

College of Engineering, Pune
End Semester Exam – May 2011
SY. B.Tech. (Civil)
(CE 210) – Structural Mechanics-I

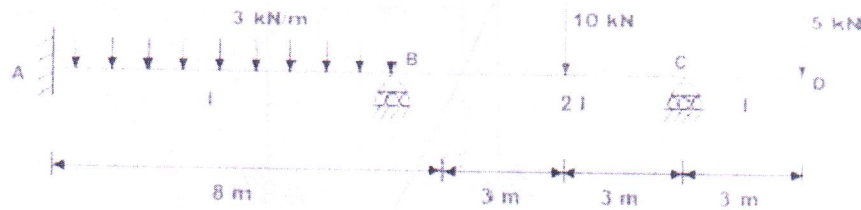
Date:- 30 April 2011
 Maximum Marks: 50

Time: - 2 pm to 5 pm
 Duration : - 3 hrs.

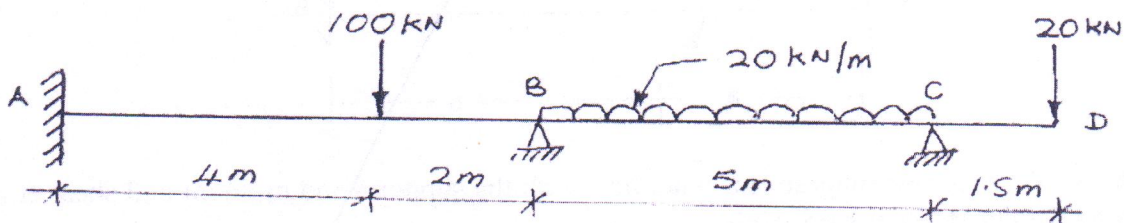
Instructions:

1. All questions are compulsory.
2. Marks of each question are indicated against it.
3. No negative marking.
4. Assume suitable data wherever applicable and mention it clearly.
5. Use of mobile phones is strictly prohibited in the exam hall.

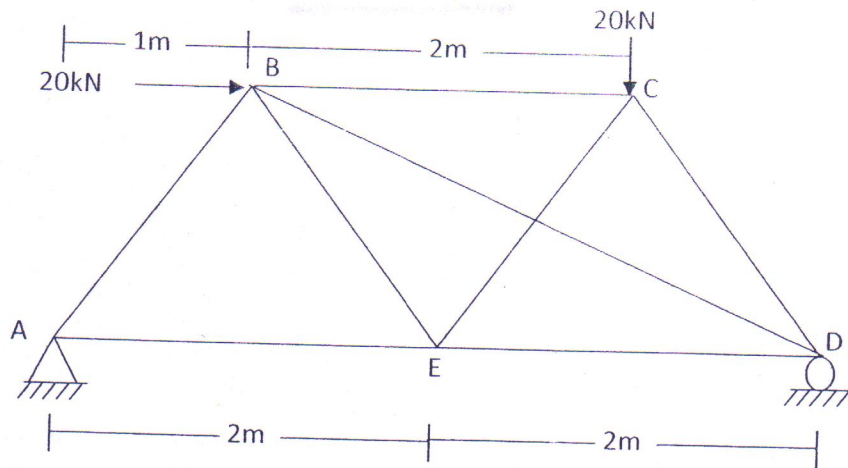
- Q.1 Draw the bending moment diagram for the continuous beam *ABCD* loaded as shown in Fig. below. The relative moment of inertia of each span of the beam is also shown in the figure. Use moment distribution method. (06)



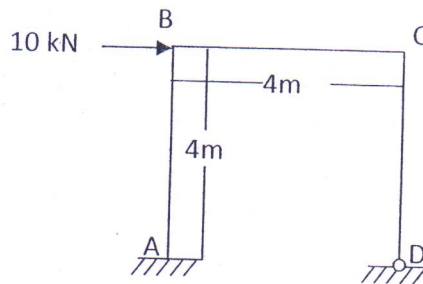
- Q.2 Analyze the following continuous beam *ABCD* by slope deflection method. The support B sinks by 15mm. Take $E = 200 \times 10^5 \text{ KN/m}^2$ and $I = 120 \times 10^{-6} \text{ m}^4$. (06)



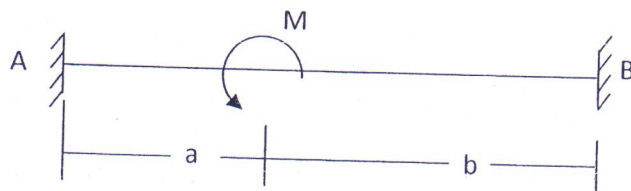
- Q.3 Find forces in all the members of the pin jointed frame as shown in figure below. Axial rigidity for all members is the same. Adopt BD as the redundant member. (06)



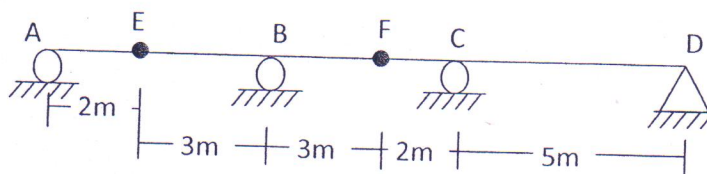
- Q.4 Analyse the portal frame shown in figure below by Castigliano's theorem. The end A is fixed while end D is hinged. Also sketch the deflected shape of the same. Take EI constant. (08)



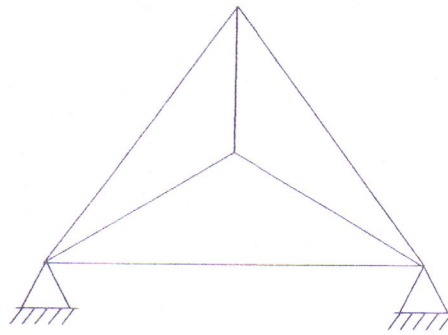
- Q.5 Draw shear force and bending moment diagram for the following beam by using compatibility method. Select moments at the fixed ends as the redundant. (06)



- Q.6 Draw influence line diagram for reactions at all the supports and moment and shear at B by using Muller Breslau's principle. (06)



Q.7 Comment on static and kinematic indeterminacy of the following pin jointed structure. (04)



Q.8 a] Derive an expression for the stiffness of a member when the far end is fixed and when the far end is hinged. (05)

b] Explain in detail about rigid jointed and pin jointed structures. (03)

COLLEGE OF ENGINEERING, PUNE
End Semester Examination (April 2011)

S.Y. B. Tech (Civil)

(CE 206) Building Design and Drawing

Day & Date - Tuesday, 26 April, 2011

Max. Marks. 50

Time: 2 pm to 5 pm

Duration: -3 hrs

Instructions to Candidates:

- 1 Q.4 and Q.5 are compulsory, answer any two questions from Q1 to Q3
- 2 Neat diagrams must be drawn wherever necessary.
- 3 Assume suitable data if necessary.
- 4 Figures to the right indicate full marks.
- 5 Use of non-programmable calculators is allowed.

- Q 1. A. Explain general principles of thermal insulation. (8)**
- B. The internal dimensions of a factory building are 40m x 25m x10m (height). The numbers of air changes required per hour are 3, the indoor temperature is 34°C and outdoor temperature is 28°C. Find the area of opening required, if the distance between the inlet and outlet opening is 5m. (7)**
- Q 2. A. Explain with sketches design considerations to protect your structure from different climatic conditions. (7)**
- B. Write short notes on (Any Two) (8)**
- i) Systems of air-conditioning
 - ii) Artificial Lighting
 - iii) Green Building
- Q 3. A. What are constructional measures of Noise control and sound insulation with respect to (8)**
- a) Wall and partition,
 - b) floors and ceiling
- B. Write note on Means of Escape. (7)**
- Q 4. Draw Plan, elevation and section of following (Figure 1) line plan of building. Show furniture arrangement in room. Assume suitable data. Scale 1:50 (15)**
- Q 5. Draw perspective view of object shown in Figure 2. (5)**

Figure 1

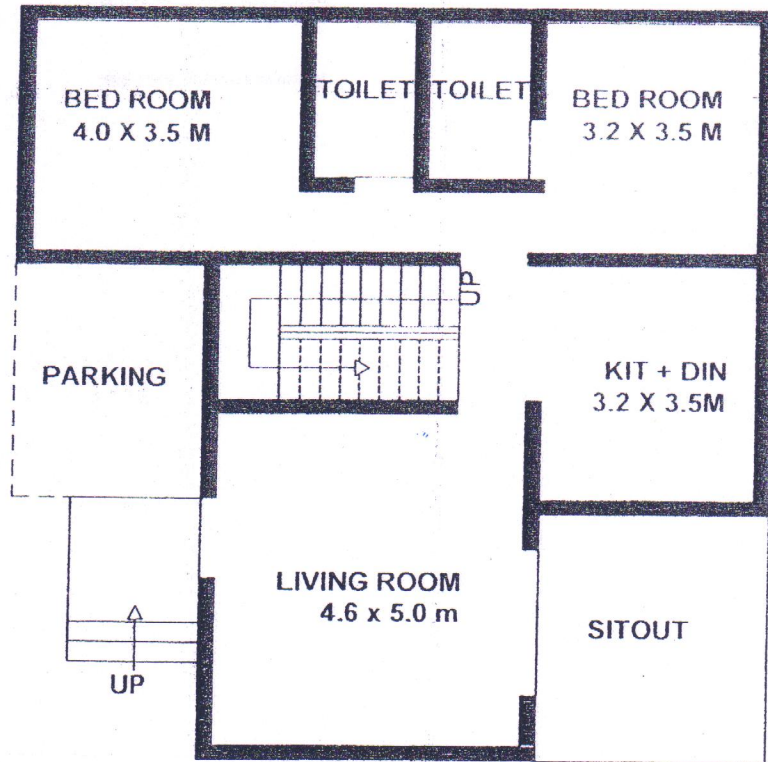
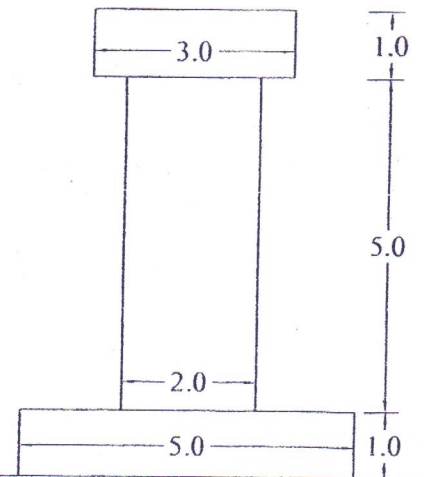
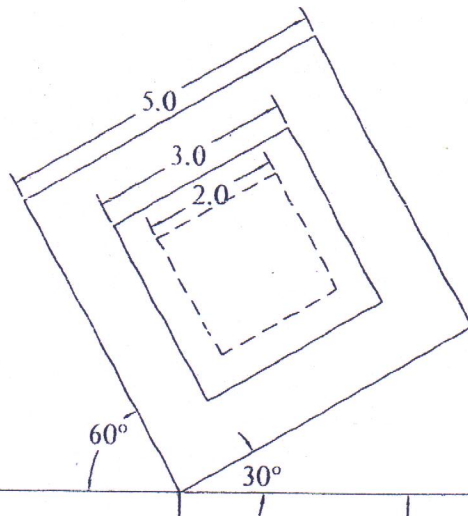


Figure 2



Elevation

Eye Level = 1.8m above ground Level
Station Point = 6.0m

Figure 1

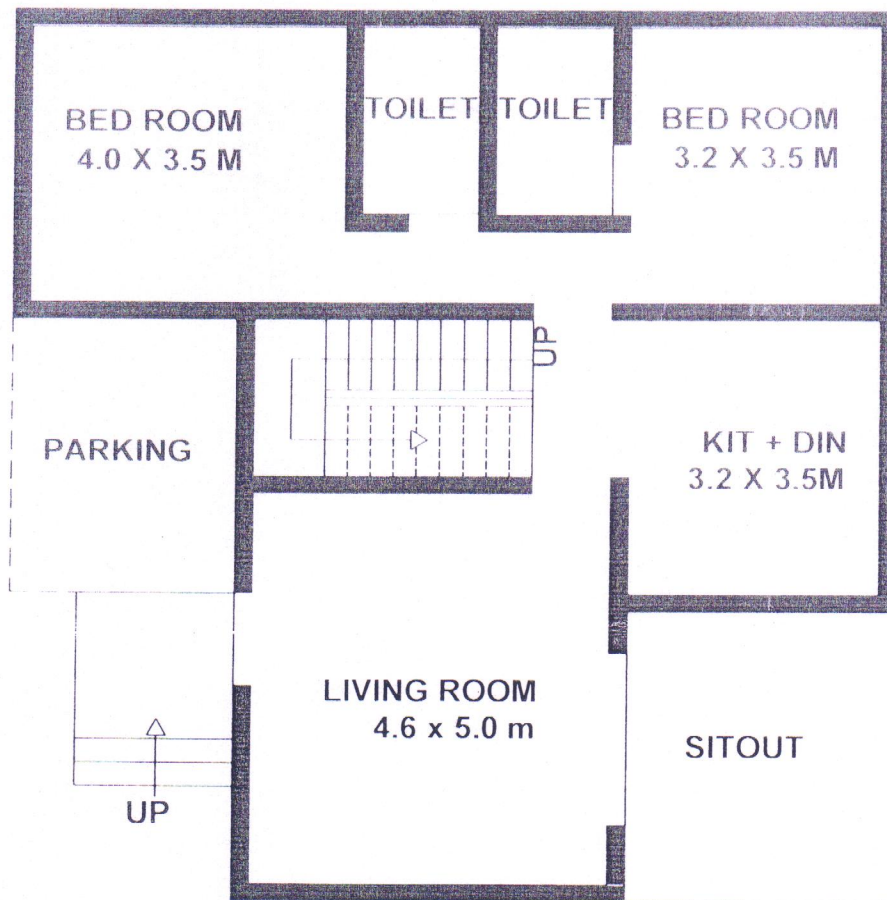
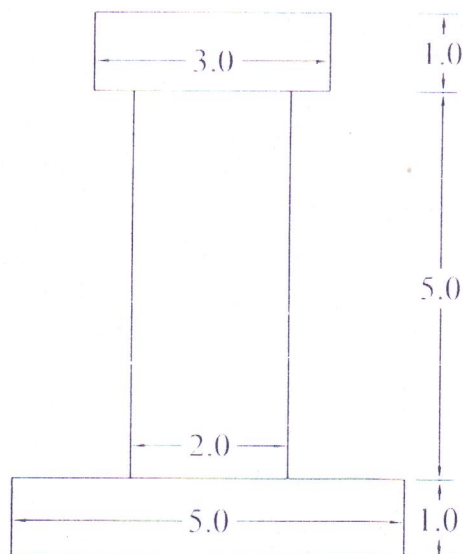
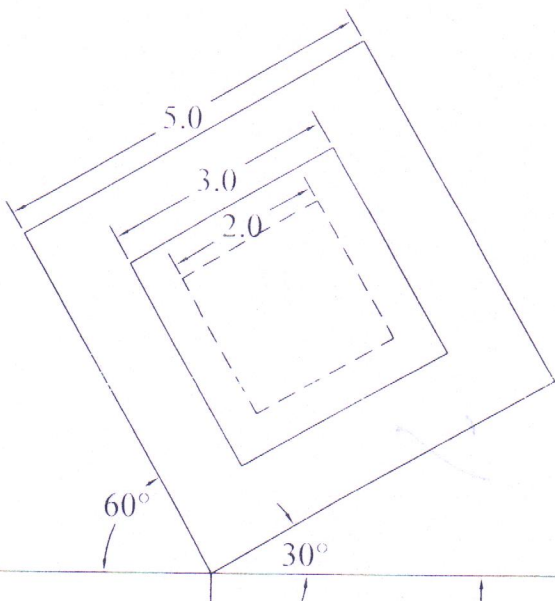


Figure 2



Elevation

Eye Level = 1.8m above ground Level
Station Point = 6.0m

College of Engineering, Pune

S.Y. B.Tech (Civil)

CE-211 Concrete Technology

Date : 07/08/2011

Timing : 2:00pm – 5:00pm

Academic Year : 2010-11

Max. Marks : 50

Spring Semester

Instructions: 1. All questions are compulsory

2. Use of non-programmable calculator is allowed

Q1. Fill in the blanks - (1 mark each)

(7)

- i) Unsoundness caused to cement due to free lime is detected by carrying out ----- test and that by Magnesium Sulphate is detected by carrying out ----- test.
- ii) Various standard charts of the graphs prepared for the concrete mix design are based on the assumption that size and surface of aggregate is ----- and ----- respectively.
- iii) If "P" the standard consistency of cement is taken as 27% and if 400 gm of cement is to be taken to cast cement mortar cubes for compressive test, the quantity of water to be added is -----.
- iv) The difference in target mean strength and characteristic strength of concrete is the product of ----- and -----.
- v) Very low value of VB test is an indicative of ----- workability and such concrete can be used for -----.
- vi) Bleeding of concrete is caused due to ----- and segregation is caused due to -----.
- vii) If lean mix of concrete has collapsible slump, then such concrete is likely to lead to -----.
- Q2.a) As a Civil Engineer, can we use the sea water for casting reinforced concrete? Comment on this. (3)
- b) Explain the effect of air entrainment on properties of concrete. (3)
- c) "Workability of concrete is affected by size & shape of aggregate." Explain (3)

Q3. a) Compare the cylinder strength & cube strength of concrete. (3)

b) What are the factors which affect the modulus of elasticity of concrete? (3)

c) Describe the Non-Destructive techniques used for the measurement & detection of cracks in concrete. (3)

Q4.a) Discuss in detail the IS method of Mix Design of concrete.. (3)

b) Explain in detail the gain of strength of concrete with age. (2)

c) Calculate the standard deviation for a set of concrete cubes cast and tested (20 samples) The values of compressive strengths are 18.00, 17.50, 19.50, 20.00, 16.00, 21.50, 23.00, 16.50, 17.00, 22.00, 19.50, 16.50, 18.50, 21.50, 23.50, 21.00, 16.00, 18.00, 20.50, 23.00.

(2) (4 marks)

Q5. Write short notes on – (any 3) (9)

- 1) Ready mix concrete.
- 2) Fiber reinforced concrete.
- 3) Carbonation of concrete
- 4) Accelerators used in concrete

Q6. Explain the difference between mild, moderate & severe exposure of concrete. (3)

In respect of the 3 exposure conditions above, fill in the blanks of following table. (4)

Exposure conditions	Minimum Cement content		Max W. C.	
	PCC	RCC	PCC	PCC
Mild				
Moderate				
Severe				

-----Best of luck -----

College of Engineering, Pune
Department of Mathematics
MA 220 Engineering Mathematics IV (For Civil)
End Semester Examination

Date: 28/04/2011

Max. Marks 50

Max. Time 3 Hours

Instructions: Use separate answer sheets for Sections A and B.

Solve all questions. Figures on the right indicate max. marks.

SECTION A

1. Fill in the blanks: [5]
 - (a) The cardinality of the set of outcomes when a coin is tossed until a head or 3 tails appear is
 - (b) If X is a continuous random variable with CDF $F(x)$ then $F(x) = \dots$
 - (c) The r.v. X whose probability distribution is $f(x) = \frac{e^{-6}6^x}{x!}$; $x = 0, 1, 2, \dots$ is called a random variable and its mean is and variance is
2. Six independent space missions to the moon are planned. The estimated probability of success on each mission is 0.95. What is the probability that at least five of the six missions will be successful? [2]
3. Two students are to be selected at random from a class containing 45 girls and 54 boys to represent in sports and gathering. If X denotes the number of boys and Y denotes the number of girls selected, find
 - (a) joint distribution of X and Y [2]
 - (b) Find the probability that a girl is not selected if it is known that 1 boy is selected. [2]
4. Given a r.v. X with s.d. σ and a r.v. $Y = aX + b$, show that if $a < 0$, the correlation coefficient $\rho_{XY} = -1$ and if $a > 0$, it is 1.

OR

The following data was collected to determine the relationship between pressure and the corresponding scale reading for the purpose of calibration.

Pressure, x (lb/sq.in.)	10	10	10	10	10	50	50	50	50	50
Scale reading, y	13	18	16	15	20	86	90	88	88	92

Find the equation of regression line and hence find the pressure for a scale reading of 54. [4]

5. It is claimed that an automobile is driven on the average more than 20000 k.ms per year. To test this claim, a random sample of 100 automobile owners are asked to keep a record of the kilometers they travel. Would you agree with this claim if the sample showed an average of 23500 k.m. and a standard deviation of 3900 k.m.? Use 4 percent level of significance.

OR

Compute the correlation coefficient for the following grades of 6 students selected at random:

<i>MathsGrade</i>	70	92	80	74	65	83
<i>EnglishGrade</i>	74	84	63	87	78	90

Interpret your result.

[4]

6. Let D^2 denote the sum of the squares of the deviations from the mean of a random sample consisting of n observations. Assume that the random sample is taken from a population X with mean μ and variance σ^2 . Give an unbiased and a biased estimator of σ^2 . [2]
7. (a) If Z is a standard normal r.v. with $P(Z \geq k) = 0.057$ then find k . [2]
 (b) The average time taken by Mr. X to travel from home to office is 24 minutes with a standard deviation of 3.8 minutes. Assume the distribution of trip times to be normally distributed. If he leaves the house at 8.30 A.M. and coffee is served at the office from 8.50 A.M. until 9 A.M. what is the probability that he misses the coffee? [2]

OR

Find (i) k (ii) mean (iii) median and (iv) variance of a r.v. X with pdf

$$f(x) = \begin{cases} kx; & 0 < x < 3 \\ 0 & ; \text{ otherwise} \end{cases}$$

[4]

Section B

Q.I. Attempt the following.

- (a) With usual notations, prove that $\Delta \nabla = \nabla \Delta = \delta^2$. [2]
 (b) Obtain the solution of the following system using Gauss-Seidel iteration method starting with initial solution as $(0,0,0)$. Perform 3 iterations.

$$5x - y = 9, \quad -x + 5y - z = 4, \quad -y + 5z = -6. \quad [4]$$

(c) The following table gives the results of the measurements of train resistance; V is the velocity in miles per hour, R is the resistance in pounds per ton:

$V :$	20	40	60	80	100	120
$R :$	5.5	9.1	14.9	22.8	33.3	46.

If R is related to V by the relation $R = a + bV + cV^2$, find a, b and c . [4]

Q.II. Attempt any **three** of the following. [15]

(a) By using the bisection method, find an approximate root of the equation $\sin x = 1/x$, that lies between $x = 1$ and $x = 1.5$ (measured in radians). Carry out upto the fifth stage.

(b) Given that

$x :$	1	1.1	1.2	1.3	1.4	1.5	1.6
$y :$	7.989	8.403	8.781	9.129	9.451	9.750	10.031.

Find dy/dx and d^2y/dx^2 at $x = 1.1$.

(c) Using three point Gaussian quadrature formula, evaluate $\int_2^4 (1+x^4) dx$. Given that Abscissae and Weights are $-0.77460, 0, 0.77460$ and $0.55556, 0.88889, 0.55556$ respectively.

(d) Use the fourth order Runge-Kutta method to estimate $y(0.4)$ when $y'(x) = x^2 + y^2$ with $y(0) = 0$. Assume $h = 0.2$.

College of Engineering, Pune
End Semester Exam – May 2011
S.Y. B. Tech (Civil Engineering)
(Fluid Mechanics-II)

Day & Date- Tuesday, 3 May 2011
Maximum Marks: 50

Time: - 2 pm to 5 pm
Duration –3 hrs.

Instructions:

1. Solve any five questions
2. Figures to the write indicate full marks.
3. Assume suitable data, if necessary

- Q. 1 A.** Discuss in detail the 'Karman Vortex Street' along with the diagram. 5
- Or**
- Write a short note on any two
1) Magnus effect 2) Polar Diagram 3) Aerofoil
- B.** A kite of dimensions 0.8 x 0.8 m and weighing 6 N is maintained in air at an angle of 10° to the horizontal. The string attached to the kite makes angle at 45° to the horizontal and at this position, the drag and lift co-efficient are estimated to be 0.6 and 0.8 respectively. Determine 1) Wind speed and 2) Tension in the string. Take density of air 1.2 kg/m^3 . 5
- Q. 2 A.** Why surge tanks are used in Hydroelectric Power Plants? Draw a neat sketch of a surge tank? 4
- Or**
- What is water hammer action? What is the difference between gradual and sudden closure of valve, Explain gradually closer of valve mathematically?
- B.** A Pelton wheel of 1.1 m mean diameter works under a head of 500 m. The deflection of jet is 165° and its relative velocity is reduced over the bucket by 15 percent due to friction. If the diameter of jet is 100 mm and the water is to leave the bucket without any whirl, determine: 1) Rotational speed of wheel, 2) Ratio of bucket speed to jet velocity, 3) Impulsive force and power developed by the wheel 4) Available power (water power) , 5) Power input to buckets, and 6) efficiency of the wheel with power input to bucket as reference input Take $C_v=0.97$ 6
- Q. 3 A.** Draw a neat sketch of a Centrifugal Pump, indicate all the major components and state function of each component. 4
- Or**
- Write a short note on any two
1) Governing of Turbine 2) Draft Tube 3) NPSH 4) Performance characteristics of Pump
- B.** An inward flow reaction turbine has external and internal diameter as 1.08m and 0.54 m. The turbine is running at 200 rpm. The width of the turbine at inlet is 240 mm and velocity of flow through the runner is constant and is equal to 2.06 m/s. The guide blades make an angle of 10° to the tangent of the wheel and discharge at the outlet of the turbine is radial. Draw the inlet and outlet velocity triangles and determine 1) Runner blade angle and width of runner at outlet 2) hydraulic efficiency; and 3) power developed 6

Or

- Q.3 B A centrifugal pump, in which water enters radially, delivers water to a height of 165 m. The impeller has a diameter of 360 mm and width 180 mm at inlet and the corresponding dimensions at the outlet are 720 mm and 90 mm respectively; its rotational speed is 1200 rpm. The blades are curved backward at 30° to the tangent at exit and the discharge is $0.389 \text{ m}^3/\text{s}$. Determine 1) Theoretical head developed and Manometric efficiency 2) Pressure rise across the impeller 3) Power required to drive the pump assuming overall efficiency of 70 % 6

- Q.4 A. What do you mean by geometric elements of Channel? Derive the conditions for the most economical section of trapezoidal channel? 5

Or

What is channel transition? State various types of channel transitions and their applications.

- B. A trapezoidal channel is to carry $45 \text{ m}^3/\text{s}$ with a mean velocity of 0.6 m/s . One side of canal is vertical and the other has a slope of 2 horizontal to 1 vertical. Find the minimum hydraulic slope, if Manning's $N=0.013$. 5
- Q.5 A. Draw a neat sketch of the specific energy curve for an open channel with constant Discharge. What is Froude number? Prove that for critical flow the specific energy is 150% of the critical 4

Or

Write a short note on Stream gauging or devices used for measurement of velocity for open channel?

- B. A rectangular channel 2.4 m wide carries uniform flow of water at a rate of 7 cum/sec at a depth of 1.5 m. If there is local rise of 15 cm in the bed, calculate the change in water level. What is the maximum rise in bed that will be permissible so that there is no change in the upstream depth of flow? 6
- Q.6 A. Derive the relation between the conjugate depths of a hydraulic jump in a rectangular channel in terms of Froude number at two stations. 4

Or

Show that the gradually varied flow equation for flow in a rectangular channel of variable width B may be expressed as

$$\frac{dy}{dx} = \frac{S_o - S_f + \left(\frac{Q^2 y}{gA^3}\right) \frac{dB}{dx}}{1 - \frac{Q^2 B}{gA^3}}$$

- B. Water is discharged in a rectangular channel 1.2 m wide passing under a sluice so that flow is $0.85 \text{ m}^3/\text{s}$ and the depth 0.6 m. Examine how the depth will vary downstream if slope of the channel bed is i) 1 in 1000 ii) 1 in 700 and iii) 1 in 500. Assume a chezy coefficient at 57, and illustrate the answer by sketches of the probable water surface. 6

COLLEGE OF ENGINEERING, PUNE

S. Y. B. Tech. (Civil)

End-semester Examination, May, 2011

(CE - 205) Surveying-I

[Max. Marks: 50]

Duration: 3 Hours

Instructions to candidates:

1. Answer any *five* questions
2. Neat diagrams must be drawn wherever necessary
3. Assume suitable data if necessary
4. Figures to the right indicate full marks
5. Use of non-programmable calculators is allowed

- Q.-1. a) Define Survey Stations and criteria for selection of station points. (5)
 b) What are the methods of plotting a Traverse Survey? Explain any-one in detail. (5)

- Q.-2. a) What is meant by balancing of traverse? Explain the various the rules to do this. (6)
 b) Following are the latitudes and departure of the lines of a closed traverse ABCD. Compute the area of traverse. (4)

Line	Latitude in m.	Departure in m.
AB	-116.1	-44.4
BC	+6.8	+58.2
CD	+80.5	+17.2
DA	+28.8	-31.0

- Q.-3. a) Explain clearly the two-point problem and how it is solved? (4)
 b) What are the methods for solving three-point problem? Explain Bessel's Graphical Method of solving three-point problem. (6)

- Q.-4. a) Derive the formula for the horizontal distance and the elevation of staff station for the inclined sights, the staff being held vertical. (5)
 b) A tachometer fitted with an anallatic lens was used to observe the following (5)

From	To	Bearing	Vertical angle	Hair reading		
C	A	320^0	$+12^0$	0.906	1.721	2.550
C	B	50^0	$+10^0$	0.744	2.199	3.654

The value of constant was 100 and the staff was held vertically. Determine the length and gradient of AB.

- Q.-5. a) What are the various types of curves? Explain any-one instrumental method of setting out simple curve in the field. (5)
 b) Two tangents intersect at chainage 1190 m., the deflection angle being 36^0 . Calculate all the data necessary for setting out a curve with radius of 300 m. by deflection angle **or** offset from chord, the peg interval is 30 m. (5)
- Q.-6. Attempt any **two** from the followings (10)
- a) What is transition curve? State the various types of transition curve with the help of neat sketch?
 - b) Explain in detail procedure followed in conducting Route Surveying.
 - c) What are the characteristics of contour lines and uses of contour?

-----X-----