

Code: 4GC42

II B.Tech. II Semester Regular Examinations May 2016

**Probability and Statistics**

( Common to CE, ME &amp; IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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## UNIT-I

1. a) Box A contains 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same color? 7M
- b) Two dice are thrown. Let X assign to each point (a,b) in S the maximum of its numbers i.e.  $X(a, b) = \max(a, b)$ . Find the probability distribution. X is a random variable with  $X(s) = \{1, 2, 3, 4, 5, 6\}$ . Also find the mean and variance. 7M

OR

2. a) The probabilities that students A, B, C, D solve a problem are  $\frac{1}{3}, \frac{2}{5}, \frac{1}{5}$  and  $\frac{1}{4}$  respectively. If all of them try to solve the problem, what is the probability that the problem is solved. 7M
- b) Probability density function of a random variable X is  $f(x) = \frac{1}{2} \sin x$ , for  $0 \leq x \leq \pi$ . Find the mean, mode and median of the distribution and also find the probability between 0 and  $\frac{\pi}{2}$ . 7M

## UNIT-II

3. a) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective (iii)  $P(1 < X < 4)$ . 7M
- b) Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 (or) 3 boys (iv) At least one boy. Assume that there is equal probability for boys and girls. 7M

OR

4. a) The life of electronic tubes of a certain type may be assumed to be normal distribution with mean 155 hours and S.D. 19 hours. Determine the probability that the life of tube (i) Between 136 hours to 174 hours (ii) Less than 117 hours (iii) More than 195 hours 7M
- b) Using Recurrence relation, find the probabilities when  $x = 0, 1, 2, 3, 4, 5$ . If the mean of Poisson distribution is 3. 7M

## UNIT-III

5. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5%. 7M
- b) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and a variance of 16 minutes. Test of significance at 0.05 level. 7M

OR

6. a) In a city A, 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant at 0.05 level of significance? 7M
- b) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D. of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with S.D. of 398 hours. Is there a significant difference between the means of two batches? 7M

<b>UNIT-IV</b>
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7. a) A random sample of 10 boys had the following I.Q's : 70, 120, 110, 101, 88, 83, 95, 98, 107 and 100.

(i) Do this data supports the assumption of a population mean I.Q of 100.

(ii) Find a reasonable range in which most of the mean I.Q. values of sample of 10 boys lie. 7M

- b) Two horses A and B were tested according to the time to run a particular track with the following results.

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	

Test whether the two horses have the same running capacity. 7M

**OR**

8. a) The nicotine contents in milligrams in two samples of tobacco were found to be as follows:

Sample A	24	27	26	21	25	-
Sample B	27	30	28	31	22	36

Can it be said that the two samples have come from the same normal population. 7M

- b) Fit a Poisson distribution to the following data and for its goodness of fit at level of significance 0.05.

x	0	1	2	3	4
Frequencies	419	352	154	56	19

7M

<b>UNIT-V</b>
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9. a) Explain the np- charts. 7M

- b) Show that the variance of queue is

$$V(n) = E(n^2) - [E(n)]^2$$
7M

**OR**

10. a) Construct a control chart for mean and range for the range for the following data on the basis of fuses, samples of 5 being taken every hour (each set of 5 has been arranged in ascending order of magnitude)

42	42	19	36	42	51	60	18	15	69	64	61
65	45	24	54	51	74	60	20	30	109	90	78
75	68	80	89	57	75	72	27	39	113	93	94
78	72	81	77	59	78	95	42	62	118	109	109
87	90	81	84	78	132	138	60	84	153	112	136

7M

- b) Patients arrive at a clinic according to a poisson distribution at the rate of 30 patients per hour. The waiting room does not accommodate more the 14 patients. Examination time per patient is exponential with mean rate 20 per hour.

i) Find the effective arrival rate at the clinic.

ii) What is the probability that an arriving patient will not wait. Will he find a vacant seat in the room?

iii) What is the expected waiting time until a patient is discharged from the clinic. 7M

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Hall Ticket Number :

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**R-14**

**Code: 4GC43**

*II B.Tech. II Semester Regular Examinations May 2016*

**Environmental Science**

( Common to CE, ME and CSE )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Enumerate four conceptual spheres in the earth's environment.
- b) Explain briefly the importance of Environmental studies and need for public awareness?

**OR**

2. a) Define and explain scope of environmental studies?
- b) Explain role of an individual in promoting environmentalism?

**UNIT-II**

3. a) Explain the importance of forests in maintaining ecological balance and in providing economical and commercial services?
- b) Explain the food problems of India and World

**OR**

4. a) Write a note on possible conflicts over water, giving examples of Indian and Global context.
- b) Explain role of an individual in conservation of natural resources

**UNIT-III**

5. a) What are the three different types of ecological Pyramids? Explain
- b) Define and explain "River" ecosystem?

**OR**

6. a) Explain the concept of "food chain" and "food web"?
- b) Comment on Indian biodiversity with special reference as a mega diversity nation?

**UNIT-IV**

7. a) Explain the major water pollutants and their effect on the Environment?
- b) Briefly describe sources, effects and control of Noise pollution?

**OR**

8. a) Discuss briefly any two Global effects of Air Pollution.
- b) Describe various effects and control measures of Thermal pollution?

**UNIT-V**

9. a) Enumerate and Explain rainwater harvesting methods
- b) Explain the evolution of family welfare programs in India?

**OR**

10. a) Explain environmental consequences of unethical behavior of human population?
- b) Discuss objectives and elements of value education?

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R-14

Code: 4G641

II B.Tech. II Semester Regular Examinations May 2016

**Strength of Materials-II**

( Civil Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) A Spherical shell of 1m diameter is subjected to an internal pressure of  $1.2 \text{ N/mm}^2$ . Taking the maximum allowable stress as  $100 \text{ N/mm}^2$ . Find the necessary thickness of the plate. Take joint efficiency at 75%. 7M
- b) Find an expression for the change in the volume of a thin cylindrical shell subjected to internal fluid pressure. 7M

**OR**

2. The Maximum allowable stresses in a cylinder of 500 mm inner diameter and 100 mm thickness is  $12.6 \text{ MPa}$ . Determine the maximum allowable internal & external pressure on the cylinder, when applied separately. 14M

**UNIT-II**

3. a) Define the term 'Polar Modulus'. Find the expressions for polar modulus for a solid shaft and for a hollow shaft. 6M
- b) A solid circular shaft of steel is 6cm in diameter and transmits 60 KW power at 140 R.P.M. Taking  $N=0.82 \times 10^5 \text{ N/mm}^2$ . Calculate the maximum intensity of stress and the angle of twist in degrees for a length of 6 meters. 8M

**OR**

4. A leaf spring carries a central load of 2.5 KN. The leaf spring is to be made of 10 steel plates 6 cm wide and 5 mm thick. If the bending stress is limited to  $100 \text{ N/mm}^2$ , determine length of the spring and deflection at the centre of the spring. Take  $E=2 \times 10^5 \text{ N/mm}^2$ . 14M

**UNIT-III**

5. Derive Euler's critical load formula for long column with one end fixed and other end free. 14M

**OR**

6. Find the Euler's crushing load for a hollow cylindrical steel column of length 6 m, 175mm external diameter and 25mm thick. The both ends of the column are fixed. Compare this load with crushing load given by Rankine's formula. The Rankine's constants are  $320 \text{ N/mm}^2$  and  $\frac{1}{7500}$ . For what length of this cross section does the Euler's formula ceases to apply. 14M

UNIT-IV
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7. a) Find an expression for the maximum and minimum stresses when a rectangular column is subjected to a load, which is eccentric to Y-Y axis. 7M
- b) What is Core of a section? Derive the expression for a rectangular hollow section. 7M

OR

8. A masonry chimney 24 m high, of uniform circular section 3.5m external diameter and 2m internal diameter is subjected to a horizontal wind pressure of 1 KN /mm<sup>2</sup> on projected area. Find the maximum and minimum stress intensities at the base if the specific weight of masonry is 22 KN/m<sup>3</sup>. 14M

UNIT-V
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9. a) How do you determine the total deflection and angle of deflection when a beam is subjected to Unsymmetrical bending? 7M
- b) Describe the Mohr's Circle method to locate the principal axis and determine the principal moment of Inertia of the section. 7M

OR

10. A beam of T section having flange size 100 mm × 20 mm, web size 150 mm × 10 mm is 2.5 m long and is simply supported at the ends. It carries a load of 3.5KN inclined at 20° to the vertical and passing through the centroid of the section .If E=200 GN/m<sup>2</sup>. Calculate (i) maximum tensile stresses, (ii) minimum compressive stresses, (iii) deflection due to load (iv) position of the neutral axis 14M

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**R-14**

**Code: 4G642**

*II B.Tech. II Semester Regular Examinations May 2016*

**Hydraulics and Hydraulic Machinery**

( Civil Engineering )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Discuss the methods adopted to prevent the boundary layer separation.
- b) In an experiment a smooth two dimensional flat plate is exposed to a wind of velocity 90kmph. If laminar boundary layer exists upto a value of  $R_e=2 \times 10^5$  find the maximum distance from the leading edge upto which laminar boundary layer exists and its maximum thickness. Take kinematic viscosity of air as  $1.6 \times 10^{-5} \text{ m}^2/\text{s}$ .

**OR**

2. a) A truck having projected area of  $6.5 \text{ m}^2$  travelling at 72kmph has a total resistance of 1.6kN. Out of this resistance 30% is due to rolling friction and 20% due to surface friction. The rest is due to drag. Find the coefficient of drag. Assume specific weight of air as  $12 \text{ N/m}^3$ .
- b) Write short notes on lift and drag.

**UNIT-II**

3. a) A flow of 100lps flows down in rectangular laboratory flume of width 0.6m and having adjustable bottom slope. If Chezy's C is 56 determine the bottom slope necessary for uniform flow with a depth of flow 0.3m. Also find whether the flow is rapid or tranquil.
- b) What is Pitot-tube? How does it work?

**OR**

4. a) Show that the loss of energy in a rectangular channel due to the formation of hydraulic jump is  $(y_1 - y_2)^3 / 4y_1y_2$ .
- b) Explain direct step method.

**UNIT-III**

5. Derive the expression for \_\_\_\_\_ when a jet strikes a series of radial curved vanes attached to a wheel at the outer circumference.

**OR**

6. A jet of water having a velocity of 15m/s strikes a curved vane which is moving with a velocity of 5m/s in the same direction as that of the jet at inlet. The vane is so shaped that the jet is deflected through  $135^\circ$ . The diameter of jet is 100mm. Assuming the vane to be smooth find force exerted by the jet on the vane in the direction of motion, power exerted on the vane and efficiency of the vane.

**UNIT-IV**

7. a) Give the layout of a hydro electric power plant with brief explanation.  
b) An inward flow reaction turbine has external and internal diameters as 1m and 0.5m respectively. The velocity of flow through the runner is constant and is equal to 1.5m/s. Find discharge through the runner and width of the turbine at outlet if the width of the turbine at inlet=200mm.

**OR**

8. Explain performance characteristic curves of a turbine.

**UNIT-V**

9. a) Each impeller of a three stage centrifugal pump has external diameter of 375mm and width 20mm. The pump is discharging 3600 litres of water per minute at 900r.p.m. The vanes are curved back at  $45^{\circ}$  to the tangent at outlet.  
b) Name the different types of casings for the impeller of a centrifugal pump with brief explanation.

**OR**

10. a) Two turbo generators each of capacity 25000kW have been installed at a hydel power station. During a certain period the load on the hydel plant varies from 15000kW to 40000kW. Calculate the total installed capacity, the load factor and the utilization factor.  
b) Define load factor, utilization factor and capacity factor.

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Code: 4G643

R-14

II B.Tech. II Semester Regular Examinations May 2016

### Structural Analysis-I

( Civil Engineering )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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#### UNIT-I

1. A fixed beam of span 6m carries point loads 200kN and 150kN at distances 2m and 4m from the left end. Find the fixed end moments and the reactions at the support. Draw B.M and S.F diagrams. 14M

OR

2. Deduce expressions of fixing moments when one end support sinks down by from its original position. 14M

#### UNIT-II

3. A continuous beam ABC covers two consecutive spans AB and BC of lengths 4m and 6m, carrying uniformly distributed loads of 50kN/m and 100kN/m respectively if the ends A and C are simply supported find the support moments at A,B and C. Draw also B .M and S.F diagrams. 14M

OR

4. A continuous beam ABCD is simply supported over three spans of dimensions AB=8m; BC=12m; CD=5m with carrying a UDL of 4kN/m, 3 kN/m and 6 kN/m respectively. Find the moments over supports B and C. Draw SFD & BMD. 14M

#### UNIT-III

5. A continuous beam ABCD is simply supported at A, B and C, and is fixed at D. The spans AB, BC and CD are 3 metres, 4 metres and 6 metres long. The beam carries a point load of 15 kN on AB at 2 metres from A, a point load of 25 kN at the middle of BC and a point load of 8 kN at the middle of CD. If  $I_{ab} : I_{bc} : I_{cd} = 1 : 1 : 2$ , find the support moments and reactions using moment distribution method. 14M

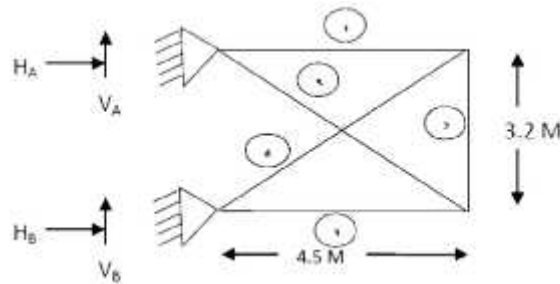
OR

6. a) A continuous beam ABC consists of spans AB=6m and BC=5m.the end A is simply supported while the end C is fixed .the span AB carries a UDL of 40kN/m .the span BC does not carry any load the beam is of uniform section .find the support moments and draw the BMD by slope deflection method 8M
- b) What are the advantages of slope-deflection method over moment distribution method? 6M



<b>UNIT-IV</b>
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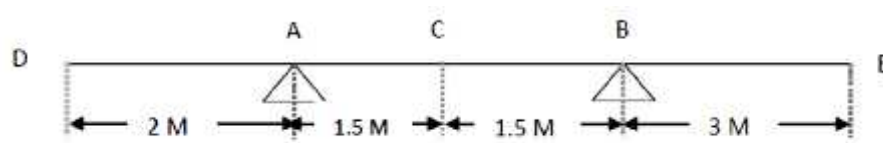
7. Analyze the pin jointed truss shown. All areas are the same



14M

OR

8. Two wheel loads 250kN and 100kN spaced 0.8m apart roll on the girder shown in figure below. Find the maximum positive and negative shear force at the section C and also draw SFD



14M

<b>UNIT-V</b>
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9. a) What is an influence line diagram? Explain its importance in structural analysis. 7M  
 b) Draw influence line diagrams for MA, Shear force and bending moment at 'X' for a propped cantilever beam of span 10 m at 1 m intervals. Consider section 'X' at 4 m from left end support. 7M

OR

10. Derive the influence diagram for reactions and bending moment at any section of a simply supported beam. Using the ILD, determine the support reactions and find bending moment at 2.5m, 4.5m and 6.5m for a simply supported beam of span 9m subjected to three point loads of 15kN, 25kN and 5kN placed at 1m, 4.5m and 6.5m respectively. 14M

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Hall Ticket Number :

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**R-14**

**Code: 4G644**

*II B.Tech. II Semester Regular Examinations May 2016*

**Building Planning and Drawing**

( Civil Engineering )

Max. Marks: 70

Time: 3 Hours

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**PART-A**

Answer all **Three** units by choosing one question from each unit ( 3 x 14 = 42 Marks )

**UNIT-I**

1. a) Explain principle underlying building bye-laws.  
b) What are provisions for **(i)** Lighting and Ventilation **(ii)** Means of Access

**OR**

2. a) Discuss the various bye-laws as applied to building and indicate their usefulness or otherwise  
b) Write short notes on Floor area ratio. How is it related to height of the building? Explain

**UNIT-II**

3. a) What are the functions of the rooms of a residential building?  
b) Explain the grouping and standard dimension of various rooms in residential building
- OR**
4. a) Differential between the following **(i)** Hotel and Motel **(ii)** Reading room and stack room **(iii)** Auditorium and foyer **(iv)** Dispensary and clinic  
b) What are the factors to be considered in the design of bank building

**UNIT-III**

5. a) Differentiate between PERT and CPM network methods  
b) Define a dummy activity used in a network. State the two purposes for which it is used. Mention four conventions that are used in drawing the network.
- OR**
6. The utility data for a network are given below  
(i) Draw network diagram  
(ii) Determine the total float, free, independent and interfering floats and identify the critical path

Project data

Activity 0-1, 1-2, 1-3, 2-4, 2-5, 3-4, 3-6, 4-7, 5-7, 6-6

Durations 2, 8, 10, 6, 3, 3, 7, 5, 2, 8

**PART-B**

Answer any **one** question from the following Units ( 1 x 28 = 28 Marks )

**UNIT-IV**

7. Draw to suitable scale a king post truss for a clear span of 6000 mm showing all the details and demensions

**OR****UNIT-V**

8. The line plan of a residential building is as shown in fig. A-2.

**Specifications:**

*Foundation:* 300 mm thick c.c 1:2:4 and 600 wide.

*Basement:* Brick work in c.m. 1:6, 300 mm wide and 450 mm above ground level.

*Superstructure:* All walls are 200 mm thick are of bricks in c.m. 1:6. Height of ceiling above floor level is 3000 mm.

*Roof:* 100 mm thick R.C.C. slab. Provide two layers of flat tiles each 13 mm thick as the weathering coat. Parapet wall 100 mm thick should extend to a height of 600 mm above the roof.

*Flooring:* 20 mm thick c.m. 1:3 over plain cement concrete layer of 1:3:6, 100 mm thick.

D Panelled door 1000 mm x 2100 mm

D<sub>1</sub> Panelled door 750 mm x 1800 mm

W Glazed window 1200 mm x 1400 mm

V Ventilator 900 mm x 500 mm

C R.C.C. column 200 mm diameter.

Sunshades are to be provided over all the openings of the outer walls.

All the dimensions of rooms are clear internal dimensions.

Draw: (i) Detailed dimensioned plan; (ii) Section along AB

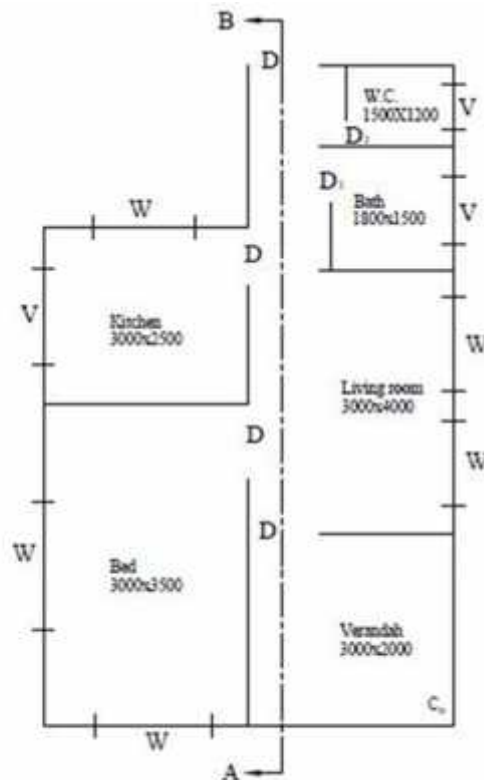


Fig. A2

All dimensions are in mm

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