

Civil

Sub: - Surveying - II

Q.P. NO : 12434

Date: 27/11/14

(3 Hours)

[Total Marks : 80



- N.B. : (1) Question No 1 is compulsory.
(2) Attempt any three from the remaining questions.
(3) Attempt sub question in order only.
(4) Assume suitable data , if required and state the same clearly.
(5) Figures to right indicate full marks.

1. Solve any four of the following.

20

- (a) Draw a neat sketch of simple circular curve & show all elements.
- (b) Explain use of computer in surveying.
- (c) Explain principles of EDM
- (d) Explain field method to determine the constant of a tacheometer ?
- (e) Differentiate between land survey and construction survey ?

2. (a) Describe the principle of tacheometry and differentiate between fixed hair method and movable hair method of tacheometry.

8

(b) A fixed hair tacheometer fitted with an anallatic lens with instrument constant of 100, was used to determine the slope between point P & Q. The following reading were taken. If the staff was held vertically, compute the gradient from P & Q.

12

Inst. Station	Staff station	Bearing	Reading of Stadia hair	Reading of axial hair	Vertical angle
A	P	345°	0.915 2.585	1.750	+15°
	Q	75°	0.760 3.715	2.240	+10°

3. (a) What is transition curves ? Why it is provided, explain different types of transition curve.

10

(b) Two tangents intersect at chainage 1250 m. The angle of intersection is 150°. Calculate all data necessary for setting out a curve of radius 250m by the deflection angle method. The peg intervals may be taken as 20m.

10

4. (a) What do you understand by setting out work? Explain in detail the procedure for setting out work for a building.

10

(b) A gradient of -5% meets a gradient of +3.0% at a chainage of 1350 m and elevation of 14 m. A vertical curve of length 200m is to be set out with pegs at 20m interval. Calculate the elevation of Pegs by chord gradient method.

10

(TURN OVER)

SN-Gen. 8563-14.

OVER ASIN 10

Civil

SE sem - IV (old) Nov-Dec (old) (07)

Sub? - Surveying - II

Date: 9/12/

(OLD COURSE) Q.P. NO : 14415

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions from remaining six questions.
 (3) Figures to the right indicate full marks.

1. (a) Define designation of simple circular curve. 5
 (b) Define radial acceleration used in transition curve. 3
 (c) Describe stadia diaphragm. 2
 (d) Explain various methods for positioning a structure. 5
 (e) Differentiate between tangential angle and deflection angle. 3
 (f) Write aim of route surveying. 2
2. (a) Explain linear methods of setting out of simple circular curve. 10
 (b) Explain why subtense bar method is more accurate than other methods of tacheometry. 5
 (c) Enlist various elements of a compound curve. 5
3. (a) Two straights BA and AC are intersected by EF. The angle BEF and EFC are 140° and 145° respectively. The radius of first arc is 600 m and that of second arc is 400 m. find the chainages of tangent points, the point of compound curve, given that chainage of point of intersection (A) is 3415 m. 10
 (b) How would you align a bridge and measure the length of bridge and distance between the piers? 1
4. (a) A downgrade of 1.2 % is followed by an up gradient of 2.4 %. RL of intersection is 100 m and the chainage is 360 m. A vertical parabolic curve 120 m long is to be introduced to connect the down grade. The peg interval is 15 m. Calculate the elevations of the curve by chord gradient method. If the RL of line of collimation is 103 m then determine the RL of top of wooden pegs driven along vertical curve.
 (b) Write benefits of a transition curve.
 (c) Write a short note on precise leveling.

Civil

(OLD COURSE) Q.P. NO : 14415

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any four questions from remaining six questions.

(3) Figures to the right indicate full marks.

1. (a) Define designation of simple circular curve. 5
- (b) Define radial acceleration used in transition curve. 3
- (c) Describe stadia diaphragm. 2
- (d) Explain various methods for positioning a structure. 5
- (e) Differentiate between tangential angle and deflection angle. 3
- (f) Write aim of route surveying. 2

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- (b) Explain why subtense bar method is more accurate than other methods of tacheometry. 5
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- (b) How would you align a bridge and measure the length of bridge and distance between the piers? 10

4. (a) A downgrade of 1.2 % is followed by an up gradient of 2.4 %. RL of intersection is 100 m and the chainage is 360 m. A vertical parabolic curve 120 m long is to be introduced to connect the down grade. The peg interval is 15 m. Calculate the elevations of the curve by chord gradient method. If the RL of line of collimation is 103 m then determine the RL of top of wooden pegs driven along vertical curve. 10
- (b) Write benefits of a transition curve.
- (c) Write a short note on precise leveling.

5. (a) Explain systematically the setting out of a culvert.
 (b) A tacheometer is set up at an intermediate point on a traverse course PQ and following observations were made on a vertically held staff.

Staff Station	Vertical angle	Staff intercept	Axial hair reading
P	+9°30	2.250	2.105
Q	+6°00	2.055	1.875

Compute the length of PQ and RL of Q If the RL of P is 350.5 m.

6. (a) Derive an expression for horizontal distance and elevation equation for tangential method when both vertical angles are of opposite sign.
 (b) Enlist modern surveying instruments and explain working principle of EDM.
 (c) Explain reverse curve and comment on their suitability in highway and railways.
7. (a) What is total station? Explain its various use with sketches.
 (b) Two straights on the centre line of a proposed railway curve intersect at 2610 m. The deflection angle being 46°. A circular curve with 400 m radius and transition curve of length 90 m are to be introduced. Calculate the necessary data to set out the curve by tangential angles (Calculate these values for first transition curve and circular curve only).

Subl- BDD-I

Date: 9/12/14

QP Code : 12497

(4Hours)

[Total Marks : 80

Notes: 1. Q.No.1 is compulsory.

2. Attempt any three questions out of remaining five questions.

3. Assume any data suitably, if required.

Q.No.1. It is proposed to construct a bungalow for an Executive Engineer of P.W.D. on a plot measuring 23 m x 20 m in the suburb of Thane District. The building G+1 R.C.C. framed structure, having following requirements.

- (i) Entrance Verandah : minimum 3 mt wide
- (ii) Living Room : 25 sq.mt
- (iii) Engineer's Office : 25 sq.mt.
- (iv) Master Bedroom : 20 sq.mt.
- (v) Bed Rooms (2 Nos.) : 12 sq.mt each
- (vi) Kitchen cum Dining : 25 sq.mt.
- (vii) Study Room : 12 sq.mt.
- (ix) Guest Room : 15 sqmt
- (x) Store : 9 sq.mt.

Provide staircase, passage, sanitary unit , garage, etc. as per bye-laws.

Draw Ground Floor plan.

[20]

Q. No. 2.(a) Draw sectional elevation passing through staircase and sanitary unit , for the building given in Q.No.1 [15]

(b) Draw line plan of first floor for the building given in Q.No.1. [05]

Q.No.3 (a) Draw front elevation of the building given in Q.No.1. [08]

(b) Explain Principles of planning with neat sketches. [08]

(c) Explain objects of Building bye laws. [04]

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- Q.No.4 (a) Draw roof terrace plan of the building given in Q.No.1. [07]
(b) Draw foundation plan of the building given in Q.No.1. [08]
(c) Explain Sunpath Diagram. [05]
- Q.No.5. (a) Explain F.S.I., Plinth Area, Carpet Area, Setback distances [08]
(b) Draw the plan and section of a hall measuring 10 m x 8 m, having lean to roof. [08]
(c) Differentiate between framed structure and load bearing structure. [04]
- Q.No.6. (a) Draw the site plan showing all details of the building given in Q.No.1 [08]
(b) Draw plan and section of a open well staircase for a commercial building, having floor to floor height 3.6 mt. [08]
(c) "Drawing is the Language of Engineer" Explain. [04]

GN-Con. 10551-14.

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Civil

se sem-IV (old) Nov-DEC-14
Sub:- BDD-I Date: 19/12/14

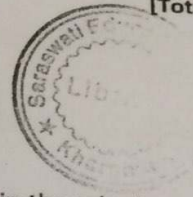
(OLD COURSE)

QP Code : 14490

[4 Hours]

[Total Marks: 100]

- NB: 1. Q.No. 1 is compulsory
2. Attempt any four questions from remaining six questions.
3. Assume any data suitably if not given and state it clearly.



1. It is proposed to construct a residential apartment in the suburban of Thane District. The building is Stilt +3 floor, R.C.C. framed structure, having the two flats on each floor. One is Type A flat : 1BHK (Area 60 sq.mts) , Second is Type B flat : 2 BHK (Area 90 sq.mt)
Provide passages, staircase , sanitary unit, parking area etc. as per byelaws.
Draw Typical floor plan. [20]
2. (a) Draw Stilt level floor plan of the building given in Q.No.1. [10]
(b) Draw the front elevation of the building given in Q.No.1. [10]
3. Draw the detailed sectional elevation passing through staircase and other important unit of building given in Q.No.1. [10]
4. (a) Explain Principle of Planning with neat sketches . [10]
(b) Explain F.S.I. with neat sketch. Define Carpet area, plinth area and built-up area [10]
5. (a) Draw the plan and section of a pitched roof over a hall measuring 10 m x 8 m [10]
(b) Draw the roof terrace plan of the building given in Q.No.1. [10]
6. (a) Draw the foundation plan for the building given in Q.No.1 [10]
(b) Draw the site plan showing proposed built-up area, internal road, parking area, open space etc of the building given in Q.No.1. [10]
7. (a) Draw plan and section of staircase for an educational building R.C.C. Framed Structure (G+1) [10]
(b) Explain [i] sun path diagram [ii] Various types of structures [10]

LM-Con. 12064-14.

INSTRUCTIONS: 1. Question Number 1 is COMPULSORY.

Dec 14

2. Answer any THREE from the remaining. 3. Each full question carries EQUAL marks.
4. ASSUME any suitable data, if needed.

1. a) What is soundness of cement? How is it tested? (04 M)
 b) Define fineness modulus. Give the practical range of fineness modulus values for coarse & fine aggregates. (04 M)
 c) Choose & write the correct option: (04 M)
 i. The heat of hydration of cement can be reduced by:
 a) Reducing the proportions of C_3A & C_3S b) Increasing the proportions of C_3A & C_3S
 c) Increasing the fineness of cement d) Both (a) & (c)
 ii. Increase in fineness modulus of aggregate indicates:
 a) Finer Grading b) Coarser grading c) Gap grading d) None of these
 iii. For a constant water-cement ratio, decrease in aggregate-cement ratio causes:
 a) Increased workability b) Decreased workability c) No workability change d) None of these
 iv. In concrete mix design, allowance for bulking of sand is necessary in case of:
 a) Volume batching only b) Weigh batching only c) Both (a) & (b) d) None of these
 d) What do you understand by Rapid hardening Cement? Why there is rapid rate of strength gain? Under what situations, would you recommend Rapid Hardening cement on site? (04 M)
 e) Enlist the types of admixtures. Write a short note on Plasticizers. (04 M)

2. a) The following table depicts compressive strengths (MPa) of 20 number of concrete cubes tested in a laboratory. Calculate: Average strength, standard deviation & coefficient of variation. (07 M)

Sample No.	Compressive Strength	Sample No.	Compressive Strength	Sample No.	Compressive Strength	Sample No.	Compressive Strength
1	44	6	40	11	48	16	43
2	46	7	38	12	42	17	45
3	38	8	35	13	44	18	38
4	41	9	37	14	36	19	39
5	36	10	41	15	34	20	42

- b) Explain the concrete workability with reference to shape, size & grading of aggregates. (06 M)
 c) Explain creep & shrinkage of concrete. (07 M)

3. a) The concrete mix design is carried out for M30 concrete as per Indian Standard method. The mix proportion per m^3 of concrete is obtained as below:

Cement (kg)	Water (kg)	Sand (kg)	Coarse Aggregates (kg)
420	189	548	1195

Correct this proportion to suit the site conditions such that free surface moisture of sand = 2%, water absorption of coarse aggregates = 2%. Coarse aggregates contain 60% of 20 mm size & 40% of 12.5 mm size. Report your answers in weights as well as ratios. (07 M)

- b) Write a detailed note on Non Destructive Testing by using Ultrasonic Pulse Velocity method. If a concrete gives pulse velocity of 2.5 km/second, give your comments on the quality of concrete with reference to Indian Standard specifications. (07 M)
- c) What are the advantages of using Ready Mixed Concrete? (06 M)

4. a) Discuss in detail, the factors affecting the durability of concrete. (10 M)
- b) With a neat sketch, explain Compacting Factor Test for determining the concrete workability. For the same concrete, how are the slump value & Compacting factor related? (10 M)

5. Write notes on any four: (20 M)

- High Performance Concrete
- Self Compacting Concrete
- Segregation & bleeding of concrete
- Retarders used in concrete
- Distress in concrete structures

6. a) Explain Split Tensile Test, with a neat sketch. (08 M)
- b) Discuss high volume fly ash concrete. (06 M)

c) How many minimum concrete compressive test results are needed for a particular concrete grade on site, to fix up the value of Standard Deviation? In the absence of test results, what is the value of Standard Deviation would you adopt for designing M25 concrete mix, as per Indian Standard specifications? (03 M)

d) The concrete mix design is carried out as per Indian Standard Method for M20 concrete. The crushing strength test results of three cubes after 28 days of curing are: 12 N/mm^2 , 20 N/mm^2 & 30 N/mm^2 . Can this result be accepted? If not, give the specific reasons. (03 M)

Instructions: 1. Question no. 1 is compulsory and solve any four questions out of remaining six questions.

2. Draw neat sketches wherever necessary.

3. Figures to the right indicate full marks.

- 1(a) Define high performance and high strength concrete. 20
(b) Write any five advantages of ready mixed concrete.
(c) Define Segregation and Bleeding of concrete.
(d) Explain the importance of non destructive testing of concrete
(e) Enlist any five properties for coarse and fine aggregates.
- 2 (a) Explain in detail manufacturing process of concrete. 10
(b) Explain in detail various properties of hardened concrete. 10
- 3 (a) Explain in detail various factors affecting workability of concrete. 10
(b) Explain step by step procedure to design concrete mix for compressive strength as per IS: 10262-1984. 10
- 4 (a) What are the various Non destructive tests carried out on concrete? Explain any one test in detail. 10
(b) Draw flow diagram for ready mixed concrete plant and explain each operation in detail. 10
- 5(a) Explain in detail Hot weather and cold weather concreting? 10
(b) Enlist any five types of admixtures commonly used and explain them in detail. 10
- 6 Write short notes on the following 5
(a) Under water concreting. 5
(b) Roller compacted concrete 5
(c) Fibre reinforced concrete 5
(d) Polymer concrete 5
- 7(a) What are the factors affecting durability of concrete? 5
(b) What is carbonation of concrete? 5
(c) Explain in detail crack repair technique. 5
(d) Explain various methods adopted for curing of Concrete members. 5

LM.Con.:11457-14.

N.B: (1) Question No. 1 is compulsory.

(2) Attempt any three questions out of remaining five questions.

(3) Assume suitable data wherever required and state it clearly.

(4) Illustrate your answers with neat component sketches wherever required.

(5) Answers should be written in the legible handwriting, stepwise and in the systematic manner.

1. Attempt any four of the following

(a) Enlist various methods for finding deflection in structures. Also state the suitability of each method. 05

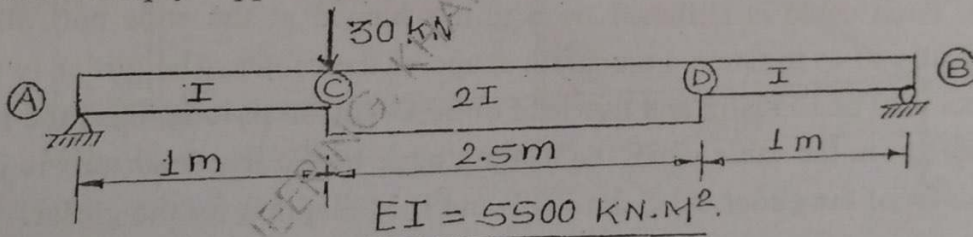
(b) State and explain Maxwell's Reciprocal theorem and Betti's theorem. 05

(c) Explain unsymmetrical bending and the concept of shear center in brief 05

(d) A symmetrical cable of span 80m with central dip 12m is loaded with udl of 20 kN/m. Find the maximum and minimum tension in the cable. 05

(e) Define strain energy. Write the expression for strain energy stored due to shear force, bending moment and twisting moment. 05

2. (a) Using Conjugate beam method, find the vertical deflection at C and slope at B for the simply supported beam as shown in figure. 08

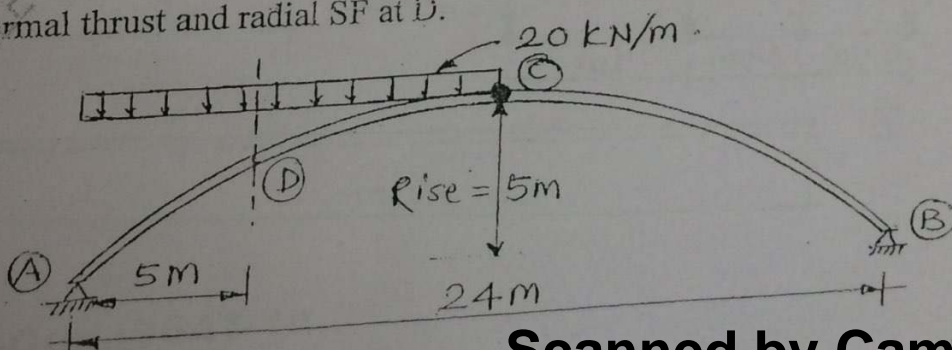


(b) A three hinged symmetrical parabolic arch is loaded as shown in figure. Calculate: 12

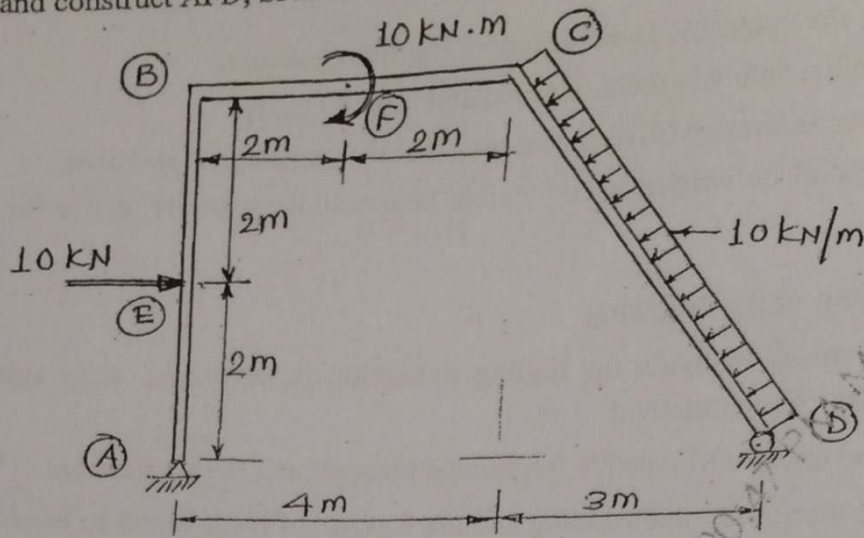
(i) Support reaction

(ii) Maximum bending moment in the portion AC and BC (Draw neat sketch).

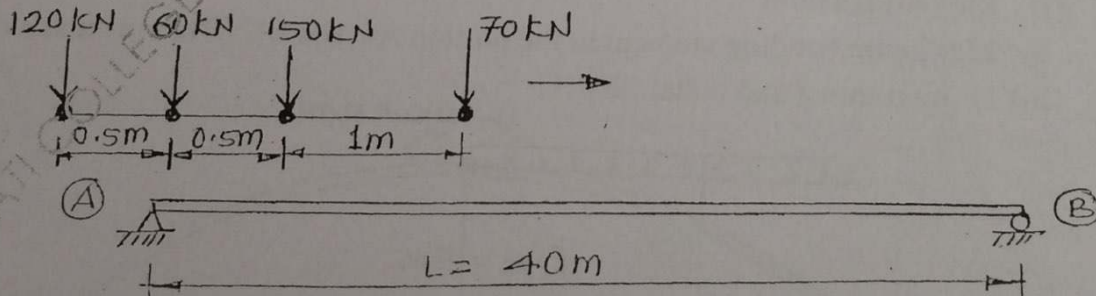
(iii) Normal thrust and radial SF at D.



3. (a) Analyse the frame as shown in fig. Draw free body diagram of each member and construct AFD, SFD and BMD.



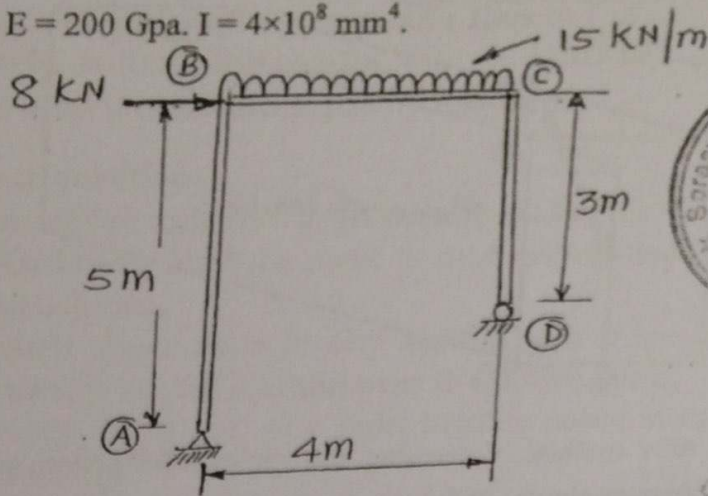
- (b) A column of hollow circular section with external diameter 300 mm and thickness 40 mm is 4 m long. It is pinned at both the ends. The column carries a load of 100 kN at an eccentricity of 40 mm, find out the stresses produced at extreme fibre of the column section. Take $E = 200 \text{ Gpa}$.
4. (a) The cables of a suspension bridge have span of 60 m and a central dip of 7.5 m. Each cable is stiffened by a girder hinged at the ends and also at the middle so as to retain a parabolic shape of the cables. The girder is subjected to a load of 10 kN/m and live load of 20 kN/m, 15 m long. Find the maximum tension in the cable when the leading edge of the live load (udl) is just at the center of the girder. Also draw S.F and B.M diagram for the girder.
- (b) A series of concentrated load traverses on a simply supported beam as shown in fig. Calculate absolute maximum bending moment in the beam.



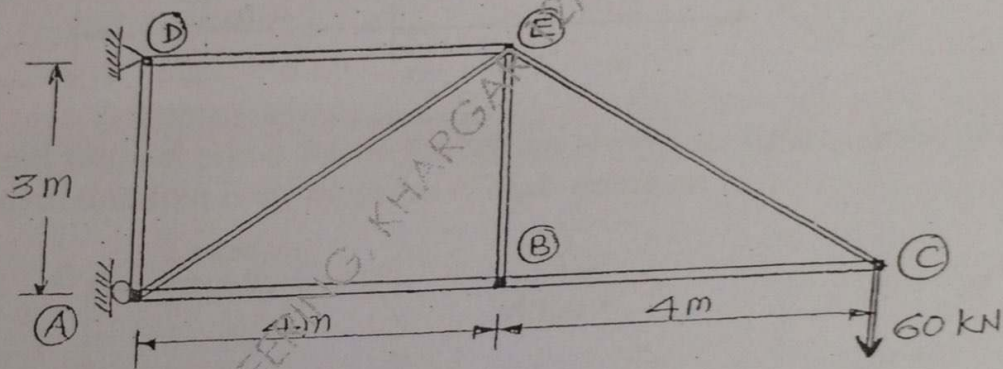
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GN-Con.:9647-14.

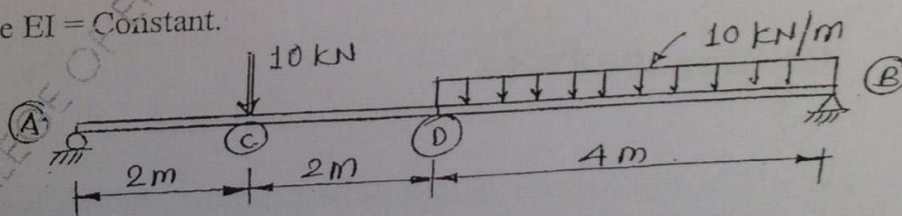
5. (a) Using unit load method or Castiglianos second theorem, for the rigid jointed frame shown in fig. Calculate a horizontal displacement of roller support at D. Take $E = 200 \text{ Gpa}$. $I = 4 \times 10^8 \text{ mm}^4$.



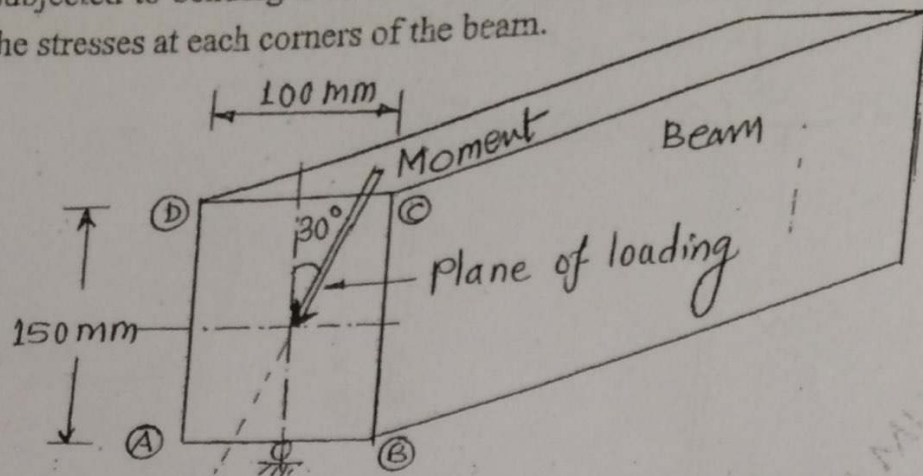
- (b) Using unit load method or any other energy method, find the vertical deflection of joint C of a pin jointed truss loaded and supported as shown in fig. Take $AE = \text{Constant}$ for all members.



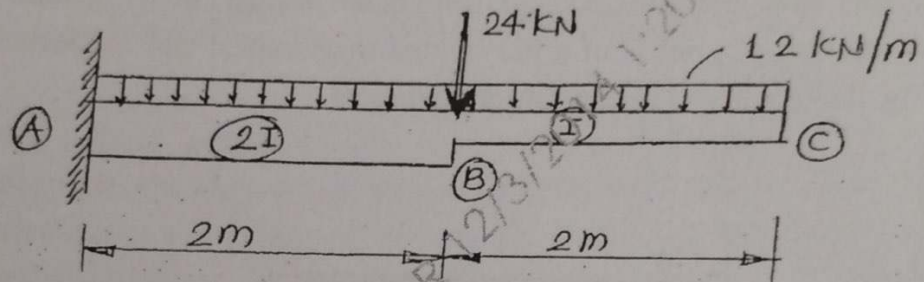
6. (a) Using Macaulay's method determine maximum deflection and slope at A and B. Take $EI = \text{Constant}$.



- (b) A beam of rectangular cross section 100 mm wide and 150 mm deep is subjected to bending moment of 15 kN.m in the plane as shown in fig. Find the stresses at each corners of the beam.



- (c) Using moment area method, determine the vertical deflection and slope at the free end of the beam as shown in figure.



GN-Con.:9647-14.

Civil

SE sem-IV (old) Nov-Dec-14
Sub:- SA-I
(OLD COURSE)

Date: 3/12/14
QP Code :14379

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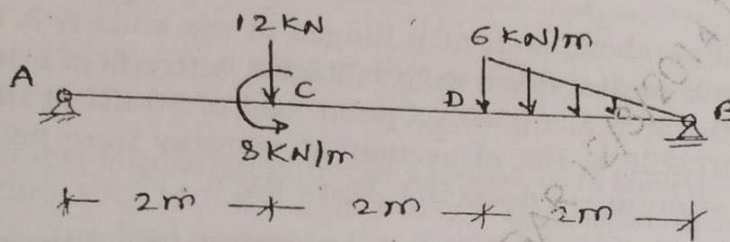
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Total Marks-100

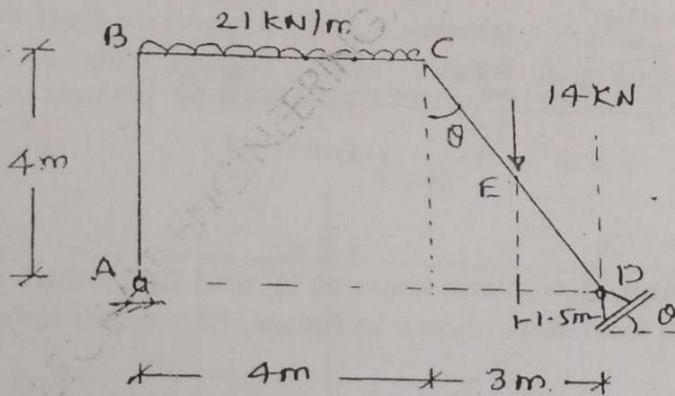
- 1) Question No. 1 is **compulsory**. Attempt **any four** out of remaining **six** questions.
- 2) Figures to the **right** indicate full marks.
- 3) Assume suitable data if needed but justify the same.

Q.1 Answer **any four** questions-

- a) State and explain- (i) Castigliano's 2nd Theorem (ii) Betti's Theorem. (5)
- b) Show that the Rankine's formula used to find critical load can be applied to both short as well as long column. (5)
- c) Show that the radial shear force at any section of a three hinged parabolic is zero when the arch is loaded with udl loading over the entire span. (5)
- d) Derive the expression for length of a light flexible cable suspended from two points which are at the same level (5)
- e) For the beam loaded as shown in figure, write the appropriate BM equation that shall be used to find deflection using Macaulay's method. (5)



- Q.2 a) For the rigid jointed plane frame loaded as shown in figure, draw AFD, SFD and BMD by constructing free body diagram of each member. (13)



- b) A simply supported timber beam of span 4.5 m carries udl of intensity 20 kN/m over the entire span. The C/S of beam is a rectangle of size 150 mm x 250 mm. Find maximum bending stress at mid span section if the plane of loading makes an angle of 30° clockwise with minor principal axis of beam section. (7)

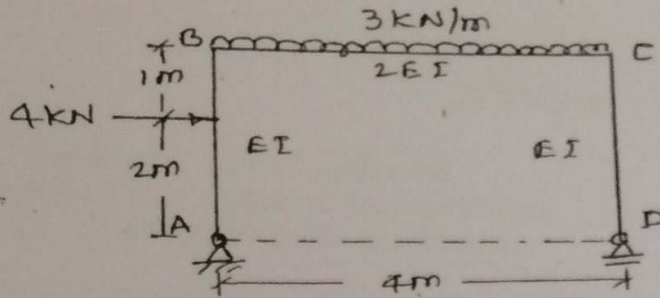
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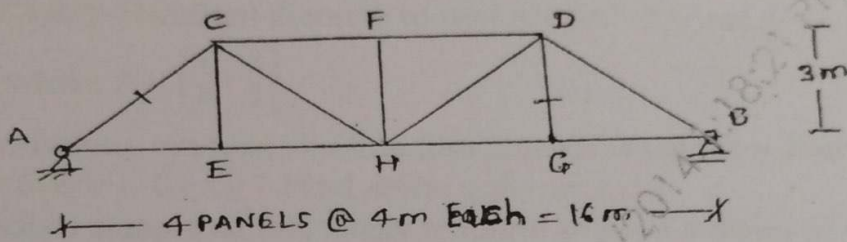
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Q.6 a) For the rigid jointed plane frame loaded & supported as shown, determine the horizontal movement of roller support 'D'. Use Virtual Work Method. Take $EI = \text{Constant}$

(12)

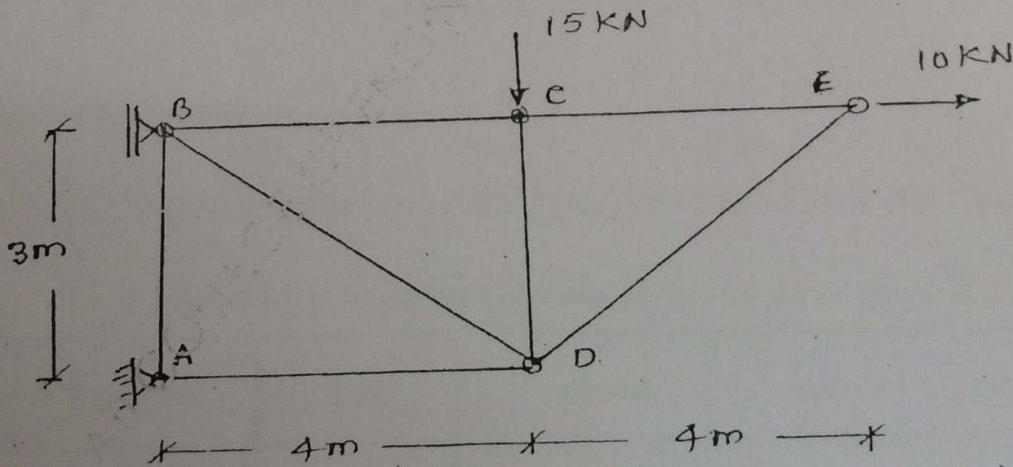


b) Draw ILD for axial force in the members 'AC' and 'DG' of a simply supported bridge truss shown in figure. Also find the maximum values of these forces if a load of 90 kN moves along the bottom chord members. (08)



Q.7 a) A simply supported girder of span 50 m is traversed by a series of wheel loads 160 kN, 200 kN, 180 kN and 140 kN spaced at distances 2m, 1.5m and 1 m respectively. The load system moves from left to right with 140 kN load leading. Find the location & magnitude of absolute maximum bending moment anywhere in the girder. (08)

(b) Using unit load method or any other energy method, find the vertical deflection of joint 'E' of a pin jointed truss loaded & supported as shown in figure. Take $AE = \text{Constant}$ for all members. (12)



- N.B. (1) Question no. 1 is compulsory.
 (2) Attempt any three of the remaining.
 (3) Use of statistical table is allowed.

1. (a) Using Green's theorem evaluate. 5
 $\int (xy+y^2)dx + x^2dy$ where c is the closed curve of the region bounded by $y=x$ and $y= x^2$.
- (b) Use Cayley-Hamilton theorem to find $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ in terms of A where $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ 5
- (c) A continuous random variable has probability density function $f(x) = 6(x-x^2)$ $0 \leq x \leq 1$ Find mean and variance. 5
- (d) A random sample of 900 items is found to have a mean of 65.3cms. Can it be regarded as a sample from a large population whose mean is 66.2cms. and standard deviation is 5 cms at 5% level of significance. 5
2. (a) Calculate the value of rank correlation coefficient from the following data regarding marks of 6 students in statistics and accountancy in a test 6

Marks in Statistics:	40	42	45	35	36	39
Marks in Accountancy:	46	43	44	39	40	43

- (b) If 10% of bolts produced by a machine are defective. Find the probability that out of 5 bolts selected at random atmost one will be defective. 6
- (c) Show that the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ 3
 is diagonalisable. Find the transforming matrix and the diagonal matrix.

- (a) In a laboratory experiment two samples gave the following results. 6

Sample	size	mean	sum of squares of deviations from the mean
1	10	15	90
2	13	14	108

Test the equality of sample variances at 5% level of significance.

3. (b) Find the relative maximum or minimum of the function. 6
 $z = x_1^2 + x_2^2 + x_3^2 - 6x_1 - 10x_2 - 14x_3 + 103$
 (c) Prove that $\vec{F} = (y^2 \cos x + z^3)\mathbf{i} + (2y \sin x - 4)\mathbf{j} + (3xz^2 + 2)\mathbf{k}$ is a conservative field. 8
 Find the scalar potential for \vec{F} and the workdone in moving an object in this field from $(0, 1, -1)$ to $(\frac{\pi}{2}, -1, 2)$

4. (a) The weights of 4000 students are found to be normally distributed with mean 50kgs. and standard deviation 5kgs. Find the probability that a student selected at random will have weight (i) less than 45 kgs. 6
 (ii) between 45 and 60 kgs.
 (b) Use Gauss's Divergence theorem to evaluate 6
 $\iint_S \vec{N} \cdot \vec{F} ds$ where $\vec{F} = 4x\hat{i} + 3y\hat{j} - 2z\hat{k}$ and s is the surface bounded by $x=0, y=0, z=0$ and $2x+2y+z=4$
 (c) Based on the following data, can you say that there is no relation between smoking and literacy. 8

	smokers	nonsmokers
Literates	83	57
Illiterates	45	68

5. (a) A random variable X follows a Poisson distribution with variance 3 calculate $p(X=2)$ and $p(X \geq 4)$ 6
 (b) Use Stoke's theorem to evaluate $\int_C \vec{F} \cdot d\vec{r}$ where $\vec{F} = x^2\mathbf{i} + xy\mathbf{j}$ and c is the boundary of the rectangle $x=0, y=0, x=a, y=b$ 6
 (c) Find the equations of the two lines of regression and hence find correlation coefficient from the following data. 8

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

6. (a) Two independent samples of sizes 8 and 7 gave the following results. 6

Sample 1:	19	17	15	21	16	18	16	14
Sample 2:	15	14	15	19	15	18	16	

Is the difference between sample means significant.

6. (b) If $A = \begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$ find A^{50} 6
- (c) Use the Kuhn-Tucker Conditions to solve the following N.L.P.P. 8

$$\text{Maximise } z = 2x_1^2 - 7x_2^2 + 12x_1x_2$$

$$\text{Subject to } 2x_1 + 5x_2 \leq 98$$

$$x_1, x_2 \geq 0$$



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