

Civil

Sub: - AM-IV

date: 15-5-15

(OLD COURSE)

QP Code : 3960

(3 Hours)

[Total Marks : 100]

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



1. (a) Using Green's theorem evaluate  $\int_c (xy + y^2) dx + x^2 dy$  where  $c$  is the closed curve of the region bounded by  $y = x$  and  $y = x^2$ . 5

(b) A continuous random variable has probability density function  $f(x) = C(x-x^2)$ ,  $0 \leq x \leq 1$ . Find mean and variance. 5

(c) A random sample of 900 items is found to have a mean of 65.3 cms. Can it be regarded as a sample from a large population whose mean is 66.2 cms and standard deviation is 5 cms at 5% level of significance. 5

(d) Evaluate  $\int_c \frac{3z^2 + z}{z^2 - 1} dz$  where  $c$  is the circle  $|z| = 2$ . 5

2. (a) Use Gauss's divergence theorem to evaluate  $\iiint_s \bar{N} \cdot \bar{F} ds$  where  $\bar{F} = 4xi + 3yj - 2zk$  and  $s$  is the surface bounded by  $x = 0$ ,  $y = 0$ ,  $z = 0$  and  $2x + 2y + z = 4$ . 6

(b) In an intelligence test administered to 1000 students the average score was 42 and standard deviation 24. Find the number of students  
 (i) exceeding the score 50  
 (ii) between 30 and 54. 6

(c) Evaluate  $\int_0^{2\pi} \frac{\cos 2\theta}{5 + 4 \cos \theta} d\theta$  using Residue theorem. 8

3. (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.

(b) Determine the poles of the following and find the residue at each pole  $\frac{z+2}{z^2(z-1)}$ . 6

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(c) Find the equations of the two lines of regression and hence find correlation coefficient from the following data

X :	65	66	67	67	68	69	70	72
Y :	67	68	65	68	72	72	69	71

4. (a) If 10% bolts produced by a machine are defective. Find the probability that out of 5 bolts selected at random atmost one will be defective.  
 (b) Find Laurent's series which represents the function

$$f(z) = \frac{2}{(z-1)(z-2)} \text{ when } 1 < |z| < 2.$$

(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. Find the scalar potential for  $\vec{F}$  and the work done in moving an object in this field from  $(0, 1, -1)$  to  $(\frac{\pi}{2}, -1, 2)$ .

5. (a) If x is poison variate and  $P(x = 0) = 6 P(x = 3)$  find  $P(x=2)$ .  
 (b) Tests made on breaking strength of 10 pieces of a metal wire gave the following results 578, 572, 570, 568, 572, 570, 570, 572, 596, 584 in kgs.  
 Test if the breaking strength of the metal wire can be assumed to be 577 kg.  
 (c) The following table shows the marks obtained by 10 students in Accountancy and statistics. Find the coefficient of rank correlation

Student No. :	1	2	3	4	5	6	7	8	9	10
Accountancy :	45	70	65	30	90	40	50	57	85	60
Statistics :	35	90	70	40	95	40	60	80	80	50

6. (a) 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  $x = 0, y = 0, x = a, y = b$ .

(b) A random variable X has the following probability distribution

X	:	-2	3	1
P(x = x)	:	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

Find the first four raw moments and central moments.

- (c) Using the coefficient of variation find which of the following batsman is more consistent in scoring. Would you also accept him as a better batsman a *love* reason. 2

Score of A	:	42	115	6	73	7	19	119	36	24	29
Score of B	:	47	12	76	42	4	51	37	48	13	9

7. (a) Find  $a, b, c$  if  $\vec{F} = (axy + bz^3)\mathbf{i} + (3x^2 - cz)\mathbf{j} + (3xz^2 - y)\mathbf{k}$  is irrotational. 6
- (b) The following table gives the number of accidents in a city during a week. Find whether the accidents are uniformly distributed over a week. 6

Day	:	Sun	Mon	Tue	Wed	Thurs	Fri	Sat
No. of accidents	:	13	15	9	11	12	19	14

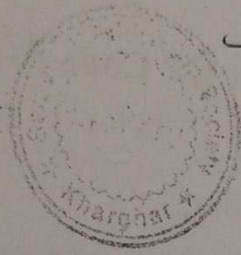
- (c) Find the mean and variance of Binomial distribution. 2
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Civil

Sub: FM-II

Date: 21-5-15



(OLD COURSE)

QP Code : 3962

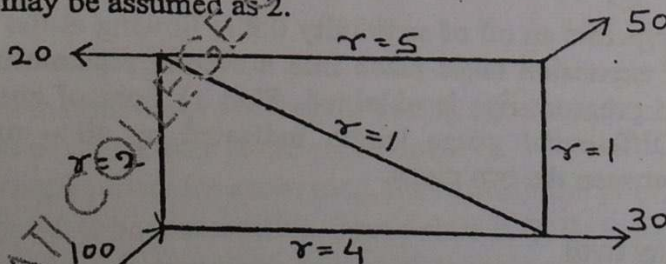
(3 Hours)

[Total Marks : 100]

- N.B.:- 1) Question No 1 is compulsory.  
 2) Solve any four questions from remaining questions.  
 3) Assume suitable data wherever necessary and mention it clearly.

- Q.1 Attempt any four of the following questions. 20
- What are the important characteristics of laminar flow? Give examples where such flow is encountered.
  - Derive Dupit's equation.
  - Calculate the pressure gradient along flow, the average velocity and the discharge for an oil of viscosity  $0.02 \text{ Ns/m}^2$  flowing between two stationary parallel plates 1m wide maintained 10 mm apart. The velocity midway between the plates is 1.8 m/s.
  - Explain Moody diagram.
  - Explain HGL and TEL.
  - An aeroplane is moving at a supersonic speed is not heard by a stationary observer until the plane has passed him. Comment on the validity of this statement.

- Q.2 a) A siphon of diameter 200 mm connects two reservoirs whose water surface level differs by 40 m. The total length of pipe is 8010 m. The pipe crosses a ridge. The summit of ridge is 8m above the level of water in the upper reservoir. Determine the mean depth of the pipe below the summit of the ridge if the absolute pressure head at the summit of siphon is not to fall below 2.8m of water. Take  $f = 0.006$  and the atm. pressure head 10.3 m of water. The length of siphon from the upper reservoir to the summit 500 m. Find the discharge also. 10
- b) For a pipe network shown in figure determine the flow in each pipe. The value of  $n$  may be assumed as 2. 10



- Q.3 a) i) Prove that the velocity of sound wave in compressible fluid is given by,  $C = \sqrt{K/\rho}$  where  $K$  = bulk modulus of fluid and  $\rho$  = density of fluid. 05
- ii) A pipe of 100 mm diameter carrying water. The velocities of a the pipe centre are found to be 2.7 m/s and 2.4 m/s resp. Find the wall shearing stress. 05
- b) The difference in the water surface levels in the two tanks, which are connected by three pipes in series of lengths 300, 170 and 210 m and of diameter 300, 200 and 400 mm resp. is 14m. Determine the rate of flow of water if coefficients of friction are 0.005, 0.0052 and 0.0048 resp. considering moor losses and neglecting minor losses. 10

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Q.4 a) Prove the relationship for one dimensional compressible flow, 10

$$\frac{dA}{A} = \frac{dP}{\rho V^2} [1 - M^2]$$

b) i) A valve is provided at the end of cast iron pipe of diameter 150 mm and of thk. 10 mm. The water is flowing through the pipe which is suddenly stopped by closing the valve. Find the maximum velocity of water, when the rise of pressure due to sudden closure of the valve is  $196.2 \text{ N/cm}^2$ . Take  $K$  for water as  $19.62 \times 10^4 \text{ N/cm}^2$  and  $E$  for cast iron pipe as  $11.772 \times 10^6 \text{ N/cm}^2$ . C6

ii) A projectile is travelling in air having pressure and temp. as  $8.829 \text{ N/cm}^2$  and  $-2^\circ\text{C}$ . If the Mach angle is  $40^\circ$ , find the velocity of projectile. Take for air  $R = 287 \text{ J/kg K}$  and  $k = 1.4$ . 04

Q.5 a) Derive an expression for universal velocity distribution equation for turbulent flow. 08

b) A smooth pipe of diameter 350 mm and length 800 m carries water at the rate of  $0.04 \text{ m}^3/\text{s}$ . Determine the head lost due to friction, wall shear stress, centre line velocity and thk. of laminar sub layer. Take the kinematic viscosity of water as 0.018 strokes. 12

Q.6 a) A fluid of viscosity  $0.7 \text{ Ns/m}^2$  and sp. gravity 1.3 is flowing through a circular pipe of dia. 100 mm. The max. Shear stress at the pipe wall is given as  $196.2 \text{ N/m}^2$ . Find 1) pressure gradient 2) the avg. velocity 3) Reynolds number of flow. 10

b) Find the max. power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe 300 m long and 100 mm diameter with co-efficient of friction as 0.01. The available head at nozzle is 90 m. 10

Q.7 a) In a 100 mm diameter pipeline an oil of sp.gravity 0.9 is flowing at the rate of  $0.0125 \text{ m}^3/\text{s}$ . A sudden expansion takes place into a second pipeline of such diameter that maximum pressure rise is obtained. Find 1) Loss of energy in sudden expansion 2) Differential gauge length indicated by oil - mercury manometer connected between the two pipes. 10

b) Write short notes on ( any two) 10

- i) Hydrodynamically smooth and rough boundary
- ii) Water hammer effect with control measures
- iii) Kinetic energy correction factor and momentum correction factor
- iv) Mach number and it's significance

(3 Hours)

[Total Marks : 80

- N.B.
- (1) Question no. 1 is compulsory.
  - (2) Attempt any three from the remaining questions.
  - (3) Assumption mode should be clearly stated
  - (4) Figures to the right indicate full marks.



1. Attempt any two questions:-

- (a) Explain in detail the field procedure for setting out the curve by Rankine's method of deflection angles. 20
- (b) Explain in detail the procedure along with neat sketch the tachometric radial contouring project along with method employed for plotting the contours.
- (c) Explain (i) Principle of EDM (ii) Principle of tacheometry

2. (a) Differentiate between

- (i) Stadia system and tangential system of tacheometry
- (ii) Fixed hair method and moveable hair method of stadia tacheometry

(b) To determine the distance between two points X and Y and their elevations. Following observations were recorded upon vertically held staves from two travers stations R and S. The tacheometer was fitted with an anallatic lens and instrument constant was 100. Compute the distance XY gradient from X to Y and bearing of XY 10

Travase Stn	RL (m)	HI (m)	Co-ordinates of station		Staff Stn	Beaing	Vertical Angles	Staff Reading
			Lat.	Dep.				
R	1020.60	1.50	800	1800	X	15°14'	+8°9'	1.10, 1.85, 2.60
S	1021.21	1.53	950	2500	Y	340°18'	+2°3'	1.32, 1.91, 2.50

3. (a) Explain in brief the procedure for setting out a simple circular curve by the method of offset from chord produced. 10
- (b) In making a survey for a new road, the intersection point of two straights was found to be inaccessible. Four points P, Q, R, S were therefore selected two on each straight, and the distance between Q and R was found to be 122.20m. If the angle PQR was 169°47'40" and angle QRS 148°22'20"; Draw up a table of deflection angles and chainages for setting out a 200m radius curve by pegs driven at every 20m chain. Chainage of Q=(140+90) chains. 10

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4. (a) Define setting out of works and explain in brief the detailed procedure for setting out of bridge 10
- (b) What is Total station. Mention the advantages of total station over level and theodolite along with the uses of total station. Mention the features of Total station 10
5. (a) What is transition curve? What are the requirements of an ideal transition curve. Enlist the objectives of providing transition curve and mention the different types of transition curves. 10
- (b) A 3% rising gradient meets a 2% down gradient the vertical curve 200m long is to be used. The pegs are to be fixed at 20m interval. Calculate the elevation of the curve points by tangent correction method and calculate the staff readings required given that the height of collimation is 350m, RL of the apex is 350.0m and its change is 1000.0 m 10
6. (a) What is GPS? What are the advantages of space based positioning system and enlist the various applications of GPS in surveying 10
- (b) Explain in brief:- 10
- (i) Auto level
  - (ii) objectives and advantages of GIS
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Civil

Sub:- SA-I



Date: 27-5-15

QP Code : 3967

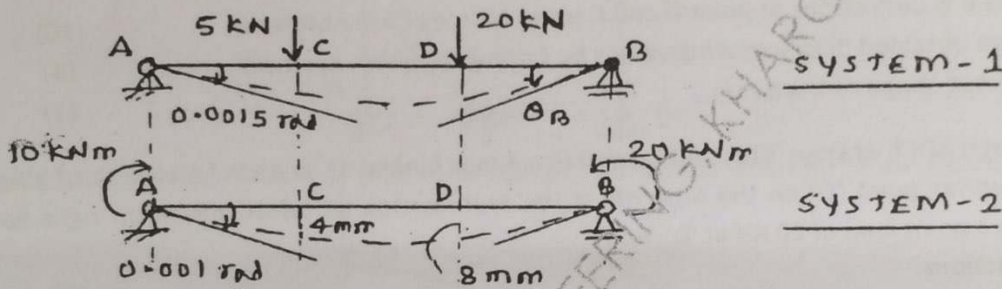
(OLD COURSE)

Maxmum Marks-100

Duration-3 hrs

- N.B. 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 a) State & explain Mohr's theorems I & II to determine displacement in a structure. (4)  
b) Explain the necessity of stiffening girder in a cable-suspension bridge. (4)  
c) Define the terms- i) Effective length of column ii) Slenderness ratio. (4)  
d) Explain the terms- i) Unsymmetrical bending ii) Product of inertia. (4)  
e) Two system of loads & displacements for a simply supported beam are as shown in figures Find the displacement ' $\theta_B$ ' using appropriate energy theorem. (4)



Q.2 a) A suspension cable bridge of span 90 m and central dip of 9 m is strengthened by a 3-hinged stiffening girder. The girder is hinged at each end & also at mid span. If the girder carries a dead load of 15 kN/m along with a point load of 120 kN at a section 15 m to the left of central hinge, calculate maximum & minimum tension in the cable. Also draw SFD & BMD for stiffening girder indicating salient points. (12)

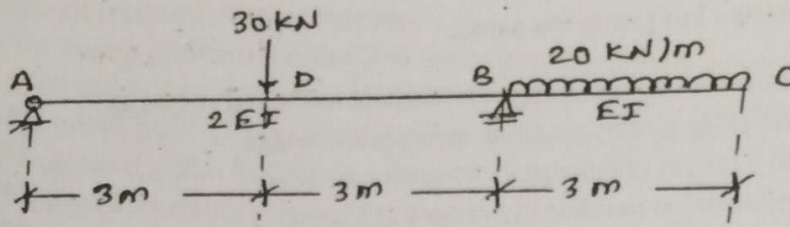
b) A simply supported beam of span 4 m carries udl of 12 kN/m over the entire span. If the beam c/s is rectangular of size 250 mm X 500 mm and the plane of loading is inclined at  $30^\circ$  (clockwise) with the minor principal axis, find the maximum tensile & maximum compressive stress produced on the cross section. Also locate the neutral axis. (8)

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RJ-Con. : 10823-15.



Q.3 An overhanging beam is loaded & supported as shown in figure-

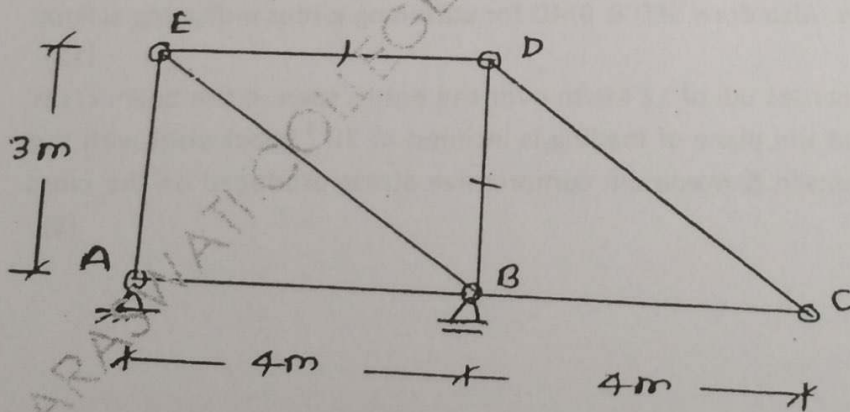


- a) Find slopes at A and B & deflections at point D and C using Moment Area Method. (10)  
 b) Verify above obtained displacements values by Conjugate beam Method. (8)  
 c) Draw deflected shape of the beam. (2)

Q.4 a) A parabolic arch ADCB of span 30 m and central rise 4 m is hinged at its ends and the third hinge is provided at left quarter point 'D' on the arch rib. If the arch carries udl of 10 kN/m on right half portion CB along with a point load of 20 kN at 'D', find-

- i) Support reactions. (3)  
 ii) NT, RSF and BM at right quarter point (6)  
 iii) Maximum BM in portion CB (3)  
 Also draw BMD for the arch (2)

b) Construct ILD for axial force in truss members ED & DB as shown in figure 3(b) (6)



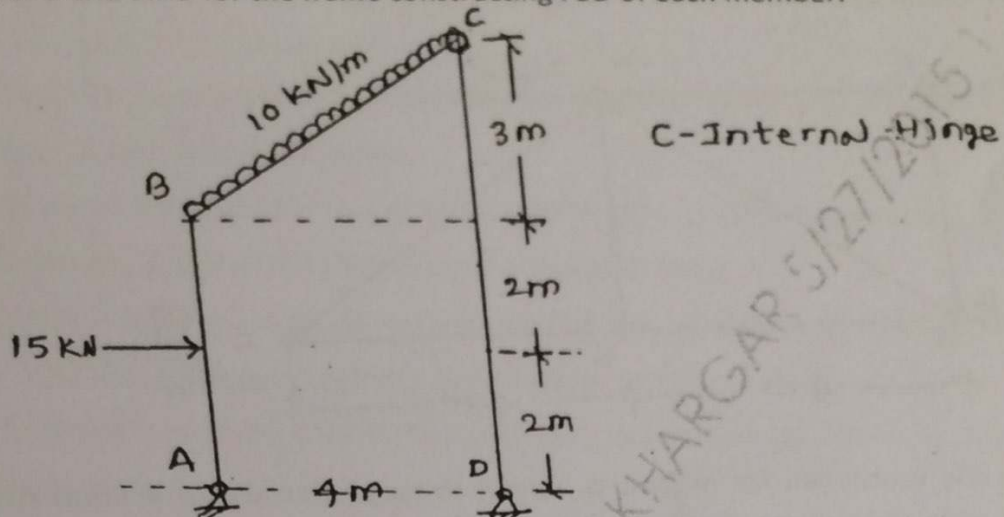
RJ-Con. : 10823-15.

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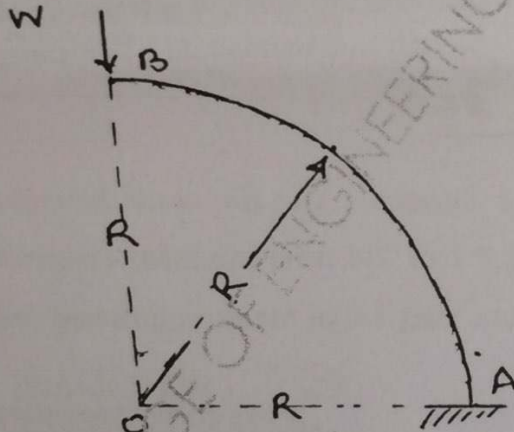
Q.5 a) For the plane frame loaded and supported as shown-

i) Find reactions at supports. (2)

ii) Draw AFD, SFD and BMD for the frame constructing FBD of each member. (12)



b) Using strain Energy Method, find vertical deflection at the free end 'B' of a bent cantilever loaded as shown. (6)



Q.6 a) A simply supported girder of span 40 m is traversed by a train of wheel loads 120KN, 150KN, 200KN & 100 KN spaced at 2 m, 1 m and 1 m distances respectively, from left to right with 100 KN load leading. Find the location & magnitude of absolute maximum BM anywhere in the girder. (10)

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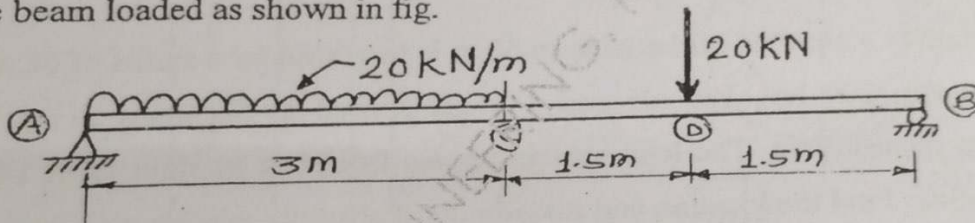
N.B. (1) Question No.1 is compulsory.

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

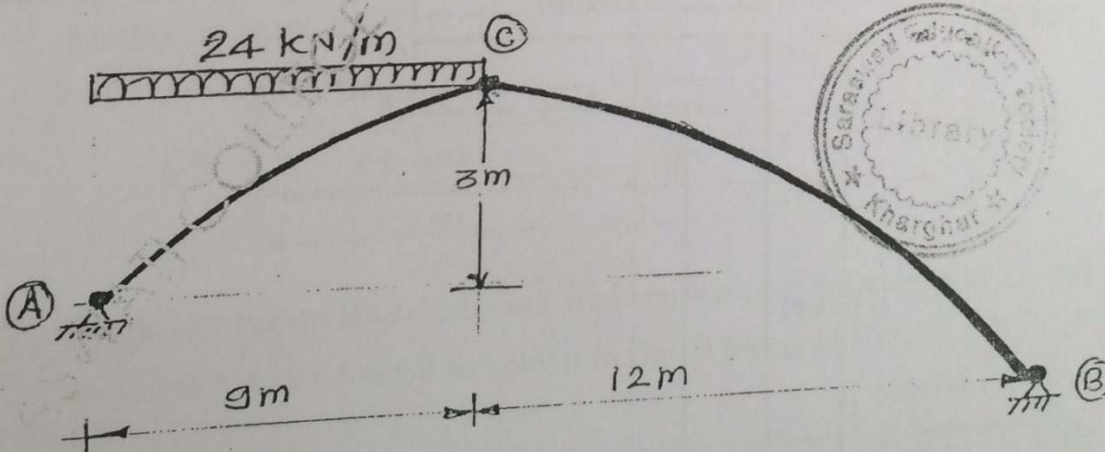
(3) Assume suitable data wherever required and state it clearly.

1. Attempt any four of the following:

- (a) In three hinged parabolic arch subjected to UDL over entire span, show that bending moment & radial shear at any section is zero. 05
- (b) Find the strain energy stored due to bending in cantilever beam subjected to UDL of intensity  $w$  kN/m over entire span. 05
- (c) Define influence line diagram and give its application in civil engineering. Draw ILD for Reaction, S.F and B.M for Simply supported beam 05
- (d) A symmetrical cable of span 50 m and central dip of 5 m subjected to udl of intensity 20kN/m. Find the maximum and minimum tension in the cable. 05
- (e) Using Macaulay's method determine maximum deflection and slope at supports for the beam loaded as shown in fig. 05



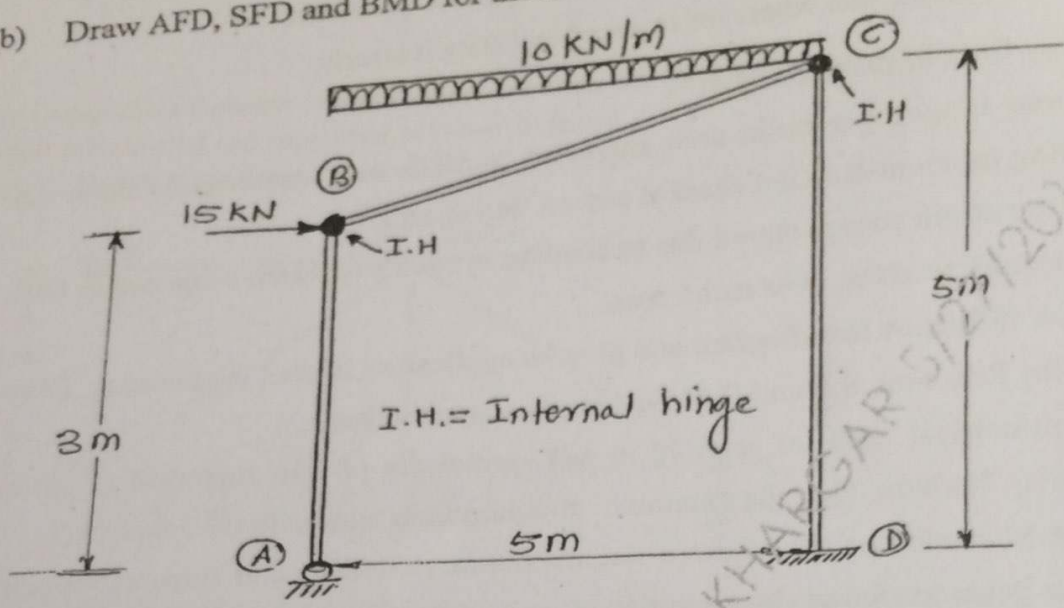
- (a) An unsymmetrical three hinged parabolic arch is loaded as shown in fig. Determine: Support reaction, BM, NT and RSF at 5 m from left support. Also find maximum bending moment in left part and right part. 13



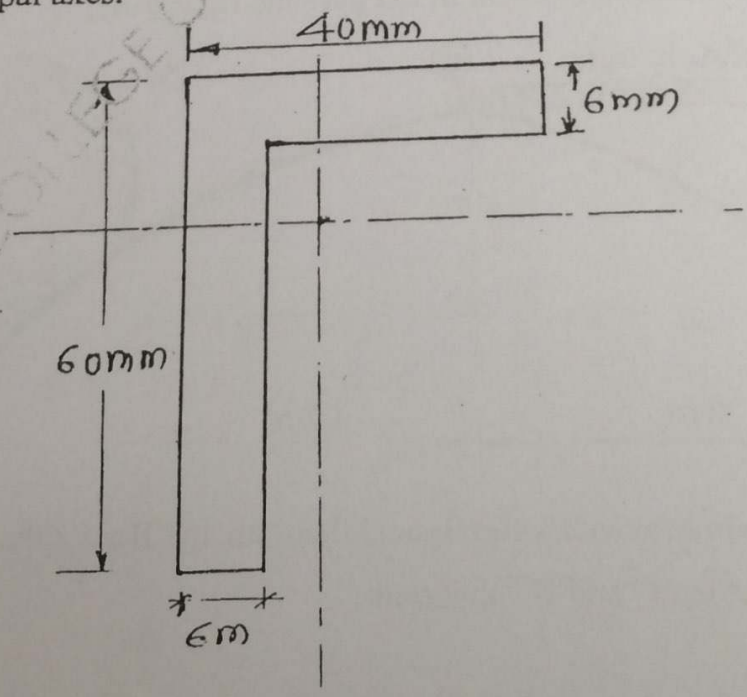
- (b) State and explain Maxwell's Reciprocal theorem and Betti's theorem. 04
- (c) State Moment Area I<sup>st</sup> and II<sup>nd</sup> theorem. 03

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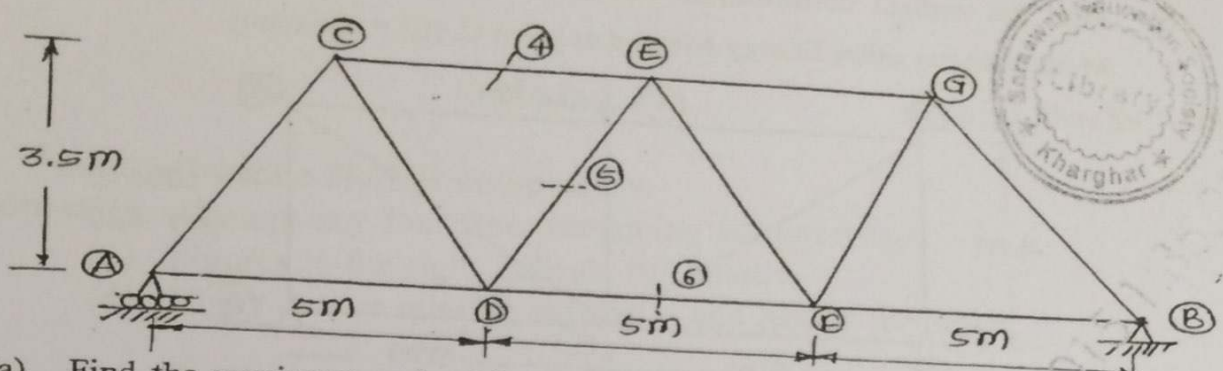
3. (a) Draw neat sketch of cable and suspension bridge. Show all the components of suspension bridge and explain what type of internal forces developed in each component. Also explain different types of cable supports.
- (b) Draw AFD, SFD and BMD for the frame loaded as shown in fig.



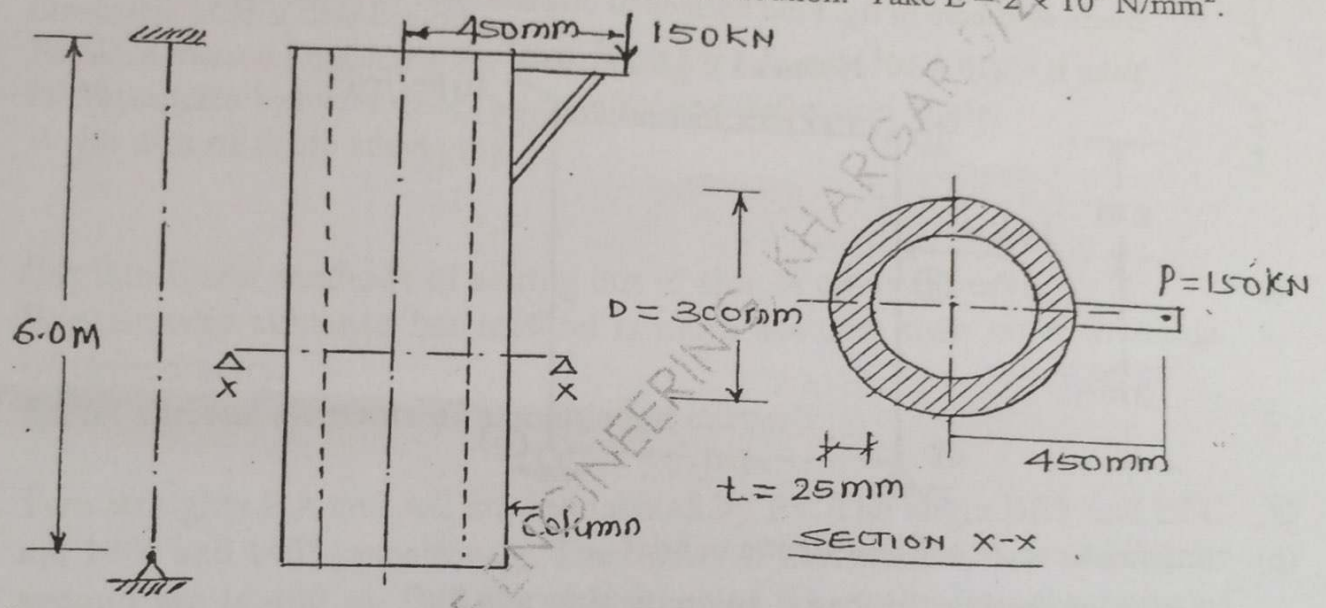
4. (a) A simply supported girder of span 50 m is traversed by a series of wheel loads 160 kN, 200 kN, 180 kN and 140 kN spaced at distances 2 m, 1.5 m and 1 m respectively. The load system moves from left to right with 140 kN load leading. Find the location and magnitude of absolute maximum bending moment anywhere in the girder.
- (b) Determine Principal moment of inertia for the section as shown in fig. Also locate principal axes.



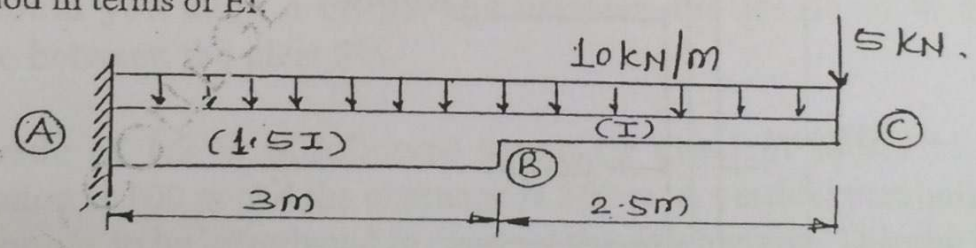
(c) Draw I.L.D for members 4, 5 and 6 of the truss as shown in fig. Assume that load moves along the bottom chord.



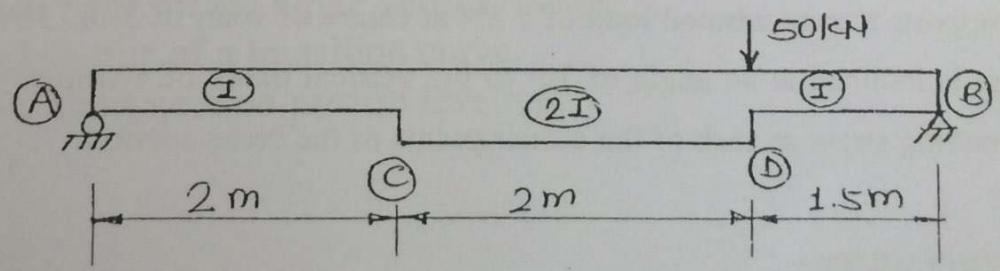
5. (a) Find the maximum and minimum stresses developed at the base of a column loaded as shown in fig. Also draw stress distribution. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ .



(b) Determine the maximum deflection of the cantilever beam by Moment Area Method in terms of EI.

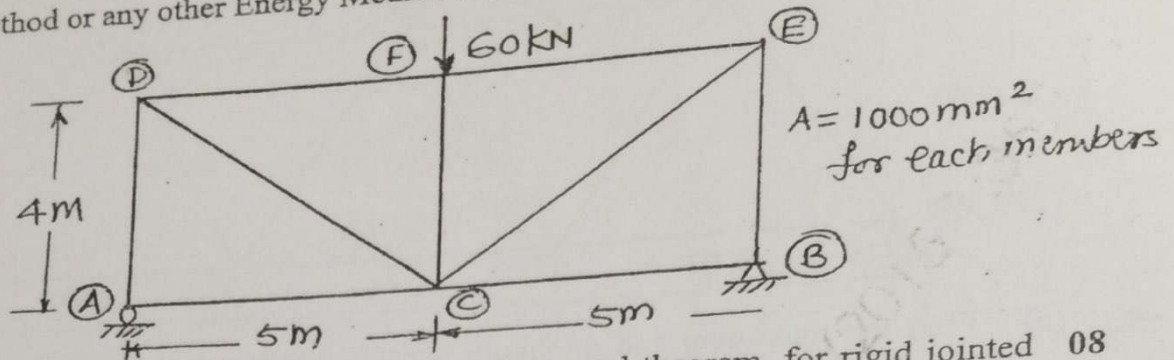


(c) Using Conjugate Beam Method find the vertical deflection at D and slope at A for the S.S. beam loaded as shown in fig. in terms of EI.

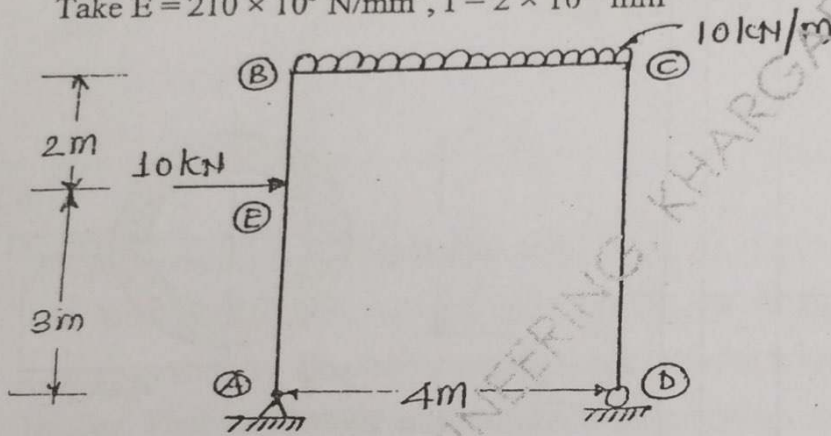


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6. (a) Attempt any ONE of the following  
 (i) Find the vertical deflection in the frame as shown in fig. by Unit Load Method or any other Energy Method at point C. ( $EI = \text{constant}$ )



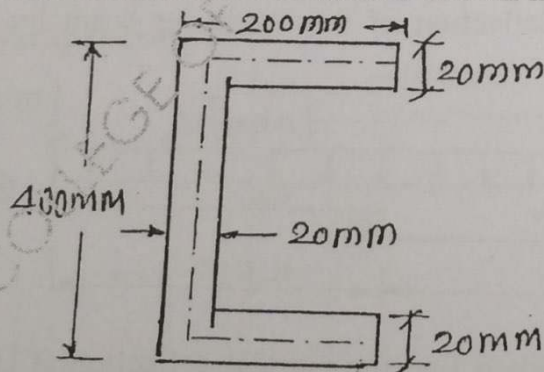
- (ii) Using Unit Load Method or Castigliano's second theorem, for rigid jointed frame as shown in fig. Find horizontal displacement of roller support. Take  $E = 210 \times 10^3 \text{ N/mm}^2$ ,  $I = 2 \times 10^8 \text{ mm}^4$



- (b) Explain Concept of Shear Centre in brief.

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Determine shear center for a C section as shown in fig.



- (c) A simply supported beam of triangular section, 150 mm base width and 200 mm height, supports a concentrated load of 5 kN at centre of span of 3 m. The plane of loading is inclined at an angle of  $30^\circ$  to the vertical plane of symmetry. Find out the bending stress at each of the corner points of the cross section.

Civil



Sub: - SUR - II  
(OLD COURSE)

QP Code : 3969

(3 Hours)

[ Total Marks : 100

- N.B. :
- (1) Question No.1 is compulsory.
  - (2) Attempt any four from remaining six questions.
  - (3) Figures to the right indicate full marks.
  - (4) If any data is missing assume it and justify the same.

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  $140^\circ$  and  $145^\circ$  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? 10
  
4. (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. 5  
(c) Write a short note on precise leveling. 5

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Civil



Sub: BDD-I - Date: 2/6/15

[REVISED COURSE]

QP Code : 3459

(4 Hours)

[Total marks: 80]

NOTE:

- v) Question No. 1 is compulsory.
- vi) Attempt any three out of the remaining five questions.
- vii) Figure to the right indicates full marks
- viii) Assume any suitable data and clearly state the same.

- Q.1 It is proposed to construct a RCC Framed structure Bungalow (single storey) with the following area requirements.  
 Drawing Hall =  $20 \text{ m}^2$ , Master Bed Room =  $20 \text{ m}^2$ , Children's Bed Room =  $15 \text{ m}^2$ , Guest Room =  $15 \text{ m}^2$ , Kitchen and Dining Room =  $20 \text{ m}^2$ .  
 Provide verandah, passage sanitary units etc. as per bye laws.
- i) Draw the Floor plan 14
  - ii) Draw the Front elevation 06
- Q.2 A) Draw the cross section passing through staircase, bath, WC of building drawn in Q. no.01 15  
 B) Draw the site layout plan for building drawn in Q. no.01 clearly indicating various services, open spaces etc. 05
- Q.3 A) Draw the foundation plan with dimensions for the building drawn in Q no. 01. Also draw the section of one footing. 10  
 B) Suggest the type of pitched roof for a factory of size  $8 \text{ m} \times 20 \text{ m}$ . Draw the plan and section of the same showing all details with dimensions. 10
- Q.4 A) Enlist the 'principles of planning' used in planning of a residential building. Explain with sketches any two in detail. 10  
 B) Explain the zoning regulation and Building bye laws in detail. 10
- Q.5 A) Compare the Load bearing with framed RCC structure. 07  
 B) Draw the plan, elevation and section of the half paneled and half glazed door. Assume the door size as  $1.2 \text{ m} \times 2.1 \text{ m}$ . 07  
 C) Explain carpet area, built up area and FSI. 06
- Q.6 Write short notes on the followings (any four) 20  
 i). Development control rules, ii). Wind rose (circulation) diagram, iii). Functional planning of a residential building, iv). Sun shading devices, v). Set back distance



SE sem-IV (old) may-June-15

(old) - Civil

Subj: - CT

Date: - 8/6/15

Civil



(OLD COURSE)

Q.P. Code : 3972

(3 Hours)

[Total Marks : 100

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 indicates full marks.

- 1(a) Enlist any five properties for coarse and fine aggregates. 20  
(b) Define high performance and high strength concrete.  
(c) Write any five advantages of ready mixed concrete.  
(d) Explain Segregation and Bleeding of concrete.
- 2 (a) Explain in detail manufacturing process of concrete. 10  
(b) Explain in detail various properties of fresh 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) Enlist any five types of admixtures commonly used and explain them in detail. 10  
(b) What are the various Non destructive tests carried out on concrete? Explain ultrasonic pulse velocity test in detail. 10
- 5(a) Draw flow diagram for ready mixed concrete plant and explain each operation in detail. 10  
(b) Explain in detail Hot weather and cold weather concreting? 10
- 6 Write short notes on the following  
(a) Explain various methods adopted for curing of Concrete members. 5  
(b) Light weight 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) The concrete mix design is carried out as per Indian Standard Method for M30 concrete. The crushing strength test results of three cubes after 28 days of curing are: 22 N/mm<sup>2</sup>, 44 N/mm<sup>2</sup> & 31N/mm<sup>2</sup>. Can this result be accepted? If not, give the specific reason(s). 5

Civil

SE SEM-IV (REV) MAY-JUNE-15

CT (REV)

Civil

DATE: 8/6/15

Sub:- CT

QP Code :3462

80 MARKS (CBSGS)

INSTRUCTIONS: 1. Question number 1 is **COMPULSORY**. 2. Attempt any **THREE** from the remaining. 3. Each full question carries **EQUAL** marks. 4) **ASSUME** any suitable data, if needed.

1. a) Carry out the Concrete Mix Design for M30 grade of concrete as per Indian Standard method. The target strength to be achieved is **38.25 MPa**. The water-cement ratio for the required target strength is **0.49** (from the graph). Refer the various tables given at the end. The details are as below. (10 M)

Design Parameters		Material Properties	
Max. size of coarse aggregates	20 mm.	Cement	53 grade (IS: 12269- 1987)
Shape of coarse aggregates	Angular	Sp. gravity of cement	3.15
Degree of workability (compacting factor)	0.85	Coarse Aggregates	20 mm & 12.5 mm in the (60:40) ratio
Degree of quality control	Fair	Sand	Conforming to Zone II
Degree of exposure	Severe	Sp. gravity of CA	2.67
		Sp. gravity of sand	2.60

b) Enlist the types of cement. Discuss Rapid Hardening Cement. (05 M)

c) Write a note on permeability of concrete. (05 M)

2. a) Explain the hydration of cement. (05 M)

b) Write a note on Rebound Hammer Test on concrete. (05 M)

c) Explain routing & sealing method of crack repair techniques, with neat sketch. (05 M)

d) What are the properties of High Strength Concrete? (05 M)

3. Write notes on the following. (20 M)

a) Ready Mixed Concrete

b) Curing of Concrete

c) Segregation

d) Slump test

4. a) Why bleeding takes place in concrete? What are the factors affecting bleeding? If the rate of bleeding is less than that of surface evaporation, what happens to the concrete? (05 M)

b) Discuss the factors affecting creep & shrinkage of concrete. (05 M)

c) For major concreting works, you would recommend weigh batching or volume batching. Discuss with substantial reasoning. (05 M)

d) What is the effect of maximum size of aggregate on concrete strength?

(05 M)  
(4 X 1 = 04 M)

5. a) Choose & write the correct option:

- i) The most commonly used admixture which prolongs the setting & hardening time is  
 a) Gypsum                      b) Calcium chloride                      c) Sodium silicate                      d) All of the above

ii) If 380 ml (or grams) of water is required to have a cement paste of 1880 grams of normal consistency, the percentage of water is:

- a) 26.67%                      b) 20.21%                      c) 25.33%                      d) None of these

iii)  $W_p$  and  $W_f$  are the weights of a cylinder containing partially compacted and fully compacted concrete. If the compaction factor ( $W_p/W_f$ ) is 0.95, the workability of concrete is:

- a) Extremely low                      b) Very low                      c) Low                      d) High

iv) The target mean strength (MPa) for M25 grade concrete with risk factor = 1.65 & standard deviation = 4, is:

- a) 18.4                      b) 45.25                      c) 31.6                      d) none of these

b) Write a detailed note on High Performance Concrete. (08 M)

c) Write a detailed note on Light Weight Concrete. (08 M)

6. Write notes on the following.

(20 M)

- a) Retarders in concrete                      b) Self Compacting Concrete  
 c) Creep of concrete                      d) Shrinkage of concrete

**Data for Concrete Mix Design from Indian Standard Code [Q. 1 (a)]**

Table 1: Minimum cement content, maximum water-cement ratio & minimum concrete grade (20 mm nominal max. size of aggregates)

Exposure	Reinforced Concrete		
	Min. cement content (kg/m <sup>3</sup> )	Max. free water-cement ratio	Min. concrete grade
Mild	300	0.55	M20
Moderate	300	0.50	M25
Severe	320	0.45	M30
Very Severe	340	0.45	M35
Extreme	360	0.40	M40

Maximum cement content: restricted to 360 kg/m<sup>3</sup>.

Table 2: Approximate sand & water content per m<sup>3</sup> of concrete\*

Grade	Nominal size of aggregate (mm)	Water content in m <sup>3</sup> of concrete (kg)	Sand as % of aggregate by absolute volume	Remarks
Up to M35	10	208	40	Sand zone II, water-cement ratio = 0.6, Compaction Factor = 0.8
	20	186	35	
	40	163	30	
Beyond M35	10	200	28	
	20	180	25	

These values apply to the conditions given in the remarks column. For other conditions, corrections are to be applied as per Table 3.

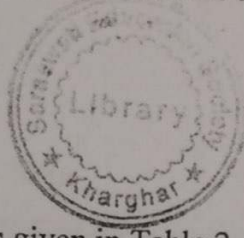


Table 3: Corrections to the values given in Table 2, to be applied for conditions other than those given in the remarks column of Table 2.

Change in conditions other than those given in Table 2	Correction for water content	Correction for sand content in total aggregates (%)
Sand conforming to zone I, III or IV	0	+1.5 for zone I, - 1.5 for zone III, - 3.0 for zone IV
Increase or decrease in compacting factor value by 0.1 (for workability)	±3%	0
Each 0.05 increase or decrease in water-cement ratio	0	±1%
For rounded aggregates (gravel)	- 15 kg/m <sup>3</sup>	- 7%

Table 4: Approximate Air Content

Maximum size of aggregate (mm)	Entrapped air
10	3%
20	2%
40	1%

Civil

Sub:- FM-II

Date:-12-6-15

QP Code 3465

(3 Hours)

Total Marks :80

- N.B
- (1) Question No.1 is compulsory
  - (2) Solve any three questions of the remaining questions.
  - (3) Assume suitable data if required.
  - (4) Draw neat figures.



Q 1)

Answer any Four

- a) Derive Dupit's Equation
- b) Show that the diameter of nozzle for maximum transmission of power is given by  $d = \left(\frac{D^5}{8fL}\right)^{1/4}$   
L=Length of the pipe and f- friction Co-efficient, D= Diameter of the pipe.
- c) Write a note on water hammer and control measures.
- d) Derive an equation for stagnation temperature and stagnation Density.
- e) Define mach number and state its significance in compressible fluid flow.
- f) Explain Hydro dynamically Smooth and Rough Boundaries.

20

Q 2)

- a) The difference of water level of two reservoirs is 8 m .They are connected by 40 m long pipe. For the first 25 m length the diameter of pipe is 120 mm and for the remaining length the diameter is 200 mm , the change in diameter being sudden. Find discharge into lower reservoir .Take  $f = 0.008$ . Draw HGL and TEL also.
- b) The water level in the two reservoirs A and B are 104.5 m and 100 m respectively above the datum. A pipe joins each to a common point D, where pressure is 98.1 kN/m<sup>2</sup> gauge and height is 83.5 m above datum .Another pipe connects D to another tank C. What will be the height of water level in C assuming the same value of 'f' for all pipes.

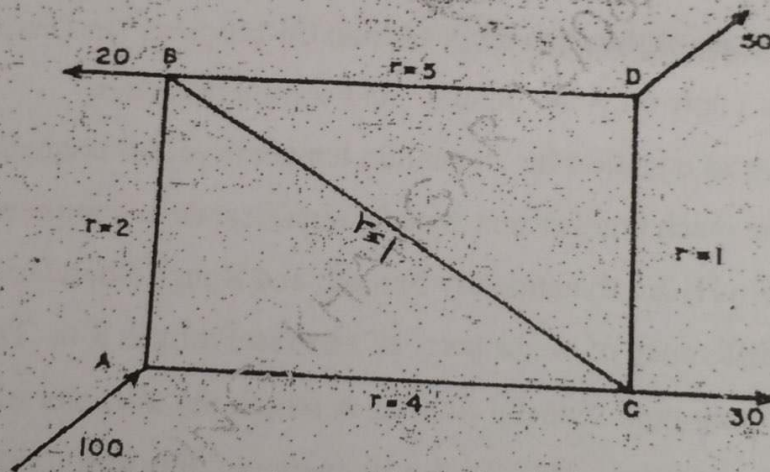
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10

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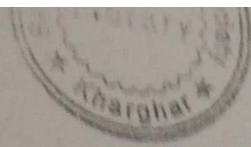
Take friction co-efficient = 0.0075. The diameter of the pipes AD, BD and CD are 300 mm, 450 mm, 600 mm respectively and their lengths are 240 m, 270 m and 300 m respectively.

- Q 3) a) Power is to be transmitted hydraulically to an accumulator at a distance of 8 km by means of number of 100 mm pipes laid horizontally for which the co-efficient of friction may be taken as 0.03. The pressure at the accumulator is maintained constant at 6524 kN/m<sup>2</sup>. Determine the minimum number of pipes required to ensure an efficiency of at least 92 %, when the power delivered is 162 kW. Also determine the maximum power that can be transmitted in this case. 10
- b) Calculate the discharge in each pipe of the network shown in figure below by Hardy Cross Method .Take n=2.0 10



- Q 4) a) Prove the following relationship for one dimensional compressible flow : 5  
 $dA/A = dV/V [M^2 - 1]$
- b) Explain propagation of pressure waves. 5
- c) Find the Mach number when an aeroplane is flying at 1100 km /hour through 10  
 still air having a pressure of 7 N/cm<sup>2</sup> and temperature - 5° C .Wind velocity  
 may be taken as zero. Take R= 287.14 J/kg K .

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- Calculate the pressure, temperature and density of air at stagnation point on the nose of the plane Take  $k = 1.4$  10
- Q 5) a) Derive Hagen Poiseuille law for flow of viscous fluid in circular pipes. 10
- b) Two parallel plates kept 100 mm apart have laminar flow of oil between them with a maximum velocity of 1.5 m/s. Calculate: 10
- (i) The discharge per meter width (ii) The shear stress at plates. (iii) The difference in pressure between two points 20 m apart. (iv) The velocity gradient at the plates, and (v) The velocity at 20 mm from the plate. Assume viscosity of oil to be 24.5 poise.
- Q 6) a) Explain Prandtl's mixing length theory. Derive expression for velocity distribution for turbulent flow in smooth pipes. 10
- b) In a pipe of diameter 300 mm the centre line velocity and the velocity at a point 100 mm from the centre, as measured by pitot tube, are 2.4 m/s and 2.0 m/s respectively. Assuming the flow in the pipe to be turbulent, find: 10
- (i) Discharge through the pipe.
- (ii) Co-efficient of Friction .
- (iii) Height of roughness projections.

Civil

(OLD COURSE)

QP Code : 3975

(4 Hours)

(Max. Marks:100)

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 BANGALOW in the suburban area of Thane District for an executive engineer of P.W.D.. The building is (G+1) R.C.C. framed structure, The plot size is 30 mx28 m. Following are the requirements:

(i)	Entrance Lobby	: min 3 mt wide
(ii)	Engineer's Office	: 25-30 sq mt
(iii)	Living Room	: 20-25 sq mt
(iv)	Study Room	: 12-15 sq mt
(v)	Master Bedroom	: 20-25 sq mt
(vi)	Bedroom (2 Nos)	: 10-12 sq mt
(vii)	Kitchen cum Dining Room	: 20-25 sq mt
(viii)	Children room	: 10-12 sq mt.
(ix)	Stores	: 10-12 sq.mt.

Provide passages, staircase, sanitary unit, parking area etc. as per byelaws. Place the units are per their requirements on Ground and First Floor.

- Draw Ground floor plan. (20)
2. (a) Draw first floor line plan of the building given in Q.No.1. (10)
  - (b) Draw the foundation plan for 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. (20)
  - 4 (a) Differentiate among Load Bearing, Framed and Composite structure with neat sketches and examples. (10)
  - (b) Draw the plan and section of pitched roof on hall measuring 8m x 7m. (10)
  5. (a) What are various objects of building bye-laws. Explain Carpet area, Floor area. (10)
  - (b) Draw roof terrace plan of the building given in Q.No.1 (10)

[TURN OVER]



6. (a) Draw the front elevation of 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 the plan and section of open well staircase for an educational building (G+1) having floor to floor height 3.6 mts. Also show design calculations. (10)  
(b) Explain Working drawing and submission drawing.



R.J-Con. 12613-15.