Hall Ticket Number :										

R-11 / R-13

Code: 1GC43

II B.Tech. II Semester Supplementary Examinations December 2017

Environmental Science

(Common to CE, ME and CSE)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks each**)

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1. a) Why should we care about sustainability? Why it is important to study environmental science? 7M

   b) Name two Institutions actively involved in environmental activities. Discuss the multidisciplinary nature of environmental science. 7M

2. a) Mention few direct uses of forest resources. Write short notes on 'Joint forest management'. 7M

   b) Discuss in detail the problems associated with 'Dam'. 7M

3. a) Prepare a note on world food problem. What is Eutrophication? 7M

   b) What is open pit mining? Discuss the role of an individual in the conservation of Natural resources. 7M

4 a) Discuss the effect of air pollution on living organism. What is 'Green house effect'? 8M

   b) Describe how an individual can contribute towards a better quality of our environment and human life. 6M

5. a) Describe the structure and functions of a forest ecosystem. 7M

   b) What are ecological pyramids? Discuss energy flow in an ecosystem with appropriate diagram. 7M

6. a) Explain 'Ex-situ' and 'In-situ' conservation of biodiversity. 7M

   b) Describe India as a megadiversity nation. 7M

7. a) In your opinion what are the major limitations to successful implementation of our environmental legislations? Elaborate. 7M

   b) Prepare a note on urban problems related to energy. 7M

8. a) List out various causes of rapid population growth in India. Mention few measures to control the rapid population growth in India. 7M

   b) Explain the role of 'Information Technology' in protection of our environment. List out few major precautions to avoid AIDS. 7M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G642

II B.Tech. II Semester Supplementary Examinations December 2017

Hydraulics and Hydraulic Machinery

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks each**)
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1. a) Write any four factors that influence the thickness of the boundary layer forming along a flat smooth plate. 2M
   b) Write about laminar sublayer. 2M
   c) Calculate the friction drag on a flat plate 15cm wide and 45cm long placed longitudinally in a stream of oil of relative density 0.925 and kinematic viscosity 0.9 stokes, flowing with a free stream velocity of 6 m/s. Also find the thickness of the boundary layer and shear stress at the trailing edge. 10M
2. a) Describe the velocity distribution in open channel flow using neat diagram. 4M
   b) Write notes on most economical section, specific energy, critical depth and critical flow. 6M
   c) A trapezoidal channel has a bed width of 3m and side slopes of 1:1. The bottom slope of the channel is 0.0036. If a discharge of 15 m^3/s passes in this channel at a depth of 1.25m, estimate the value of Chezy's coefficient C. 4M
3. a) Give complete list of GVF profiles for mild, steep and critical slopes with their flow type, depth condition and also draw their neat profiles. 8M
   b) Differentiate Rapidly Varied Flow and Gradually Varied Flow in Open channel. 2M
   c) A stationary hydraulic jump occurs in a rectangular channel with the initial and sequent depth being equal to 0.2m and 1.2m respectively. Estimate the discharge per unit width and the energy loss. 4M
4. a) Determine the force exerted by a jet of water on a stationary flat plate in the direction of the jet. 4M
   b) Write two applications of radial flow turbines. 2M
   c) A 75mm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45^o to the axis of the jet. Find the normal pressure on the plate when the plate is stationary and when the plate is moving with a velocity of 15 m/s in the direction of the jet and away from the jet. 8M
5. a) Give the list of working proportions of Pelton wheel. 5M
   b) Write about draft tube in turbines and their importance with neat diagram. 4M
   c) An inward flow reaction turbine has inlet and outlet diameters of 1.2m and 0.6m, respectively. The breadth at inlet is 0.25m and at outlet is 0.35m. At a speed rotation of 250 rpm, the real velocity at entrance is 3.5 m/s and is radial. Calculate the (i) absolute velocity at entrance and its inclination to the tangent of the runner (ii) discharge 5M

6. a) Define Governor. Write about its operation in reaction turbine using a neat sketch. 6M

   b) Define Cavitation. Describe how this is being controlled in turbines. 3M

   c) A turbine develops 8000 kW when running at 100 rpm. The head on the turbine is 30m. If the head is reduced to 18m, determine the speed and power developed by the turbine. 5M

7. a) Describe the performance of pumps in series and pumps in parallel with neat sketch. 5M

   b) Describe the classification of losses in centrifugal pumps. 5M

   c) A centrifugal pump discharges 0.2 m^3/s of water at a head of 25m when running at a speed of 1400 rpm. The manometric efficiency is 80%. If the impeller has an outer diameter of 30cm and width of 5cm, determine the vane angle at the outlet. 4M

8. a) Describe the classification of hydro-power plants based on the storage being provided. 5M

   b) Define and differentiate the terms load factor, utilization factor and capacity factor. 5M

   c) Using one method explain the procedure to estimate the hydropower potential of any plant. 4M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GC42

II B.Tech. II Semester Supplementary Examinations December 2017

Probability & Statistics

(Common to CE, ME and IT)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Find the mean, median, mode and standard deviation for the following distribution.

x	1	3	5	7	9	11	13	15
y	3	3	4	14	7	4	3	4

8M

b) Obtain the rank correlation coefficient for the following data.

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

6M

2. 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 colours? 7M

b) A business man goes to hotels X, Y, Z, 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbings. What is the probability that business man's room having faulty plumbing is assigned to hotel Z? 7M

3. a) 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 of the distribution. 10M

b) If X is a continuous random variable with probability density function $f(x) = \begin{cases} x^2, & 0 \le x \le 1 \\ 0, & else\ where \end{cases}$ If $P(a \le x \le 1) = \frac{19}{81}$, find the value of 'a'. 4M

4. a) The mean of Binomial distribution is 3 and the variance is $\frac{9}{4}$.

Find (i) the value of n (ii) $P(X \ge 7)$ (iii) $P(1 \le X < 6)$ 7M

b) If X is a poisson variate such that $3P(x=4) = \frac{1}{2} P(x=2) + P(x=0)$,

Find (i) the mean of x (ii) $P(x \le 2)$ 7M

5. Samples of size 2 are taken from the population 3, 6, 9, 15, 27 with replacement. Find
   a) The mean of the population
   b) The standard deviation of the population
   c) Mean of the sampling distribution of means
   d) The standard deviation of the sampling distribution of means. 14M

6. a) What is the size of the smallest sample required to estimate an unknown proportion to with in a maximum error of 0.06 with at least 95% confidence. 7M

b) A random sample of 500 points on a heated plate resulted in an average temperature of 73.54 degrees Fahrenheit with a standard deviation of 2.79 degree Fahrenheit. Find a 99% confidence interval for the average temperature of the plate. 7M

7. To compare two kinds of bumper guards, 6 of each kind were mounted on a car and then the car was run into a concrete wall. The following are the costs of repairs.

Guard 1	107	148	123	165	102	119
Guard 2	134	115	112	151	133	129

Use the 0.01 level of significance to test whether the difference between two sample means is significant. 14M

8. In an investigation on the machine performance, the following results are obtained.

	No. of units inspected	No. of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at α = 0.05. 14M

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Hall Ticket Number :										

R-11/R-13

Code : 1G643

II B.Tech. II Semester Supplementary Examinations December 2017

Structural Analysis-I

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any* ***five*** questions
All Questions carry equal marks (**14 Marks** each)

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1. A fixed beam of span 14m carries an eccentric clockwise couple of 25KNm at 6m from left support A. Calculate the fixed end moments for the beam & draw the BMD & SFD. 14M

2. A two span continuous beam ABC is fixed at A and is continuous over B. The span AB = 6.5m and the span BC = 4.7m. Support C is simply supported. The span AB carries two point loads of 15 KN each at 3m & 5m from fixed end A. Span BC is loaded with an udl of 3 KN/m over the entire span. Analyse the beam using Clayperon's theorem of three moments and sketch the BMD & SFD. 14M

3. A two span continuous beam ABC of span 10m is fixed at A & C and is continuous over B. The span AB = 5m & span BC = 5m. Support B sinks by 5mm. Span AB & BC both carry a udl of 6 KN/m over the entire length. Analyze the beam by Slope – Deflection method & draw the bending moment diagram. Take E = $2X10^5$ MPa & I = $4X10^7$ mm^4. 14M

4. A simply supported beam ABC is continuous over two spans AB & BC of 6m and 5 m respectively. The span AB is carrying a udl of 2KN/m and the span BC is carrying a point load of 10 KN at 2m from B. Analyse the beam and draw the BMD & SFD using Moment-Distribution method. 14M

5. a) State and derive Castigliano's first theorem. 7M
   b) Derive the expression for strain energy due to bending. 7M

6. A live load of 20 KN/m intensity and 6m long moves on a simply supported girder of span 20m from left to right. Find the maximum positive and negative shear force that can occur at a section 8m from the left support. 14M

7. Draw the influence line diagram for shear force and bending moment for a section at 3m from left hand support of a simply supported beam 12cm long. Hence calculate the maximum bending moment and shear force at the section, due to uniformly distributed rolling load of length 8m and intensity 10KN/m run. 14M

8. State and derive Castigliano's first theorem. Show how this theorem is helpful in the analysis of redundant frames. 14M

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Hall Ticket Number :										

R-11 / R-13

Code: 1G641

II B.Tech. II Semester Supplementary Examinations December 2017

Strength of Materials-II

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks each**)

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1. a) Derive an expression for hoop stress induced in a thin spherical shell subjected to internal pressure. 7M

   b) A thin cylindrical shell 600 mm in diameter with wall thickness of 15 mm and 2.4 m length is subjected to an internal pressure of 4 N/ mm^2. Calculate the change in volume. Take E = 2 X 10^5 N/ mm^2 and μ = 0.3. 7M

2. A compound cylinder is formed by shrinking one cylinder on to another. The final dimensions are: Internal diameter = 15 cm, External diameter = 30 cm, and diameter at junction= 25cm. The shrinkage pressure is 10MPa. Calculate the shrinkage allowance. What is the minimum temperature to which the outer cylinder must be heated so that it can be slipped on? Take α for material of outer cylinder = 0.6 X 10^{-5} / ^{0}C. 14M

3. a) Derive Torsion formula stating the assumptions. 7M

   b) Compare the weights of a solid circular shaft and a hollow circular shaft of ID 3/4th of its OD; if the two shafts are required to transmit the same torque. Assume that the length and material of both the shafts are the same. 7M

4 a) Define: (**i**) stiffness (**ii**) spring index (**iii**) Helix angle (**iv**) Solid length w.r.to helical springs. 8M

   b) A close coiled helical spring is to be designed such that the mean diameter of the coil is 12 times the wire diameter. The spring is to absorb 300 J of energy with an extension of 15 cm. The maximum shear stress set up in the spring is not to exceed 100 MPa. Determine:

   (**i**) Mean diameter of coil (**ii**) Wire diameter (**iii**) Number of turns. 6M

5. a) Derive an expression for Euler's crippling load for a column with both ends fixed. 7M

   b) Compare the crippling loads given by Rankine's and Euler's formulae for tubular strut 225 cm long having outer and inner diameters of 37.5 mm and 32.5 mm respectively and loaded through pin joints at both ends. Take yield stress = 315 MPa, E= 200 GPa and a = 1 / 7500. 7M

6. A chimney is 45 m high. Its external diameter tapers from 4 m at the base to 2 m at the top. The internal diameter at the base is 2.5 m. The horizontal wind pressure is 2 KPa. Self weight of the chimney is 2.5 MN. Determine the maximum and minimum stresses. 14M

7. Find the centroidal principal moments of inertia of a T-section 30 X 30 X 5 mm. 14M

8. Draw the B.M. and Torsion diagrams for a semi-circular beam AB of radius 'R'. The cross-section of the material is circular with radius 'r'. It is loaded with a load at the mid-point C of the semi circle. The ends A and B are fixed. 14M

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