

AIKTC/KRRC/SoET/ACKN/QUES/2017-18/

Date: \_\_\_\_\_

School: SoET-CBSGS Branch: CIVIL ENGG. SEM: IV

To,  
Exam Controller,  
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following Semester/Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Applied Mathematics- IV	CE-C401		✓	
2	Surveying- II	CE-C402		✓	
3	Structural analysis- I	CE-C403		✓	
4	Building design and drawing	CE-C404		✓	
5	Concrete technology	CE-C405		✓	
6	Fluid mechanics- II	CE-C406		✓	

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)  
Librarian, AIKTC

40

SF - Sem-IV - CBQS - AM-IV - Civil/Mech

11/05/18

Q. P. Code: 25067  
Total Marks 80

[3hours]

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

1. a) By using Green's Theorem show that the area bounded by a simple closed curve 'c' is given by  $\frac{1}{2} \int_c (x dy - y dx)$  (5)
- b) A variable X follows a Poisson distribution with variance 3. Find  $P(x=2)$  and  $P(x \geq 2)$  (5)
- c) Can it be concluded that the average life span of an Indian is more than 70 years, if a random sample of 100 Indians have an average life span of 71.8 years with standard deviation of 7.8 years (5)
- d) Using Cayley - Hamilton Theorem find  $A^e$  if  $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  (5)
2. a) A continuous random variable X has the probability density function given by  $f(x) = 2ax + b, 0 \leq x \leq 2$   
 $= 0$  otherwise  
If the mean of the distribution is 3, find the constants a and b (6)
- b) Ten school boys were given a test in statistics and their scores were recorded. They were given a months special coaching and a second test was given to them in the same subject at the end of the coaching period. Test if the marks given below give evidence to the fact that the students are benefitted by the coaching. (6)
- Marks in Test I : 70, 68, 56, 75, 80, 90, 68, 75, 56, 58  
Marks in Test II : 68, 70, 52, 73, 75, 78, 80, 92, 54, 55
- c) Two lines of regression are given by  $x + 2y = 5, 2x + 3y = 8$ , calculate (i) mean values of x and y, (ii) the coefficient of correlation and (iii) the ratio of the regression coefficients. (8)

Q. P. Code: 25067

- 3.a) Seven dice are thrown 729 times. How many times do you expect at least four dice to show 3 or 5. (6)
- b) Use divergence theorem to show that  $\iint_S \nabla r^2 \cdot d\vec{s} = 6V$  where  $s$  is any closed surface enclosing a volume  $V$  (6)
- c) Find the eigen values and eigen vectors of the matrix  $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$  (8)
4. a) Out of 800 people 25% were literate and 300 had travelled beyond the limits of the district. 40 % of the literates were among those who had not travelled. Prepare a 2x2 table and test at 5% level of significance whether there is any relation between travelling and literacy (6)
- b) Obtain the relative maximum or minimum (if any) of the function  $z = x_1x_2 + 9x_1 + 6x_2 - x_1^2 - x_2^2 - x_3^2$  (6)
- c) The marks of 1000 students of a university are found to be normally distributed with mean 70 and standard deviation 5. Estimate the number of students whose marks will be (i) between 60 and 75 (ii) more than 75 (iii) less than 68 (8)
- 5.a) A machine is designed to pack edible oil in tins of 5 kgs. A random sample of 10 tins gave the average weight of 4.8 kg and standard deviation of 2 kgs. Is the machine working properly? test at 5% level of significance. (6)
- b) Compute rank correlation coefficient from the following data (6)
- X : 18 20 34 52 12  
Y : 39 23 35 18 46
- c) Show that  $\vec{F} = (2xyz^2)\mathbf{i} + (x^2z^2 + z \cos yz)\mathbf{j} + (2x^2yz + y \cos yz)\mathbf{k}$  is conservative. Find scalar potential  $\phi$  such that  $\vec{F} = \nabla\phi$  and hence find the work done by  $\vec{F}$  in displacing a particle from A(0,0,1) to B(1,  $\pi/4$ , 2) along the straight line AB. (8)



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6.a) By using Stoke's theorem evaluate  $\int_c [(x^2+y^2)i+(x^2-y^2)j].d\vec{r}$  where c is (6)

the boundary of the region enclosed by circles  $x^2+y^2=4, x^2+y^2=16$

b) Check whether the matrix A is derogatory or not where  $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$  (6)

c) Using the Kuhn-Tucker conditions solve the following problem (8)

Maximise  $z = x_1^2 + x_2^2$  subject to  $x_1 + x_2 - 4 \leq 0, 2x_1 + x_2 - 5 \leq 0,$

$x_1, x_2 \geq 0$

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18

SE-SEM-IV-CIVIL-CBSGS-SUR-II

17/5/18

Q. P. Code: 26090

(3 hours)

[Total Marks-80]

- N.B. (1) Question no. 1 is compulsory  
(2) Attempt any three questions out of remaining five questions  
(3) Assume any additional data, if necessary, and state it clearly  
(4) Explain answers with neat sketches, wherever necessary

1. a) Explain the procedure for setting out centre line of a tunnel [05]  
b) Discuss necessity of curves. Classify horizontal curve with neat sketches. [05]  
c) Differentiate between fixed hair and movable hair method of tacheometry [05]  
d) What do you understand by Remote Sensing? Give its applications. [05]
2. a) Compare Radial Contouring Project with Block Contouring Project w.r.t the type of terrain, instruments and accessories used, time required, accuracy obtained, area covered, table for recording data, etc. [10]  
b) A simple curve, of radius of curvature 250 m, connects two straights, intersecting at 900 m chainage and an intersection angle of  $34^{\circ}30'$ . A chain of length 20 m is used. Calculate all necessary data for setting out half of the curve by perpendicular offsets from the back tangent [10]
3. a) The readings given below were made with a tacheometric theodolite having a multiplying constant of 100 and no additive constant. The reduced level at station A was 100.0 m and the height of the instrument axis 1.35 m above the ground. Calculate the gradient expressed as the horizontal distance one meter rise or fall vertically between the stations B and C. [10]
- | Station | To | WCB              | Vertical angle   | Stadia readings     |
|---------|----|------------------|------------------|---------------------|
| A       | B  | $48^{\circ}00'$  | $+11^{\circ}30'$ | 2.048, 1.524, 1.000 |
|         | C  | $138^{\circ}00'$ | $-17^{\circ}00'$ | 2.112, 1.356, 0.600 |
- b) Explain how do you perform project/ route survey for a highway [10]
4. a) The stadia hairs of a tacheometer are separated by a distance of 1.15 mm. from the central hair. The focal length of the object glass of the telescope is 23 cm. The distance of the object glass from the trunnion axis is 7 cm. Calculate the tacheometric constants [05]  
b) What do you understand by Stadia Charts and Tacheometric Tables [05]  
c) Discuss briefly about the Global Positioning System. [05]  
d) Discuss the principle and applications of Electronic Distance Measuring Instruments [05]
5. a) A gradient of -1% meets a gradient of +2% at a chainage of 1110.00 and elevation of 335.75 m.; The vertical curve of length 140 m is to be set out with pegs at 10 m interval. Calculate the elevations of the pegs by the method of Tangent Correction [10]  
b) Explain the problems encountered while setting out simple circular curve [05]  
c) A railway curve is to be connected through a transition curve to a straight for a limiting velocity of 80 kmph. Calculate the length of the transition curve if superelevation is to be built up 0.025 m. per sec. of vehicular travel [05]
6. Write short notes on: (any 4) [20]  
a) Composite Curve  
b) Instruments for setting out works  
c) Subtense bar  
d) GIS  
e) Total Station



64

SE-SEM-IV-CBSGS-Civil-SA-T

23/5/17

Q. P. Code: 21495

Time: 3 Hrs.

Marks: 80

- Instructions: 1. Question No. 1 is Compulsory  
 2. Answer Any 3 from the remaining  
 3. Figures to right indicate full marks.

- 1a) Show that for a three hinged parabolic arch carrying U.d.l. of  $w$ /unit run through out the span ( $l$ ) the parabolic shape is funicular shape. (5)  
 b) Find the Shear Centre for a section shown in fig. 1. (5)

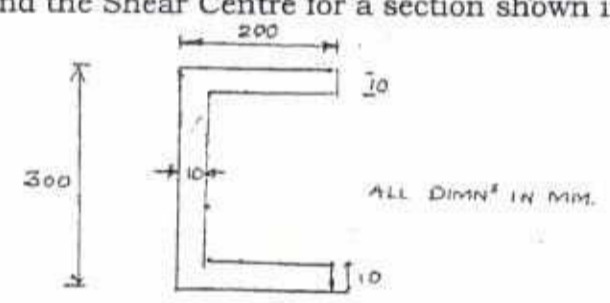


FIG 1

- c) Define strain energy write the expression for strain energy due to shear force, bending moment and twisting moment. (5)  
 d) A symmetrical cable of span 60 mtr and central dip of 6 mtrs subjected to udl of intensity 30 kn/m. Find the maximum and minimum tension in the cable. (5)

Q.2a) Sketch AFD, SFD & BMD for a frame shown in fig. 2

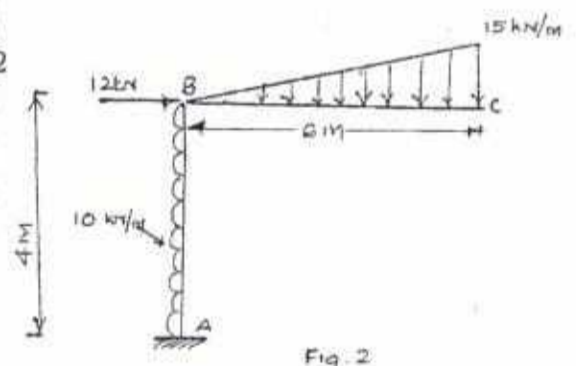


Fig-2

- b) A Three hinged parabolic arch carried udl as shown in Fig. 3 (10)  
 Determine  
 a) Max. Bending Moment.  
 b) Normal Thrust  
 c) Radial Shear at point D. and what will be max. Bending Moment in the portion CB of the Arch  
 Ref. Fig. 3

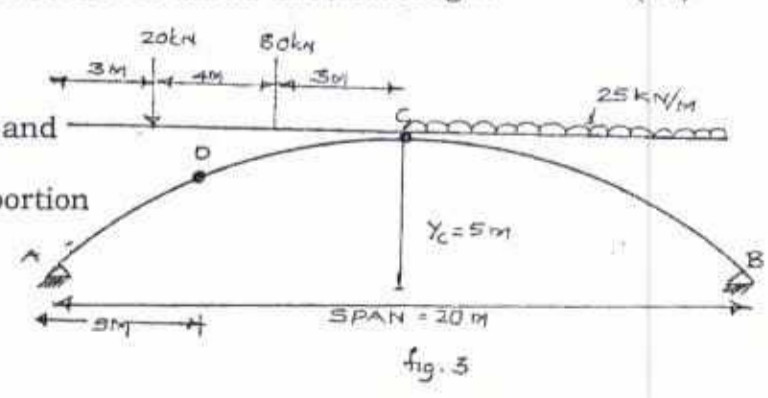


fig. 3

Q. P. Code: 21495

Q.3 a) Draw influence line diagram for  $V_B$ ,  $V_D$  &  $M_D$ . Ref. Fig. 4 (10)

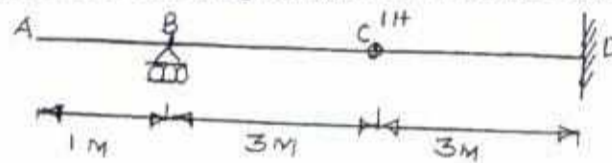


Fig 4

b) Find the slope at points B and C, and deflection at point C. Use conjugate beam method. Ref. Fig. (5) (10)

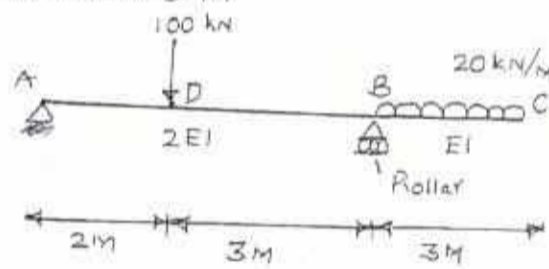


Fig 5

Q.4 a) Find the rotation at Point 'B'. Ref. Fig. 6. Using unit load method or any other energy method. (10)

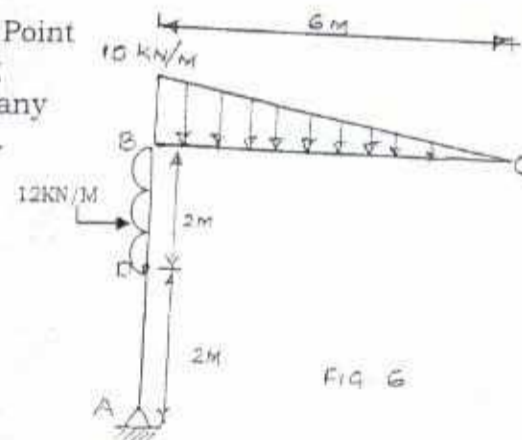


FIG 6

b) Find slope at points A, D & F, and Deflection at D & F. Ref. Fig. 7. Use Macaulay's method. Take Uniform EI throughout. (10)

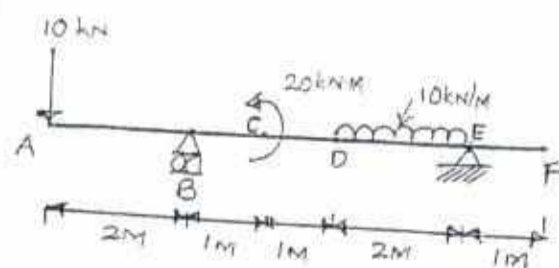


fig. 7

Q. P. Code: 21495

Q.3 a) Draw influence line diagram for  $V_B$ ,  $V_D$  &  $M_D$ . Ref. Fig. 4 (10)

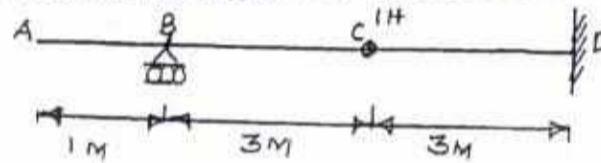


Fig 4

b) Find the slope at points B and C. and deflection at point C. Use conjugate beam method. Ref. Fig. (5) (10)

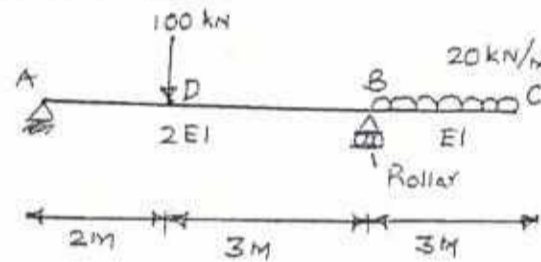


Fig. 5

Q.4 a) Find the rotation at Point 'B'. Ref. Fig. 6. Using unit load method or any other energy method.

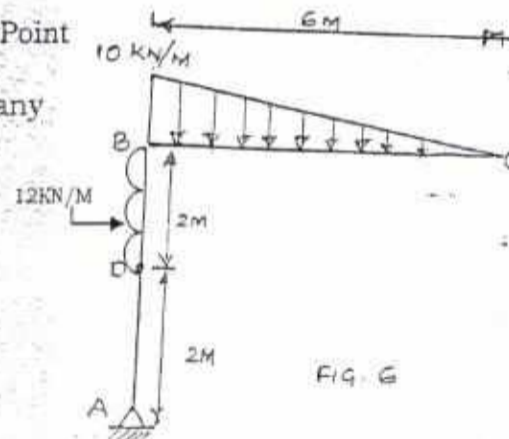


FIG. 6

b) Find slope at points A, D & F. and Deflection at D & F. Ref. Fig. 7. Use Macaulay's method. Take Uniform EI throughout. (10)

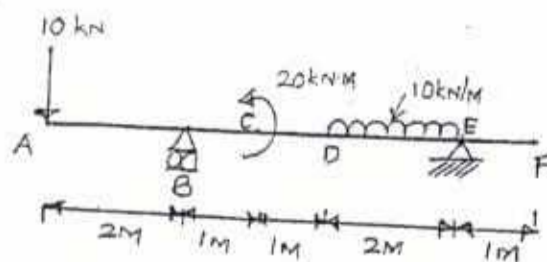


fig. 7



5

SE- sem-IV - CBSGS - Civil - BDD-5

29/5/18

**Q. P. Code: 40833**

(4 Hours)

Max.Marks:80

- Note: (1) Question No 1 is compulsory.  
(2) Attempt any three questions out of remaining five questions.  
(3) Figures to the right indicate full marks.  
(4) Assume suitable data if required and specify the same clearly.

**Q.1)** It is proposed to construct (G+1) R.C.C residential bungalow with the following requirements, by assuming Floor-Floor height as 3.3 m. on a Plot of 40 m.X40 m.

- a) Living Room:- 20M<sup>2</sup>
- b) Kitchen cum dining:- 20 M<sup>2</sup>
- c) Bed Room: - 18 M<sup>2</sup>
- d) Master Bed Room:- 25 M<sup>2</sup>
- e) Guest Room:- 20 M<sup>2</sup>
- f) Store Room-15 M<sup>2</sup>

- i) Draw developed plan of ground floor.
- ii) Draw line plan of first floor.

15  
05

- Q.2** a) Draw the Front elevation of the bungalow designed in Q. No.1.  
b) Draw the cross-section passing through staircase and sanitary unit of the Bungalow designed in Q. No. 1.

08  
12

- Q.3** a) Draw the foundation plan & details of one footing of the bungalow in Q. No.1  
b) Draw the site plan of the bungalow designed in Q. No. 1.

10  
10

- Q.4** a) Draw plan & sectional elevation of CCTW double shuttered fully panelled door.  
b) Explain the Building bye- laws with examples.

12  
08

- Q.5** a) i) Explain Sun path diagram  
ii) Explain any two principles of planning.

06  
04

- b) i) Suggest type of pitched roof for factory of size 8M.X 20M. Draw plan & section for the same.

10

**Q.6) Write notes on followings (Any 4)**

20

- a) Working drawings & Submission drawings.
- b) F.S.I & its importance
- c) Design criteria of dog legged staircase
- d) Wind rose diagram.
- e) Development Control (D.C) rules

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(15)

SE - sem-IV - CBSAS - CIVIL - C.T

4/6/18

QP Code : 39574

( 3 Hours )

[Total Marks : 80 ]

NOTE:..

- Question No. 1 is compulsory.
- Attempt any Three out of the remaining five questions.
- Figure to the right indicates full marks.
- Draw neat sketches wherever necessary.
- Assume suitable data wherever required.

- Q.1 (a) What is alkali-aggregate reaction? Explain the factors promoting the alkali-aggregate reaction. 05
- (b) Explain in short retrofitting. Mention the methods of retrofitting. 05
- (c) Explain ultralight weight concrete. 05
- (d) Define creep. What are the factors affecting creep? 05
- Q.2 (a) What do you understand by High strength concrete? What are the constituents of high strength concrete? How is high strength concrete produced? 10
- (b) Define hot weather concreting. What are the effects of hot weather on concrete? What are the precautions to be taken during hot weather concreting? 10
- Q.3 (a) What is concrete mix design? Explain step by step procedure of concrete mix design by IS code method. 10
- (b) What is fineness of aggregate? Explain the procedure to determine it. 10
- Q.4 (a) Give the list of nondestructive tests on concrete. Explain any one in detail. 10
- (b) What do you understand by soundness of cement? Explain the procedure to determine the soundness of cement. 10
- Q.5 (a) What is High Range Water Reducer (HRWR)? Explain the effects, advantages and disadvantages of HRWR. 10
- (b) Define w/c ratio in concrete? Explain the effect of w/c ratio on the strength and durability of concrete. 10
- Q.6 Write short notes on the following (any four) 20
- i Fly ash
  - ii Distress in concrete
  - iii flexural test on concrete
  - iv Ferrocement
  - v Pull out test

18

SE - Sem-IV - CB345 - Civil - FM-II

8/6/18

QP Code : 50698

(3 hours)

Total marks : 80

N.B:(1) Question no. 01 is compulsory.

(2) Attempt any 3 questions out of the remaining 5 questions.

(3) Assume data wherever necessary and clearly mention the assumption made.

(4) Draw neat figures as required.

Q1:- Attempt any Four

(20)

- Define HGL and TEL and draw HGL and TEL for uniform pipe connecting two reservoirs.
- Derive condition for Maximum power transmission through nozzle.
- Explain water hammer and state remedial measures.
- Derive Area velocity relationship  $\frac{dA}{A} = \frac{dV}{V}(M^2 - 1)$  for compressible flow.
- Prove that the co-efficient of viscosity by the dash pot arrangement is given by  $\mu = \frac{4Wt^3}{3\pi LD^3V}$

Q2:-

- Derive an expression for the loss of head due to sudden enlargement of a pipe. (10)
- A siphon of diameter 200 mm connects two reservoirs whose surface level differ by 40 m. (10)  
The total length of the pipe is 8000 m. The pipe crosses a ridge. The summit of ridge is 8 m above the level of water in the upper reservoir. Determine the minimum 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 3.0 m of water.  
Take  $f=0.006$  and atmospheric pressure head = 10.3 m of water. The length of siphon from the upper reservoir to the summit is 500 m. Find the discharge also.

Q3:-

- Three reservoirs A, B and C are connected by a pipe system having length 700 m, 1200 m and 500 m and diameter 400 mm, 300mm, and 200mm respectively. The water level in reservoir A and B from a datum line are 50 m and 45 m respectively. The level of water in reservoir C is below level of water in reservoir B. Find the discharge into or from the reservoirs B and C if the rate of flow from reservoir A is 150 liters per sec. Find the height of water level in the reservoir C. Take  $f=0.005$  for all pipes. (10)
- (i) Prove that the velocity through nozzle is given by (05)

$$V = \sqrt{\frac{2gH}{1 + \frac{4fL}{D} \times \frac{a^2}{A^2}}}$$

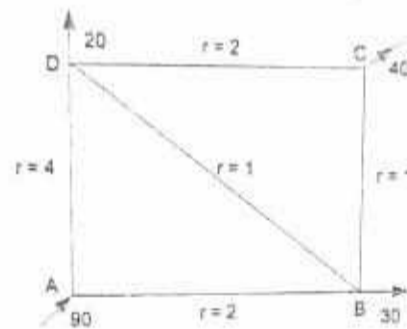


QP Code : 50698

- (ii) Find the maximum power transmitted by a jet of water discharging freely and out of Nozzle fitted to a pipe = 300m long and 100 mm diameter with co-efficient of friction as 0.01. The available head at the nozzle is 90m. (05)

Q4:-

- a) Calculate the discharge in each pipe of the network shown in below Fig. (10)  
The pipe network consists of 5 pipes. The head loss  $h_f$  in a pipe is given by  $h_f = rQ^2$ . The values of  $r$  for various pipes and also the inflow or outflow at nodes are shown in the figure.



- b) Find Mach number when an aeroplane is flying at 900 km/hour through still air having a pressure of  $8.0 \text{ N/cm}^2$  and temperature  $-15^\circ\text{C}$ . Take  $k=1.4$  and  $R=287 \text{ J/kg K}$ . Calculate the pressure, temperature and density of air at the stagnation point on the nose of the plane. (10)

Q5:-

- a) An oil of viscosity  $0.1 \text{ Ns/m}^2$  and relative density 0.9 is flowing through a circular pipe of diameter 50mm and of length 300m. The rate of flow of fluid through the pipe is 3.5 litres/s. find the pressure drop in a length of 300m and the shear stress at the pipe wall. Take  $\mu=0.1 \text{ Ns/m}^2$ . (10)
- b) Prove that for viscous flow through a circular pipe the kinetic energy correction factor is equal to 2 while momentum correction factor  $= \frac{4}{3}$ . (10)

Q6:-

- a) A rough pipe of diameter 400mm and length 1000m carries water at the rate of  $0.4 \text{ m}^3/\text{s}$ . The wall roughness is 0.012 mm. Determine the co-efficient of friction, wall shear stress, centre-line velocity and velocity at a distance of 150mm from the pipe wall. (10)
- b) (i) Obtain an expression for the velocity distribution for turbulent flow in smooth pipes. (05)  
(ii) What do you mean by Prandtl mixing Length Theory? Find an expression for shear stress due to Prandtl. (05)