

P.T.O.

3. a) Explain various primary and secondary meteorological parameters which affect dispersion of air pollutants. **6**

   b) Explain working principle of Electro Static Precipitator with a neat sketch. **6**

   c) Explain the effects of air pollution on vegetation. **4**

OR

4. Write short notes on (**any four**) : **16**

   a) Acid rain.

   b) Wind rose.

   c) Photochemical smog formation.

   d) Control of S.P.M. using fabric filter.

   e) Green house effect.

5. a) Explain factors affecting water demand. **6**

   b) Write distribution form and effects of alkalinity. **6**

   c) Following is the population data for a town. Water supply scheme is to be designed for this town with a design period of 30 years : **6**

Year	1960	1970	1980	1990	2000
Population	42,000	48,000	56,000	67,000	79,000

   Estimate the future population of a town at the end of the year 2030 by geometric increase method.

OR

6. a) Write benefits of Rain Water Harvesting system. **6**

   b) Describe different phases involved in a water supply scheme. **6**

   c) Write a note on variations in rate of demand. Explain clearly how you take into account these variations in the design of various units. **6**

SECTION – II

7. a) Acidity introduced by alum dose of 120 mg/l is to be neutralised using lime as CaO. Commercial CaO available is of 70% purity. Workout the quantity of the commercial CaO required in Kg/day, if the raw water to be treated is 10 Mld. **6**

   b) Prove that theoretically, the surface loading (Q/A) and not the depth is a measure of effective removal of particles in a sedimentation tank. **6**

   c) Explain i) Surface loading and ii) Weir loading. **4**

OR

8. a) What is Stoke's law ? What are its limitations ? **6**

   b) Explain the theory of coagulation. Give chemical equations of coagulation by alum. **6**

   c) Explain with a neat sketch cascade aerator. **4**

9. a) Explain in short, operational troubles associated with Rapid Sand Gravity Filter. **6**

   b) Explain lime-soda process of water softening. **6**

   c) Explain break point chlorination with sketch. **4**

OR

10. a) Draw a neat sketch of Rapid Sand Gravity Filter showing various components. **6**

    b) Explain reverse osmosis and electrodialysis. **6**

    c) Comment on chlorination as the best method of disinfection for public water supplies. **4**

11. a) Name various systems of water distribution and discuss in detail the dual system of distribution. **6**

b) Explain the necessity of distribution reservoir and the way in which its capacity is fixed. **6**

c) Compare continuous and intermittent systems of water supply. **6**

OR

12. a) Calculate the storage capacity of the distribution reservoir from the following data : **9**

i) Daily demand = 2,50,000 liters

ii) Pumping hours = 8 hours per day between 8 a.m. to 4 p.m.

The break up of demand is as follows :

Supply hours	**Percentage of day's supply**
6 a.m. to 8 a.m.	20%
8 a.m. to 4 p.m.	45%
4 p.m. to 7 p.m.	30%
7 p.m. to 6 a.m.	5%

b) Write short notes on : **9**

a) Mass curve method.

b) Zoning of areas.

c) Systems of water supply.

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T.E. (Civil) (Semester – II) Examination, 2009
STRUCTURAL DESIGN – II
(2003 Course)

Time : 4 Hours Max. Marks : 100

Instructions *: 1) Answer Q.* ***1*** *or Q.* ***2****, Q.* ***3*** *or Q.* ***4*** *in Section –* ***I****.*
2) Answer Q. ***5*** *or Q.* ***6****, Q.* ***7*** *or Q.* ***8*** *in Section –* ***II****.*
3) Answer to ***two*** *Sections should be written in* ***separate*** *books.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
5) ***Use*** *of IS-456-2000 and non-programmable calculator is* ***allowed****.*
6) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
7) ***Mere*** *reproduction from IS-code as answer,* ***will not*** *be given full credit.*
8) ***Assume*** *any other data* ***if necessary****.*

SECTION – I

1. a) Calculate the design constants considering the balanced design for singly reinforced section, by suing working stress method. Materials : M_{20} grade of concrete and mild steel reinforcement. **9**

   b) A simply supported beam of size 230 mm width and 569 mm effective depth is reinforced with 4 no. 12 mm diameter bars. Find the safe uniformly distributed load on the beam in addition to its self weight on a span of 4 m. Consider clear cover = 25 mm.

   Materials : M_{20} grade of concrete and mild steel reinforcement.

   Use Working stress method. **8**

   c) A rectangular reinforced concrete beam has a width of 200 mm and effective depth of 400 mm is reinforced with 2 bars of 20 mm diameter.

   Estimate ultimate moment of resistance of the section.

   Materials : M_{20} grade of concrete Fe_{415} HYSD reinforcement.

   Use Limit state method. **8**

OR

2. a) Explain in brief. **9**

i) Balanced section

ii) Characteristic strength of concrete

iii) Over-reinforced section. **9**

b) Calculate the moment of resistance by Working stress method for the flanged beam section detailed as below :

Width of web = 230 mm

Width of flange = 1800 mm

Thickness fo flange = 120 mm

Effective depth = 460 mm

Tension steel = 4 No. - 20 mm diameter.

Use M_{20} and Fe_{415} materials. **8**

c) A Tee beam singly reinforced and has following sectional properties. Estimate the ultimate flexural strength of the section using IS : 456 - 2000 code provisions.

Width of flange = 1250 mm.

Thickness of flange = 160 mm.

Width of rib = 250 mm.

Effective depth = 750 mm

Area of tensile steel = 5000 mm^2

Materials : M_{20} grade of concrete and Fe_{415} HYSD bars.

Use of Limit state method is recommended. **8**

3. a) What do you understand by "redistribution of moments" as applied to R.C. structures ? What are its advantages ? **6**

b) What are the various reasons for providing minimum shear reinforcement ? **4**

c) Obtain design moment envelope after 30% redistribution of moments for a two span continuous beam ABC freely supported at A and C and continuous over the central support B.

AB = BC 4 m

D.L (inclusive self weight) = 20 kN/m

Imposed load = 28 kN/m.

Assign all the loading combination and consider only the case of maximum hogging moment at support 'B'.

Use provision given in IS:456 - 2000 for Limit state method. **15**

OR

4. a) A R.C. beam has following data size = 250 mm width and 500 mm depth. Tension reinforcement = 12 Tor 4 Nos, Span = 3.5 m

Shear reinforcement = 8 Tor @ 130 mm c/c throughout the beam,

Use M_{20} and Fe_{415} materials.

Calculate the maximum shear capacity of beam. **9**

b) A rectangular R.C. beam of size 300 mm wide and 500 mm depth of section is subjected to the following actions :

Factored B.M. = 80 kN.m.

Factored torsional moment = 40 kN.m.

Factored shear force = 70 kN.

Materials : M_{20} and Fe_{415}.

Design the beam. **16**

SECTION – II

5. The central line plan of an office building is as shown in Fig. 1. classify the slabs structurally and design slabs S_1, S_2 and S_4 only for flexure. Draw the neat sketches showing details of main and torsional reinforcement for two-way slab. Take L.L. on all slabs = 3.5 kN/sq.m, F.F.L. = 1.5 kN/sq.m, materials M_{20} and Fe_{415}. **25**

OR

6. Design two consecutive flights of an open-wall staircase for an office building as shown in Fig. 1. with the following details :

   Floor to floor height = 3.380 m,

   No. of risers in Ist and IIIrd flights = 10,

   No. of risers in IInd flight = 6,

   L.L. = 5.0 kN/m^2. F.F.L. =1.0 kN/m^2,

   Material = M_{20} and Fe_{415}.

   Assume beams are provided at the ends. Show detailed load design calculations. Draw neat sketches giving geometrical details and reinforcement details (plan and section of I and II flights). **25**

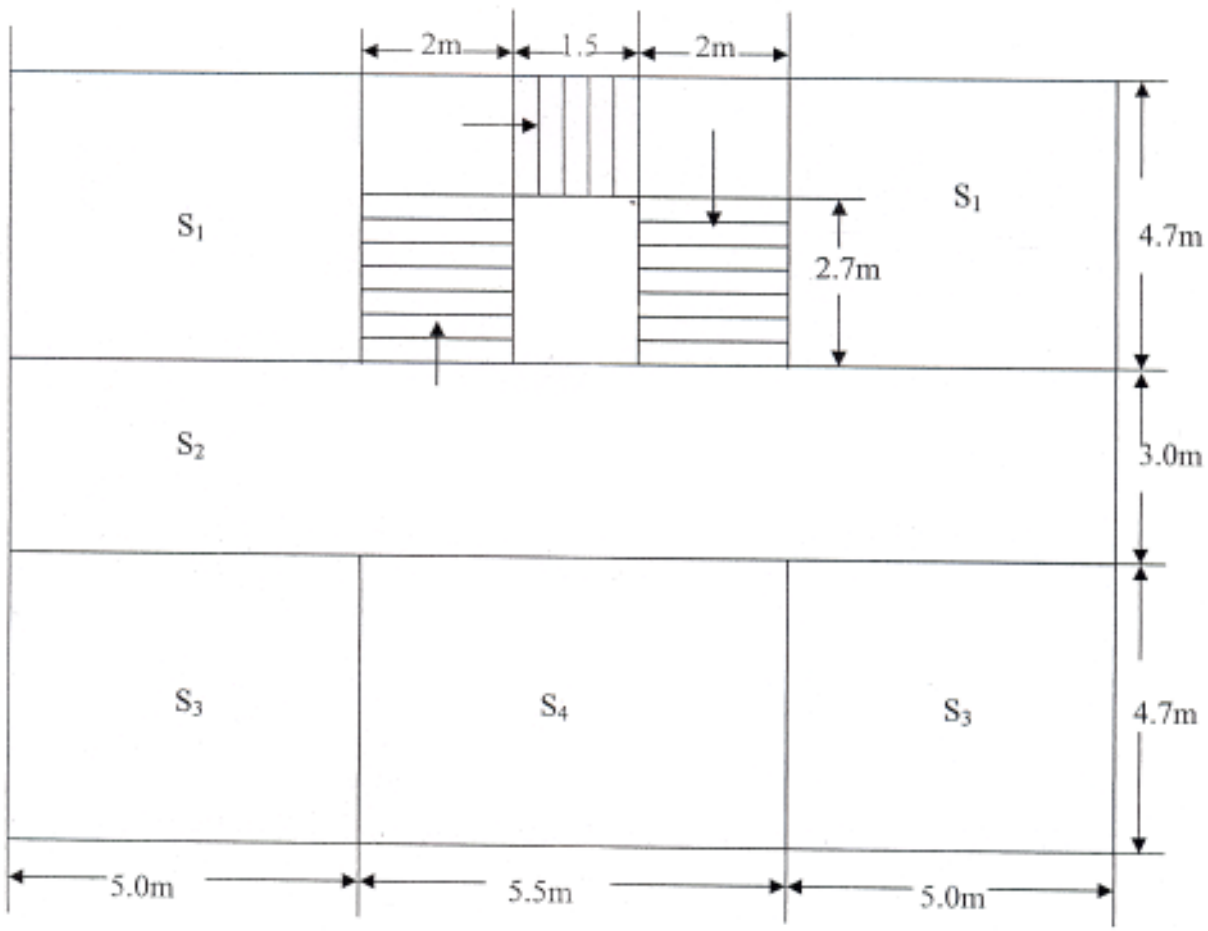
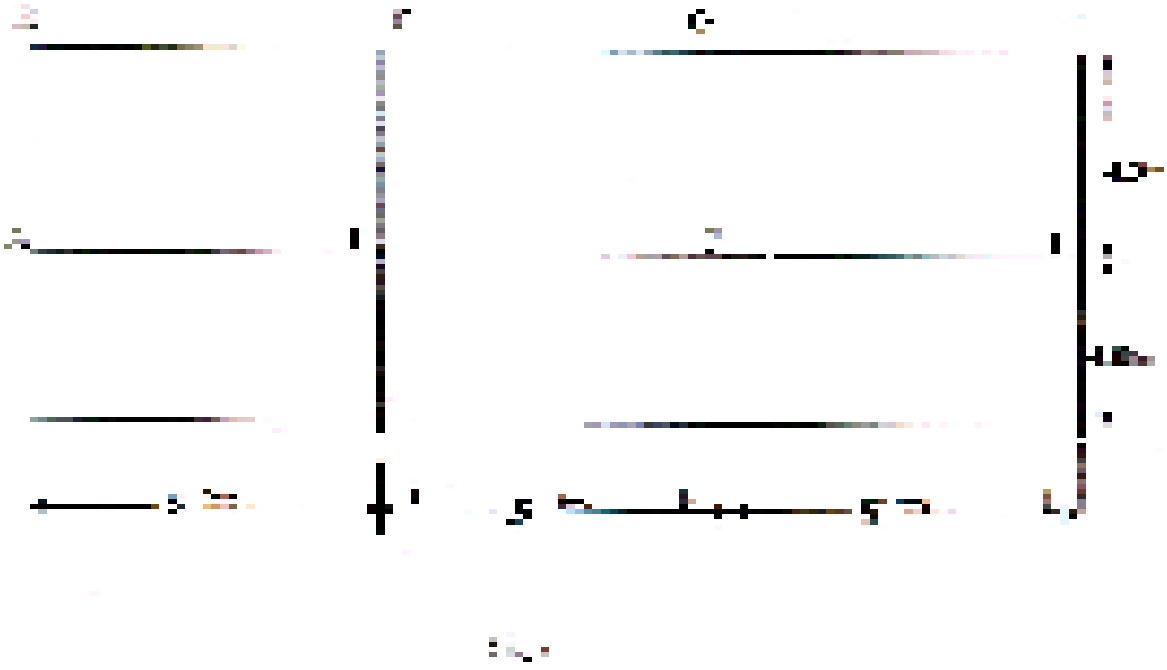


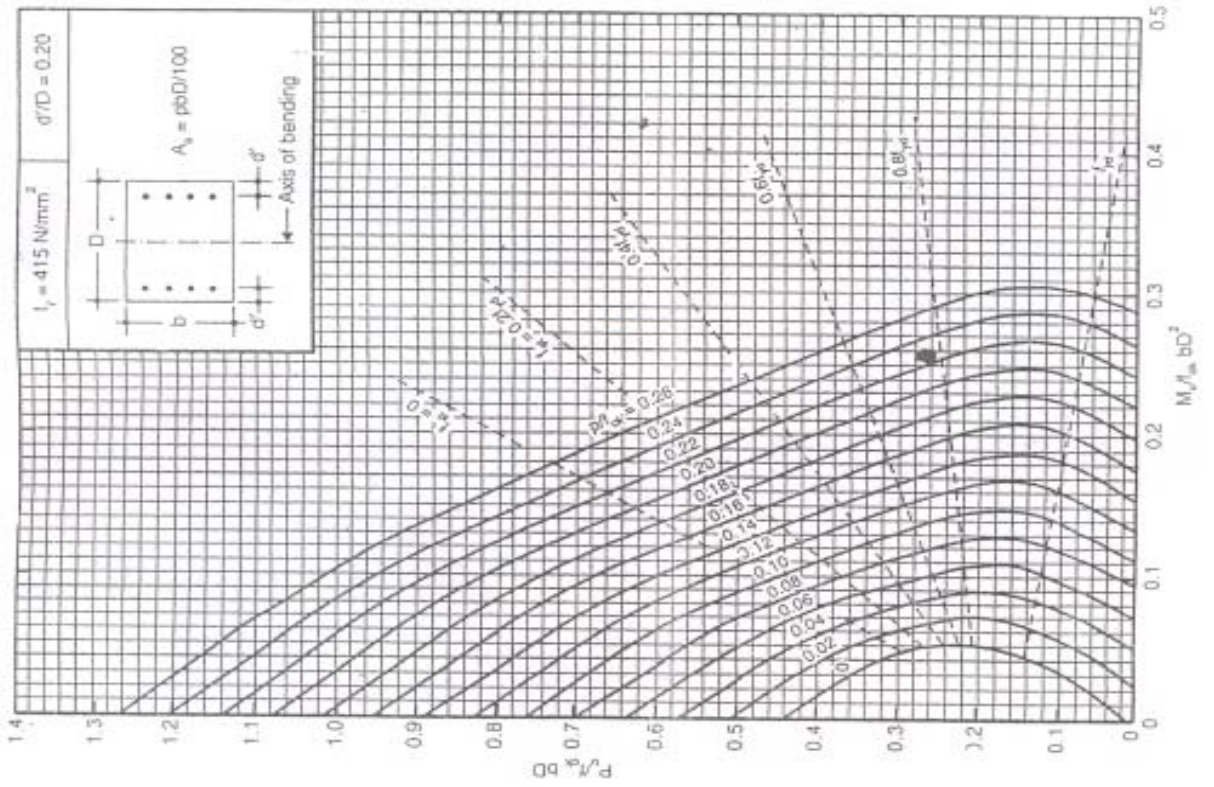
Fig.1

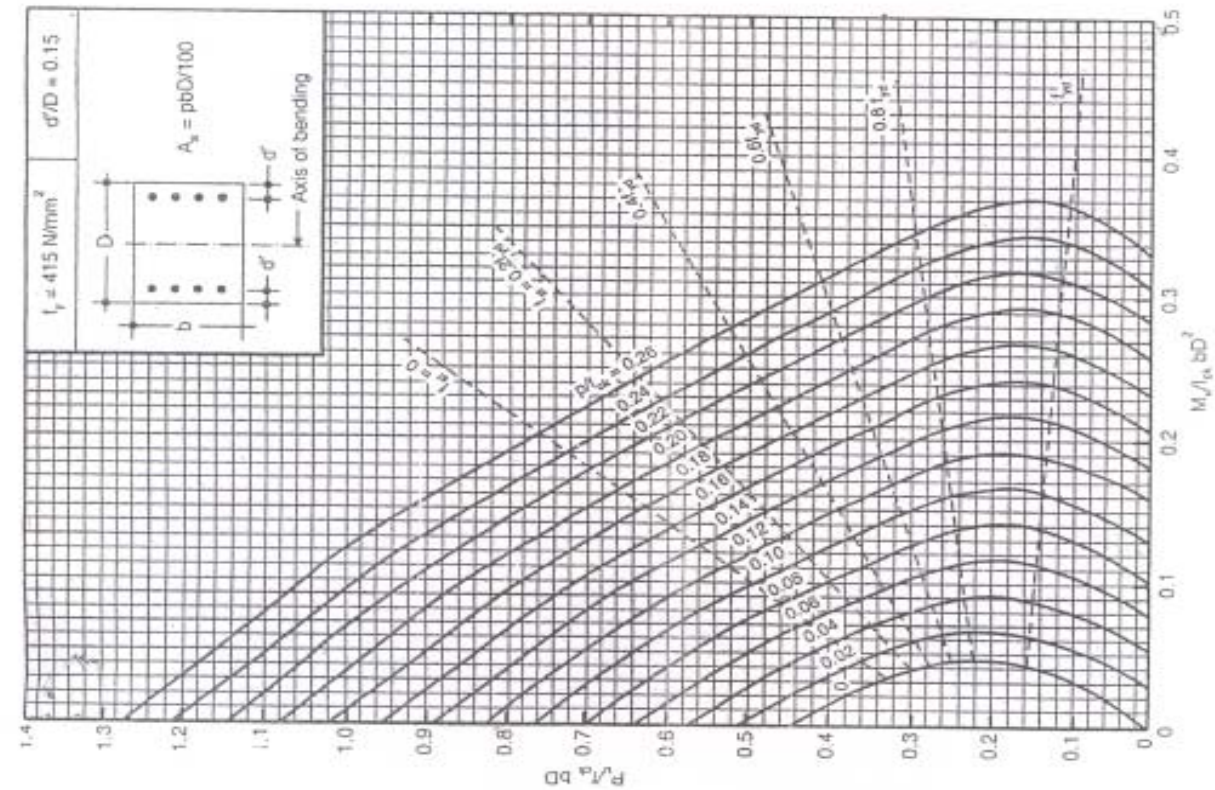
7. Design an axially loaded short column at B as shown in fig. 2 for G + 2 building with isolated footing for the following data :
   Floor to floor height = 3.3 m.
   Height of plinth above ground level = 0.7 m.
   Depth of foundation below G.L. = 1.3 m.
   L.L. on all slabs = 3.5 kN/m^2,
   F.F.L. on all slabs = 1.20 kN/m^2,
   Thickness of slab = 135 mm,
   Size g wall on all floor beams = 230×3000 mm,
   Size of Parapet wall = 0.150×0.9 m,
   Size of all beams 230×400 mm,
   S.B.C. of soil = 200 kN/sq.m,
   Use M_{20} and Fe415 show details load and design calculations. Draw neat sketches giving reinforcement details of column and footing. **25**

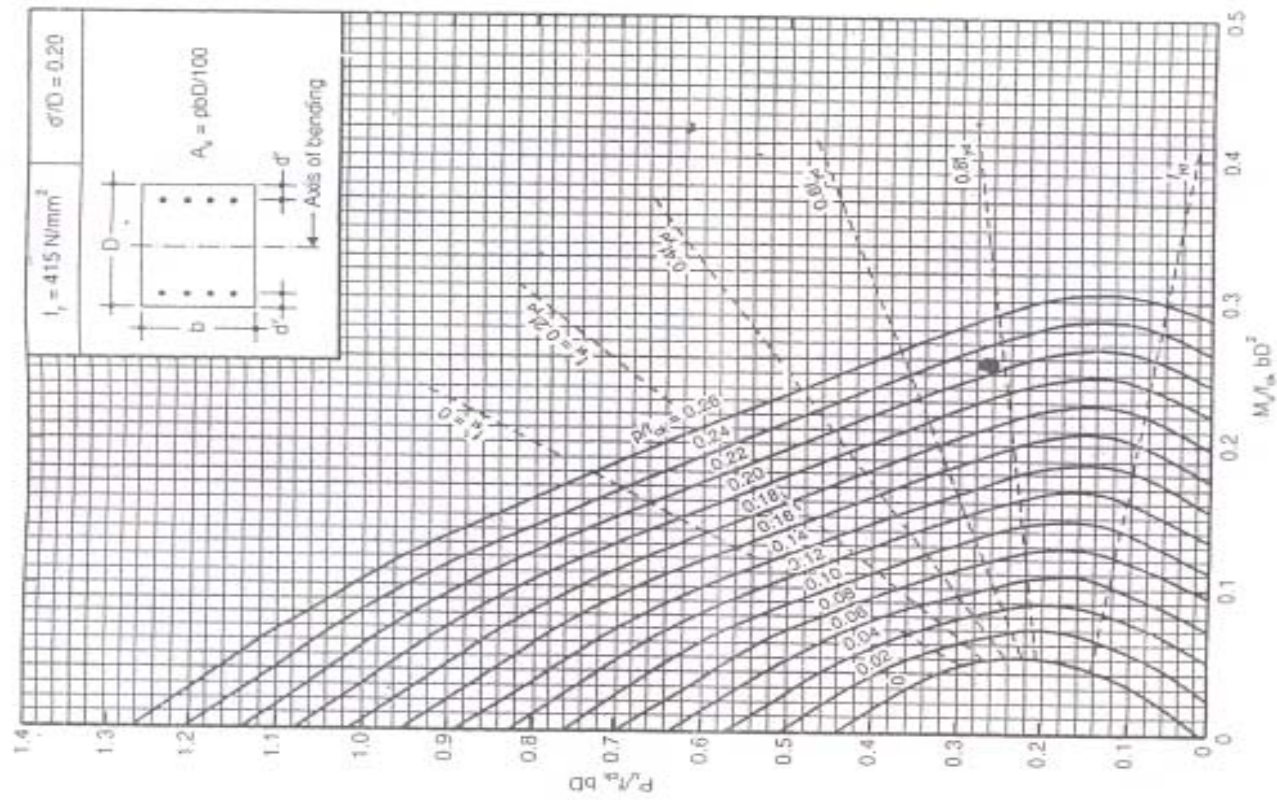


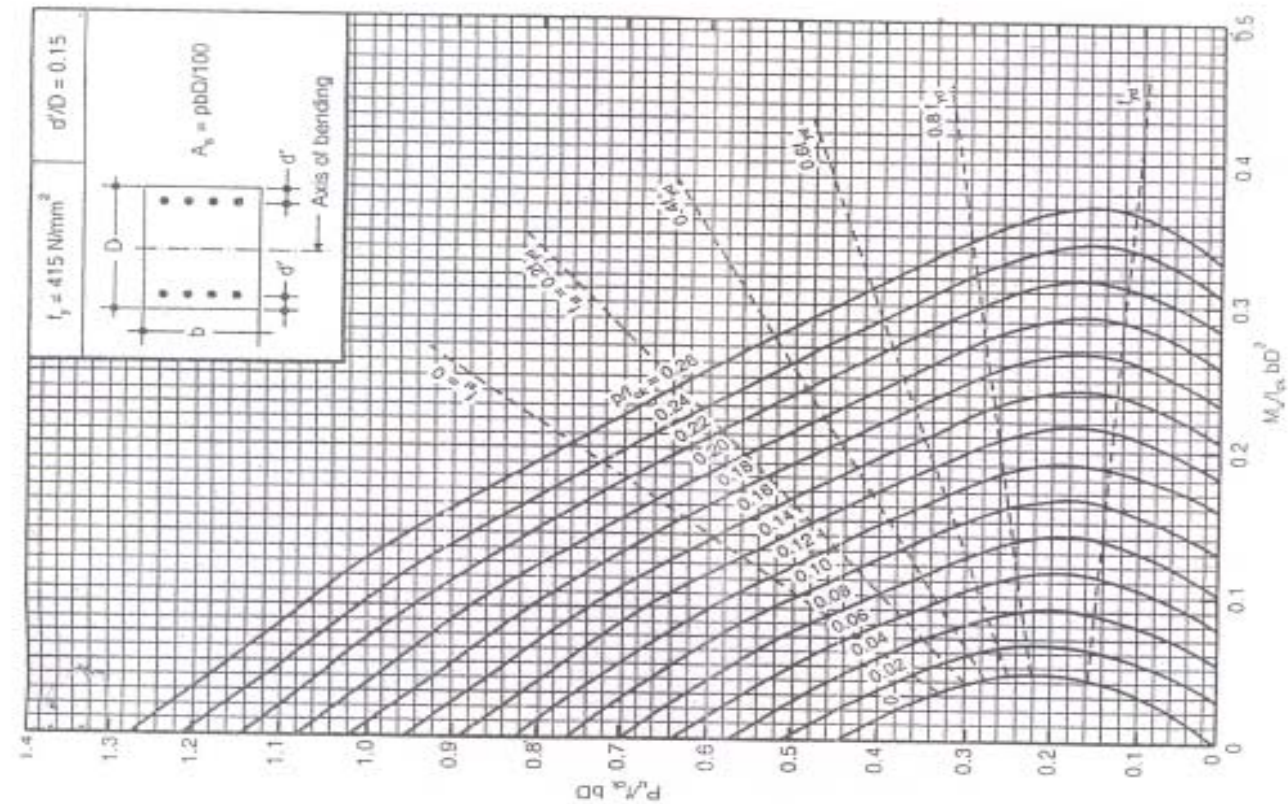
OR

8. Design a rectangular column subjected to a working load of 775 kN and working moment of 65 knm about major axis. The unsupported length of column is 3.2 m. Assume column effectively held in position but not restrained against rotation. Also design its footing considering above moment. Take S.B.C. of soil = 225 kN/m^2 Use M_{20} and Fe415 show details design calculations and reinforcement details of column and Footing (use charts). **25**


f_y = 415 N/mm²
d'/D = 0.20
A_s = pbD/100
Axis of bending
P_u/f_{ck} bD
M_u/f_{ck} bD²


f_y = 415 N/mm²
d'/D = 0.15
A_s = pbD/100
Axis of bending
P_u/f_{ck} bD
M_u/f_{ck} bD²


f_y = 415 N/mm^2
d'/D = 0.20
A_s = pbD/100
Axis of bending
P_u/f_{ck} bD
M_u/f_{ck} bD^2


f_y = 415 N/mm^2
d'/D = 0.15
A_s = pbD/100
Axis of bending
P_u/f_{ck} bD
M_u/f_{ck} bD^2

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T.E. (Civil) (Semester – II) Examination, 2009
PROJECT MANAGEMENT AND COMPUTER APPLICATIONS
(2003 Course)

Time : 3 Hours | Max. Marks : 100

SECTION – I

1. Draw the network with the help of following information :

Activity	A	B	C	D	E	F	G	H	J	X	Y
Duration	10	12	16	18	9	15	12	16	19	5	8
Preceeding activity	-	-	-	A	A, B	C	A	DEF	G	J, H	J, H

a) Draw the neat network. **8**

b) Show critical activities and critical path with the help of table. **8**

c) Find the total duration of project. **2**

OR

2. a) State differences between A - O - A and A - O - N. **6**

b) Show with example, total float and free float. Also give definition of the same. **6**

c) Explain the project life cycle with example of any construction site. **6**

3. a) Explain Resource Levelling and Resource Smoothening by giving suitable example. **6**

b) What is PERT ? Give any 3 applications of PERT. **4**

c) Explain the terms - Rescheduling and Updating. Also write the procedure for updating of network. **6**

OR

P.T.O.

4. Find the optimum solution for the following network :

Activity	Succeeding activity	Normal duration	Crash duration	Cost (in Rs.)	Cost (in Rs.)
A	B, C	8	8	500	500
B	D, E	4	3	1000	750
C	I	4	3	800	500
D	G	3	3	750	750
E	F	6	4	1500	800
F	H	9	6	2500	1600
G	-	5	4	500	400
H	-	7	5	800	600
I	F	8	5	3000	1500

The indirect cost of each activity is given as Rs. 150/- per day.

a) Find the duration and normal cost of the project. **6**

b) Find all crash solution. **6**

c) Find the optimum solution. **4**

5. a) What are the qualities required for a Project Manager ? **6**

b) Explain the arbitration concept. What are the steps carried out in arbitration ? **6**

c) Explain conditions of contract. **4**

OR

6. a) What is the importance of material management ? **6**

b) Explain various activities carried out under stores department. **4**

c) Explain, how the following materials are stored on construction site ? **6**
Cement, Aggregates, Steel, Bricks, Paints, Plumbing materials.

SECTION – II

7. a) How can you achieve quality control for brickwork and plastering on a residential site ? **6**

   b) Write the safety instructions to be followed for a Precast Girder bridge at launching stage. **6**

   c) What are the effects of accident on site ? **6**

OR

8. a) Write the important functions of Safety Manager on a construction site. **6**

   b) Draw site layout for a multistoreyed residential project at excavation stage. Assume that, Ground Water Table is high and dewatering system is installed to lower the Ground Water Table. **6**

   c) Explain the steps for quality control for construction of substructure. **6**

9. a) Prepare the flowchart and write algorithm for Gauss Quadrature method. **8**

   b) Find the real root of the equation : $x^3 + 9 = 0$ by applying Newton - Raphson method, at the end of 4^{th} iteration. Take the starting point as $x = -2$. **8**

OR

10. a) Write the flow chart for Langrangian Interpolation. **8**

    b) Derive the equation for Newton - Raphson method. **8**

11. Write short notes on :
    i) DBM **6**
    ii) Use of Spreadsheets on construction site **6**
    iii) Use of softwares in construction. **4**

OR

12. Write short notes on :
    i) Quality Control **4**
    ii) Daily reports on construction site **6**
    iii) Algorithm for CPM Network. **6**

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T.E. (Civil) (Semester – II) Examination, 2009
(2003 Course)
ADVANCED SURVEYING

Time : 3 Hours Max. Marks : 100

SECTION – I

1. a) State the objectives of Geodetic Triangulation. Classify the triangulation systems. Explain any one triangulation system stating its specifications. **(2+1+3)**

   b) With respect to Triangulation survey, explain the following terms : **6**

   1) Station adjustment
   2) Spherical Excess
   3) Reduction to Mean Sea Level.

   c) From an eccentric station S, 12.25 meters to the west of the main station B, the following angles were measured. **6**

   < BSC = 76° 25' 32", ∠CSA = 54° 32' 20"

   The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5286.5 and 4932.2 m respectively.

   OR

2. a) Differentiate between primary and secondary triangulation. **4**

   b) What is strength of a figure ? Taking illustration of a braced quadrilateral, explain its significance in a triangulation survey. **6**

   c) The triangulation stations A and B, 50 km apart, have elevations 243 m and 258 m respectively. The intervening ground may be assumed to have a uniform elevation of 216 m. Find the minimum height of the signal required at B, so that line of sight may not pass nearer the ground than 2.4 m. **8**

3. a) Define spherical excess. The following values were recorded for a spherical triangle PQR, **6**

   ∠P = 62° 28' 06" weight 8
   ∠Q = 57° 43' 36" weight 6
   ∠R = 59° 48' 38" weight 4

   Theoretical spherical excess was known to be 7". Find the corrected spherical angles.

P.T.O.

b) What do you mean by weight of an observation ? State the Rules of assigning weightage to the field observations. **4**

c) Define the following terms with suitable example. **6**

1) Indirect observation
2) Conditioned equation
3) True error.

OR

4. a) The following are the direct measurements of a base line **6**
3678.32 m, 3678.29 m, 3678.38 m, 3678.26 m, 3678.09 m, 3677.98 m.
Calculate : i) The probable error of single observation
ii) The probable error of the mean.

b) With the help of a neat sketch explain in brief single angle adjustment and station adjustment. **4**

c) Adjust the following angles closing the horizon : **6**
A = 110° 20' 48" weight 4 C = 56° 12' 00" weight 2
B = 92° 30' 12" weight 1 D = 100° 57' 04" weight 3

5. a) Obtain an expression for the difference in level between two points by reciprocal vertical angle readings from two stations. **8**

b) Correct the observed altitude for the height of signal, refraction and curvature from the following data : **8**
Observed altitude = +2° 48' 39"
Height of instrument = 1.120 m
Height of signal = 4.870 m
Horizontal distance = 5.112 km
Coefficient of refraction = 0.07
(Take R sin 1" = 30.88 m).

OR

6. a) What is Geodetic trigonometrical levelling. In what way it differs from plane trigonometrical levelling ? **6**

b) Write a short note on Axis signal correction. **4**

c) Explain in brief the effect of curvature and reffraction in Geodetic trigonometric levelling. **6**

SECTION – II

7. a) Give any four points of comparison between aerial photograph and a map. **4**

   b) Define the following terms with neat sketches : **8**

      1) Scale of the photograph
      2) Principle point
      3) Air base distance
      4) Crab and Drift

   c) Explain with reference to aerial photographs, what is meant by end overlap and side overlap and why they are provided. **6**

OR

8. An area 30 km long in the north - south direction and 24 km in the east west direction is to be photographed with a lens having 30 cm focal length for the purpose of constructing a mosaic. The photograph size is 20 cm ×20 cm. The average scale is to be 1:12,000 effective at an elevation of 400 m above datum. Overlap is to be at least 60% and the side lap is to be at least 30%. An intervalometer will be used to control the interval between exposures. The ground speed of the aircraft will be maintained at 200 km per hour. The flight lines are to be laid out in a north-south direction on an existing map having a scale of 1:60,000. The two outer flight lines are to coincide with the east and west boundaries of the area. Determine the following data for the flight plan. **(9×2=18)**

   1) Flying height
   2) Theoretical ground spacing of flight lines
   3) Number of flight lines required
   4) Actual spacing of flight lines
   5) Spacing of flight lines of flight map
   6) Ground distance between exposures
   7) Exposure interval
   8) Adjusted ground distance between exposure
   9) Total number of photographs.

9. a) What is GPS ? What are the components of GPS ? How data is obtained using GPS ? **4**

   b) Differentiate between Electronic Digital Theodolite and Microoptic Theodolite. **4**

   c) With the help of a neat sketch explain the principle of remote sensing. **4**

   d) Write a short note on classification of EDM instruments. **4**

OR

10. a) State the working principle of EDM instruments. Also write the special functions available in various EDM instruments. **6**

    b) What is GIS ? How it is useful in monitoring the use of natural resources ? **6**

    c) Write a short note on use of laser levels in various civil engineering works. **4**

11. a) Give different applications of hydrographic survey. **4**

    b) Derive an expression for solving three point problem by analytical method. **8**

    c) Write a short note on Fathometer. **4**

OR

12. a) What is hydrographic surveying ? Explain in brief any three civil engineering works (area) where it is used. **4**

    b) Explain with the help of a neat sketch, the procedure of measurement of horizontal angle using Nautical Sextant. **6**

    c) Define sounding. State various methods of locating sounding. Explain any one method in brief. **6**

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T.E. (Civil) (Sem. – I) Examination, 2009
CONSTRUCTION TECHNIQUES AND MACHINERY
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Answer questions **1** or **2**, questions **3** or **4**, questions **5** or **6** from Section – **I** and questions **7** or **8**, questions **9** o**10**, questions **11** or **12** from Section – **II**.*
*2) Answers to the **two** Sections should be written in **separate** books.*
*3) **Neat** diagrams must be drawn **wherever** necessary.*
*4) Black figures to the **right i**ndicate **full** marks.*
*5) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*6) **Assume** suitable data, if **necessary**.*

SECTION – I

1. a) Explain in detail the manufacturing process of "SIPOREX" blocks, with the help of neat flow diagram. What are its advantages and disadvantages ? **8**

   b) List out merits, demerits and applications of Precast technology. **6**

   c) Justify the need for mechanisation in construction sector. **4**

OR

2. a) State and explain the importance of construction sector in economic development of any country with the help of supporting statistical figures. **8**

   b) With the neat labelled sketch, explain working principle, components, application of
      i) Tower Crane
      ii) Derrick Crane. **6**

   c) Discuss the various factors affecting the choice of construction equipment on a major construction project. **4**

P.T.O.

3. a) Explain the need for use of RMC. Draw a systematic diagram for an RMC Plant. Discuss the advantages and disadvantages. **8**

   b) What is a Slipform technique ? Explain application of technique in pavement construction. **4**

   c) What are the methods of underwater concreting ? Explain any one method. **4**

OR

4. a) What are the important requirement for successful pumping of concrete ? Give working parameters for a concrete pump. List advantages and disadvantages of using concrete pumps. **8**

   b) State the various dewatering methods. Explain any one in detail. **4**

   c) Write short note on Autoclave curing. **4**

5. a) What are the selection criteria for crushers ? Give classification of various crushers depending on size of output. **6**

   b) List the applications of grouting. Discuss the important aspect of a good grout material. Explain Bitumen grouting in brief. **6**

   c) What are the types of Tunnel Boring Machine ? Explain the working principle of TBM. **4**

OR

6. a) How shotcreting is different from guniting ? State the applications of shotcreting. **6**

   b) With the help of systematic diagram, explain the operating mechanism of crusher plant. **6**

   c) Explain any one R.C.C. pipe laying method. **4**

SECTION – II

7. a) With the help of line diagrams expalin the working of
   i) Back hoe
   ii) Drag line.
   Discuss their suitability of operations. **8**

   b) Discuss the various factors affecting the selection of earth-moving machinery. **6**

   c) Explain the earthwork cycle. **4**

OR

8. a) With the help of line diagrams explain the working of
   i) Excavator-JCB
   ii) Scraper.
   Discuss their suitability of operations. **8**

   b) Discuss the various factors which affect the output of an earth-moving plant. **6**

   c) Discuss the advantages of hydraullicaly operated rock breakers. **4**

9. a) With a flow diagram, explain the process of the production of asphalt. State the precautions that are necessary for ensuring a good quality of operation. **8**

   b) With a neat sketch, explain the working of a slip-form paver. What are its advantages ?

OR

10. a) Explain the various types of asphalt and discuss their suitability and limitations. **8**

   b) Differentiate between hot-mix and cold-mix operations with examples. **4**

   c) Explain the terms with practical examples,
   i) DLC ii) PQC. **4**

11. a) A construction machinery costs Rs. 5 crores and has a salvage value of 10%. Work out its depriciation using,

i) Straight line method

ii) Sinking fund method.

Assume useful life as 5 years. Put the results in tabular format. **8**

b) Explain POL costs of machinery with any suitable example and assume market rates. **4**

c) Explain concept of investment cost and how it is worked out, with an example. **4**

OR

12.a) A construction machinery costs Rs. 10 crores and has a scrap value of 5%. Workout its depreciation using,

i) Modified straight line method.

ii) Double declining balance method. **8**

Assume useful life as 5 years. Put the results in Tabular format.

b) Explain the sub-heads of the owning costs with an example. **4**

c) Explain the importance of estimating the downtime costs of constructio machinery with a field example. **4**

[3563] – 104

T.E. (Civil) (Semester – I) Examination, 2009
GEOTECHNICAL ENGINEERING
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Answer Q.No.* ***1*** *or Q.No.* ***2,*** *Q.No.* ***3*** *or Q.No.* ***4*** *and Q.No.* ***5*** *or Q.No.* ***6*** *from Section – I and Q.No.* ***7*** *or Q.No.* ***8****, Q,No.* ***9*** *or Q.No.* ***10*** *and Q. No.* ***11*** *or Q.No.* ***12*** *from Section – II.*

2) Answers to the ***two*** *Sections should be written in* ***separate*** *answer books.*

3) ***Neat*** *diagrams must be drawn* ***wherever necessary****.*

4) Block figures to the right *indicate* ***full*** *marks.*

5) Your answers will be ***valued*** *as a* ***whole****.*

6) ***Use*** *of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is* ***allowed****.*

7) Assume suitable data, ***if necessary****.*

SECTION – I

1. a) Define the following with respect to a soil mass.
   i) Void ratio
   ii) Porosity
   iii) Bulk density
   iv) Degree of saturation
   v) Specific gravity
   vi) Density index **6**

   b) Derive the relationship **6**

$$\gamma_{sat} = \left(\frac{G + e}{1 + e}\right)\gamma_{\omega}$$

   c) A soil sample has a unit weight of 19 kN/m^3 and a water content of 12%. If the specific gravity of solids be 2.65, determine the dry density, degree of saturation, void ratio and porosity of the soil. **5**

OR

2. a) State and explain the types of soil structures with examples. **6**

   b) Write a short note on plasticity chart used for classification of fine grained soils. **6**

   c) State the field tests for determination of field density and explain any one. **5**

3. a) Explain with diagram a method for determining coefficient of permeability K for clayey soils in the laboratory. **6**

   b) Explain the phenomenon of boiling condition in case of cohesionless soils. Derive the equation for hydraulic gradient in case of quick sand. **6**

   c) A sample of course sand is tested in a constant head permeameter. The sample is 20 cm high and has a diameter of 8 cm. Water flows through the soil under a constant head of 1 m for 15 min. The mass of discharged water was found to be 1.2 kg. Determine the coefficient of permeability of soil. **5**

   OR

4. a) State and explain the important applications of a flow net. **6**

   b) Describe pumping out method for the determination of the coefficient of permeability of soil in the field. **6**

   c) The void ratio of a sand sample at the loosest and densest possible states are found to be 0.55 and 0.98 respectively. If the specific gravity of the soil solids is 2.67 determine the corresponding values of the critical hydraulic gradient. **5**

5. a) Compare light compaction test and heavy compaction test in a tabular from. **5**

   b) Explain factors influencing compaction. **5**

   c) The optimum moisture content of a soil is 16.5% and its maximum dry density is 15.7kN/m^3. The specific gravity of solids is 2.65. Determine

      i) the degree of saturation and percentage of air voids of the soil at OMC.

      ii) the theoretical dry density at OMC corresponding to zero-air voids. **6**

   OR

6. a) Write a short note on Newmark's chart. **5**

   b) Write short notes on Neutral and Effective stress. What is the role of effective stress in soil mechanics ? **5**

c) A concentrated load of 40 kN is applied vertically on a horizontal ground surface. Determine the vertical stress intensities at the following points.

i) at a depth 2m below the point of application of the load.

ii) at a depth of 1m and at a radial distance of 3m from the line of action of the load.

iii) at a depth of 3m and at a radial distance of 1m from the line of action of the load. **6**

SECTION – II

7. a) What is Coulomb's equation for shear strength of soil ? Discuss the factors which affect the shear strength parameters of soil. **6**

b) What are the advantages and disadvantages of triaxial compression test in Comparison with the direct shear test ? **6**

c) Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200kN/m^2 and the pore water Pressure is 80 kN/m^2. The effective stress Shear strength parameters for the soil are C^1 = 16 kN/m^2 and $\phi = 30°$. **6**

OR

8. a) Explain the various drainge conditions under which the shear tests can be carried out. **6**

b) State and explain Skempton's pore pressure equation. **6**

c) A Shear vane of 7.5 cm diameter and 11.00 cm length was pressed into soft clay at the bottom of a bore hole. If a torque of 550 N.m was required to shear the soil, Calculate the shear strength.

The Vane was then rotated rapidly to Cause remoulding of the soil. The torque required in the remoulded state was 175 N.m. Determine the sensitivity of the soil. **6**

9. a) What is 'earth pressure at rest' ? Derive an equation for determining the magnitude of earth pressure for at rest condition. **6**

b) What is stability number ? What is its utility in the analysis of stability of slopes ? **6**

c) A 5m deep canal has side slopes 1:1. The properties of soil are C_u = 20 kN/m^2 submerged unit weight = 9.81 kN/m^3. If Talylor's stability number is 0.108. determine the factor of safety with respect to cohesion. **4**

OR

10. a) State the assumptions made in the Rankine's earth pressure theory. **4**

b) Discuss Culmann's graphical method for the determination of active earth pressure. **6**

c) A slope 1 in 2 with a height of 8 m has the following soil properties C = 28 kN/m^2, =18kN/m^3, S_n = 0.064. Calculate 1) Factor of safety with respect to cohesion and ii) Critical height of slope. **6**

11. a) What are different index properties of rocks ? What is their importance ? **8**

b) Discuss the different modes of failure of rocks. **8**

OR

12. Write short notes on **any four** : **16**

i) Shear Strength of rocks.

ii) Insitu Stresses in rocks.

iii) Hardness of rocks.

iv) Rock permeability

v) Ring shear test.

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[3563] – 103

T.E. (Civil) (Sem. – I) Examination, 2009
STRUCTURAL DESIGN – I
(2003 Course)

Time : 4 Hours | Max. Marks : 100

Instructions : *1) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4** from Section – **I.***
*2) Answer Q.**5** or Q.**6**, Q. **7** or Q. **8** from Section – **II.***
*3) Answers to the **two** Sections should be written in **separate** books.*
*4) **Neat** diagrams must be drawn **wherever** necessary.*
*5) **Black** figures to the **right** indicate **full** marks.*
*6) **Use** of electronic pocket calculator and I.S. 800, 875 is **allowed.***
*7) **Assume** suitable data, **if necessary.***

SECTION – I

1. a) Compare welded and bolted connections on various points. **5**

   b) A bracket connection as shown is subjected to force of 100 KN at an angle of 30° with vertical. The thickness of bracket plate and flange of column is 12 mm. Calculate maximum force in bolt and suggest suitable size. Refer to Fig.1(b). **12**

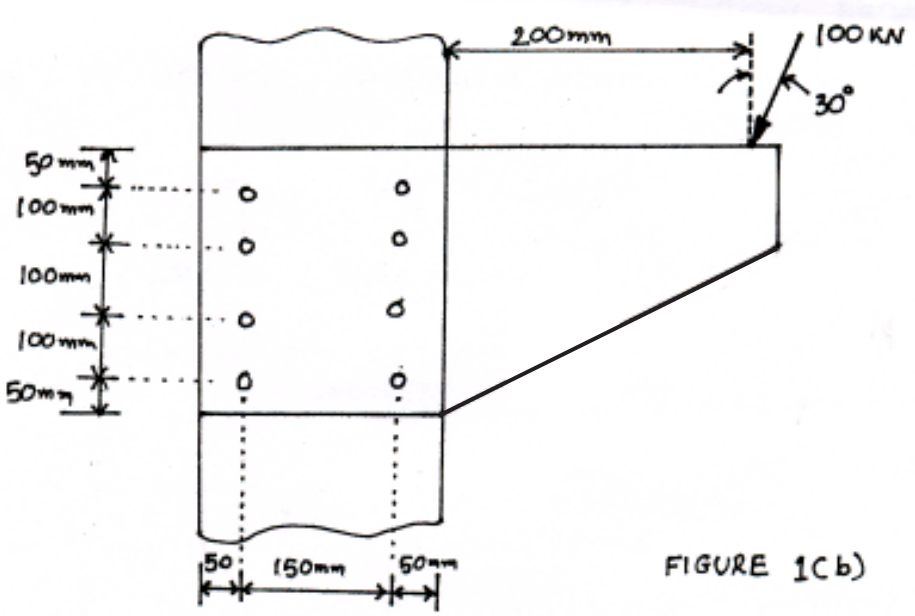

FIGURE 1C b)

P.T.O.

c) Design a single angle discontinuous strut of a roof truss to carry a axial load of 150 KN. Unsupported length of member is 3 m. **8**

OR

2. a) Explain with sketches various types of welded connections. **5**

b) A beam ISMB 300 transfer end reaction of 100 KN to the web of ISMB 400 main beam. Compression flanges of both beams are at same level. Design a double plate welded connection if 50 mm wide plate is available. **10**

c) A tie member of a truss carries axial pull of 150 KN. Design a T-section along with welded end connection. Length of member is 2.5 m. **10**

3. a) Design a beam section to support a roof slab. Span of beam is 6.5 m and superimposed load including weight of slab is 25 KN/m. ISMB 250 and 10 mm thick plates are available. Apply usual checks. **12**

b) A simply supported beam having effective span of 7 m and carries uniformly distributed load of 50 KN/m. The beam is laterally unsupported. Each end of beam is restrained against torsion and lateral bending. Taking $F_y = 250$ MPa, design a beam. **13**

OR

4. A simply supported plate girder of span 20 m subjected to uniformly distributed load of 80 KN/m and central point load of 200 KN. The girder is laterally supported throughout. Design a cross-section for a girder if depth should not be greater than 1600 mm. Design should include cross-section, curtailment of flange plate, intermittent connection between flange and web and design of end bearing stiffener. Draw neat sketches. **25**

SECTION – II

5. a) Design the timber plank flooring and steel cross-beam of a foot bridge for following details.

Type of truss is Howe truss spanning 16 m. Spacing of cross-beam is 2 m. clear walkway width is 2.5 m; on which live load is 4 KN/m^2. Modulus of elasticity of timber is 25 GPa and that of steel is 200 Gpa. Permissible bending stress in timber 15 MPa. **10**

b) Find panel point load due to dead load; wind load for a compound fink truss of 16 m span laid with 4 m. centre to centre spacing. Pitch of roof truss is 1 in 4; G. I sheets are used for covering. The wind speed for the site is 39 m/s with $K_1 = 1.0, K_2 = 0.92, K_3 = 1.0, C_{pe} = 0.7, C_{pi} = \pm 0.5$. Also design the section for purlin and sketch the design details. **15**

OR

6. a) Find the force in the member AB, BC and AC for compound fink truss as shown in Fig. 1. Design the member AB using double angle section and member BC with single angle section. **15**

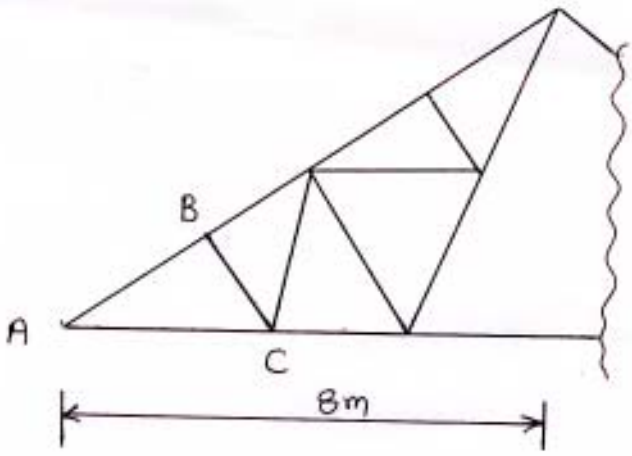

FIGURE - 1

b) Design the truss to column joint. Show the design details with appropriate schematic sketch. **10**

7. a) Design a column section consisting of two channels to carry axial compression 800 KN. Length of column 10 m; with both ends fixed. Design suitable lacing for the column. **15**

   b) Design suitable footing for the above column to rest on a soil with bearing capacity 230 KN/m^2 and permissible bearing pressure on concrete is 4 MPa. Show design details with sketch. **10**

OR

8. a) Explain in brief the merits and demerits of cold form light guage steel section. Sketch various types of cross-sections for light gauge cold form member and label the parts suitably. **12**

   b) ISHB 400 @ 58.8 kg/m is used as a column to carry axial load of 1000 KN. It rests on a footing. The S.B.C. of soil below is 230 KN/m^2. Design the slab base and show design details. **13**

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[3563] – 102

T.E. (Civil) (Semester – I) Examination, 2009
FLUID MECHANICS – II
(2003 Course)

Time: 3 Hours Total Marks: 100

Instructions : *1) Answer **any 3** questions from **each** Section.*
*2) Answers to the **two** Sections should be written in **separate** books.*
*3) **Neat** diagrams must be drawn **wherever** necessary.*
*4) **Black** figures to the **right** indicate **full** marks.*
*5) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*6) Assume suitable data, if **necessary**.*

SECTION – I

1. a) Derive an expression for force, workdone of jet impinging a moving flat plate and compare it with the force when same jet is impinging a series of moving vane. What is maximum efficiency in latter case ? **8**

   b) A 50 mm diameter jet having velocity 35 m/s strikes a flat plate, the normal of which is inclined to axis of jet at 45°. Find the normal pressure on plate, when
   1) Plate is stationary
   2) Moves with a velocity of 15 m/s indirection of jet also determine power and efficiency of jet when plate is moving. **6**

   c) What are the different types of unsteady flows and state field situation where they occur ? **4**

OR

2. a) Define coefficient of drag and lift and state the factors on which these coefficient depend. **4**

   b) Draw and explain approximate flow pattern and pressure distribution around flat plate placed perpendicular to stream of flow. **4**

   c) Derive an expression for lift force on an rotating cylinder held in a fluid stream of uniform velocity with its axis perpendicular to direction of flow of fluid. **8**

   d) Define
   1) Drag force **2**
   2) Lift force.

P.T.O.

3. a) With the help of velocity diagram derive the equation of theoretical power developed by pelton wheel and its hydraulic efficiency. Obtain the condition for maximum hydraulic efficiency. **8**

   b) In an inward flow reaction turbine the head on turbine is 25 m. The external and internal diameter are 0.6 m and 0.30 m respectively. The velocity of flow through runner is constant and equal to 2.5 m/s. The guide blade angle is 12° and the runner vanes are rigid at inlet. If the discharge at outlet is radial determine 1) Speed of turbine 2) Vane angle at outlet and 3) Hydraulic efficiency. **8**

OR

4. a) A turbine is to operate under 30 m head at 250 rpm. The discharge is 9 m^3/s. If the efficiency of turbine is 85% determine

   1) Power generated 2) Specific speed

   3) Type of turbine 4) Output under head of 25 m. **4**

   b) Explain 1) main characteristics 2) operating characteristics and 3) constant efficiency curve for an hydraulic turbine. **6**

   c) Derive an expression for specific speed of a centrifugal pump. **6**

5. a) With neat sketch explain briefly :
   1) Straight conical draft tube
   2) Moody hydrocone
   3) Elbow draft tube. **6**

   b) A centrifugal pump supplies water to an head of 38.5 m. However later it was required to supply water against head of 35 m. Find the necessary reduction in impeller diameter if it is required to reduce the original diameter of 500 mm without reducing the speed of impeller. **4**

   c) Explain with neat sketch the 3 types of impeller for a centrifugal pump. **6**

OR

6. a) Write short notes on :
   1) Multistaging for high heads.
   2) Multistaging for high discharges. **6**

   b) A centrifugal pump discharges 225 lps, at a speed of 1740 rpm against a head of 30 m. The impeller diameter is 30 cm and its width at outlet is 6 cm. If the manometric efficiency is 75%, determine the vane angle at outer periphery of the impeller. **6**

   c) How are centrifugal pump classified based on specific speed ? **4**

SECTION – II

7. a) Derive the conditions for most economic triangular channel section. **6**

   b) Water flows in 6 m wide rectangular channel with a uniform flow depth of 2 m. If the channel has a bed slope of 1 in 1500 find the discharge flowing in channel and conveyance of channel Take n = 0.02. **6**

   c) Derive Chezy's equation for flow in open channel. **6**

OR

8. a) Explain the various factors which affect the value of Mannings constant 'n'. **6**

   b) For an efficient trapezoidal channel section, determine the ratio of width to depth of flow. **6**

   c) A channel of uniform cross section has side vertical and base semicircular of diameter 2 m. find the discharge in the channel when the depth of flow is 1.25m. Take n = 0.02 and bed slope S = 1 in 3600. **6**

9. a) Define hydraulic jump and explain jump classification based on Froude Number. What are the practical applications of the jump ? **8**

   b) Differentiate between
      i) Alternate depth and Sequent depth
      ii) Specific energy depth and Specific force diagram.

   Describe the use of these diagrams in determining the loss of energy in a hydraulic jump. **8**

OR

10. a) A hydraulic jump type energy dissipator is designed to have energy loss of 3.0 when the Froude No. before the jump is 10. Calculate the sequent depth, the discharge and Froude No. after jump. **8**

b) Explain channel transition with a hump for supercritical flow. Also, draw the sketch to show variation of depths over a hump for the above transition. **8**

11. a) Show that for Gradually varied flow in a channel, the water surface slope is

$$\frac{dy}{dx} = \frac{S_0 - S_f}{1 - Fr_1^2}$$ **8**

b) Write short notes on : **8**

i) Graphical Integration method of computation in GVF.

ii) Standing wave flume.

OR

12. a) A rectangular channel section 6 m wide discharges water at a rate of 12 m^3/s with an average velocity of 1.5 m/s. **6**

Find i) Sp.Energy of flowing water

ii) Depth of water when sp. energy is min.

iii) Velocity of flow when sp. energy is min.

iv) Minimum sp. energy.

b) Discuss the characteristics and occurance of M_2 profile. Sketch water surface profile when a mild slope is followed by milder slope which is followed by steep slope. **10**

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T.E. (Civil) (Sem. – I) Examination, 2009
THEORY OF STRUCTURES – II
(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions *: 1)* ***Solve Que. 1or Que. 2, Que.3 or Que. 4, Que. 5 or Que. 6*** *from Section* ***I****.*
2) ***Solve Que. 7 or Que. 8, Que. 9 or Que. 10, Que. 11 or Que. 12*** *from Section* ***II****.*

SECTION – I

1. Analyse the beam, ABC loaded and supported as shown in fig. 1, using Slope Deflection Method. Draw BMD, SFD and Elastic Curve. **18**

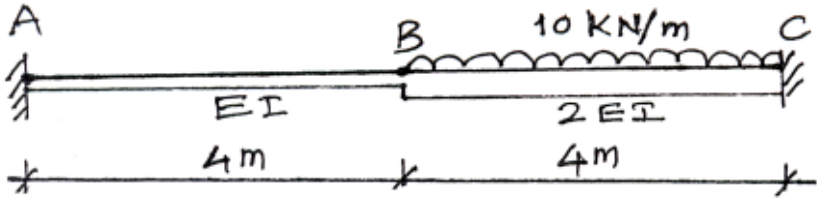

Fig. 1

OR

2. Analyse the rigid jointed plane frame, loaded and supported as shown in fig. 2, using Moment Distribution Method. Draw BMD, SFD and Elastic Curve. **18**

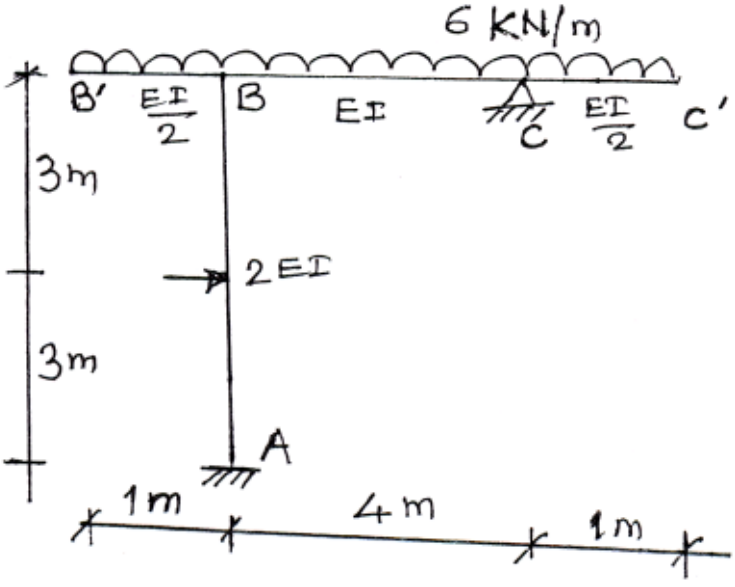

Fig. 2

P.T.O.

3. Analyse the rigid jointed plane beam, loaded and supported as shown in fig. 3, using Flexibility Matrix Method. Draw BMD, SFD and Elastic Curve. **16**

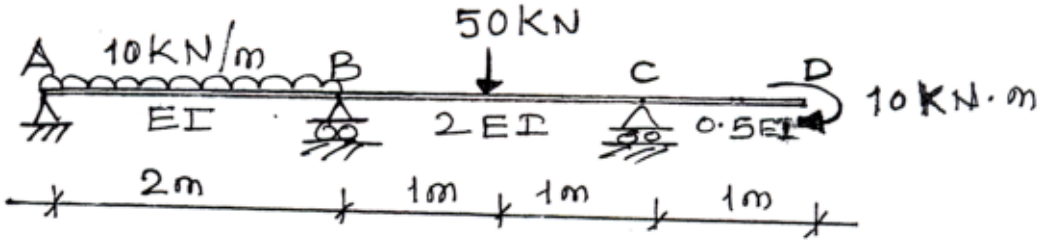

Fig. 3

OR

4. Analyse the rigid jointed plane frame loaded and supported as shown in fig. 4, using Stiffness Matrix Method. Draw BMD, SFD and Elastic Curve. **16**

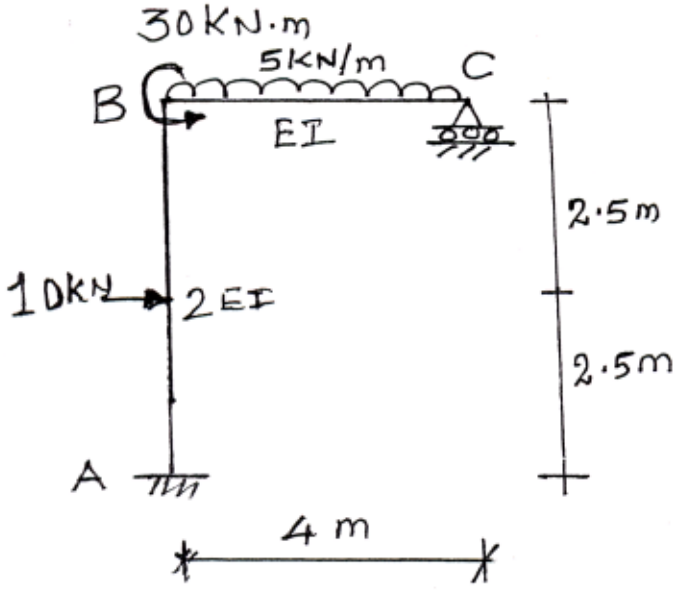

Fig. 4

5. State the assumptions made in Cantilever Method of Approximate Analysis, and hence analyses the rigid jointed frame loaded and supported as shown in fig. 5, Draw BMD, SFD and Axial Force Diagram for the beam and column of Ground story only. **16**

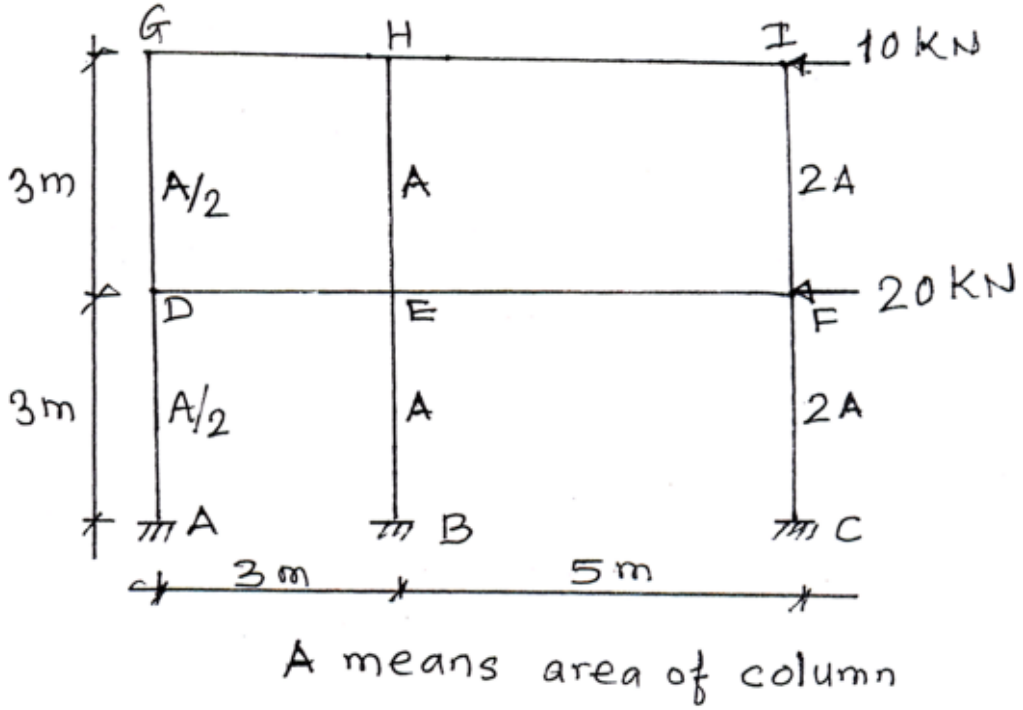

Fig. 5

OR

6. A uniform quarter circular beam, ABC of radius R, curved in plan, is simply supported at ends, A and C and at mid point, B along the arc. The beam is loaded with uniformly distributed load; 'w' per meter over the length AC. Plot the SFD and BMD along the spans, AB and BC. **16**

SECTION – II

7. a) Derive the equilibrium equation for stresses with body forces, P and Q, at state of a point in 2-dimensions. **9**

   b) Derive the Elastic Stability Stiffness matrix for Beam-Column element. **9**

OR

8. a) Explain the following : **9**
   a) Airy's stress function and its use
   b) Strain rosette
   c) Saint Venants principal
   d) Dilatation.

   b) Write a note on following : **9**
   a) upper bound and lower bound theorems
   b) linier elastic linier structure and plastic structure
   c) explain lateral instability of beam with examples.

9. a) Determine the Shape factor for solid triangle, abc of side, ab = bc = ca= 1m. **8**

   b) Derive the expressions for maximum deflection and maximum tension for parabolic cable supported at two ends. Self weight, w per meter and span, L. **8**

OR

10. a) What is plastic hinge, where and how does it get forms ? Explain the different collapse mechanism for 2D plane frame with suitable diagram. **8**

    b) A flexible cable weighing 10 N per meter hangs between two supports A and B which are 50 m apart horizontally. The left support, A is 8 m below the right support, B. Cable supports a point load of 1200 N at a point 15 m horizontally from the left support, A and 3 m below this support. Assuming that self weight cable is uniformly distributed over the total horizontal span,AB; find the maximum tension in the cable. **8**

11. a) Write the step by step procedure with mention of derivations/formulae to find the deflection at a point **by using Finite Element Method**. State the meaning of each parameter term. **8**

    b) Calculate the displacement at centre of simple supported beam, AB of span 5 m subjected to a point load of 25 kN at centre. Assume interval increment at 0.5m, EI is constant for AB and BC. **Use finite difference method**. **8**

OR

12. a) Calculate the displacement at free end of propped cantilever beam,ABC, carrying the point load of 100 kN at center of span AB. **Use Finite Difference Method**. Assume span AB=BC=2 m and interval increment at 0.5 m, EI is constant for AB and BC. **8**

    b) Derive the differential equation for defection of a beam by **finite difference method**. **8**
