Hall Ticket Number :										

R-15

Code: 5G642

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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) Define momentum thickness (θ) and energy thickness (δ_E). What are the factors affecting the boundary layer thickness on a thin flat plate? 7M

   b) A sphere of 4 cm diameter made of aluminium with specific gravity 2.8, is attached to a string and suspended from the roof of a wind tunnel test section. If an air stream of 30 m/s flows past the sphere, find the inclination of the string and the tension in the string. Take ρ_a=1.2 kg/m^3, ν_a=1.5x10^{-5} m^2/s, C_D=0.5 for $10^4 \leq R_e \leq 3x10^5$ and C_D=0.2 for $R_e \geq 3x10^5$. Neglect the drag of the string. 7M

OR

2. a) Define Drag and Lift. Briefly explain the different types of drag. What do you mean by Magnus Effect? 7M

   b) Air flows over a flat plate 1 m long at a velocity of 6 m/s. Determine i) The boundary layer thickness at the end of the plate; ii) The shear stress at the middle of the plate. iii) To drag per unit length on the sides of the plate. Take ρ_a=1.226 kg/m^3, ν_a=1.5x10^{-5} m^2/s for air. 7M

UNIT–II

3. a) A trapezoidal channel with side slopes of 1.5 to 1 has to be designed to convey 15 m^3/s at a velocity of 2.3 m/s, so that the amount of concrete lining for the bed and sides is the minimum. Calculate the area of lining required for one meter length of the channel. 7M

   b) Stating assumptions derive the dynamic equation for gradually varied flow with neat sketch. 7M

OR

4. a) Explain the specific energy curve in detail. Also explain critical, sub critical and super critical flows. 7M

   b) A trapezoidal channel having bottom width 6 m, side slopes 2 horizontal to 1 vertical and bottom slope 0.0016, carries a discharge of 10 m^3/s. A weir placed across the channel backs up the water to a depth of 2 m. Calculate how far upstream, the depth becomes 1.5 m. Classify the surface profile. Take n=0.025. 7M

UNIT–III

5. a) Obtain the expression for work done per second on a series of moving curved vanes by a jet of water striking at one of the tips of the vane. Also find the efficiency of the system. 7M

   b) Water flows over a series of curved vanes of hydraulic turbine wheel, the diameter of which between inlet tips of vanes is 2 m and that between outlet tips is 1 m. Water enters at an angle of 30^o to the tangent to wheel at inlet with a velocity of 40 m/s and leaves with a velocity of 10 m/s at an angle of 30^o to the tangent to wheel at outlet tip. Find i) vane angles at entry and exit; ii) work done on the wheel per unit weight of water; iii) hydraulic efficiency of wheel; iv) power developed by the wheel when the discharge is 0.3 m^3/s. 7M

OR

6. a) Find the expression for torque exerted on a wheel with radial curved vanes. Also find the work done on the wheel per second and efficiency of the system. 7M

   b) A rectangular steel plate is suspended vertically by a hinge on the top horizontal edge. The c.g. of the plate is 100 mm from the hinge. A horizontal jet of water 20 mm diameter, whose axis is 15 cm below the hinge impinges normally on the plate with velocity 5 m/s. Find the horizontal force, applied at the c.g. to maintain the plate in its vertical position. Find the alteration of the velocity of jet, if the plate is deflected in the direction of jet through 30^o and the same jet continues to act on the plate. 7M

UNIT–IV

7. a) Write the two functions of draft tube. Sketch the different draft tubes and compare them. 7M

   b) The following data were obtained from a test on a Pelton wheel: i) Head at the base of the nozzles = 32 m, ii) Discharge of the nozzle = 0.18 m^3/s, iii) Area of the jet=7500sq.mm, iv)Power available at the shaft=44kW, v)Mechanical efficiency=94%. Calculate the power lost in the nozzle, in the runner and in mechanical friction. 7M

OR

8. a) With a neat sketch explain the working of Francis turbine. 7M

   b) The following data were obtained from the main characteristics of a Kaplan turbine of runner diameter 1 m. P_u =30.695, Q_u = 108.6, N_u=63.6. Estimate the runner diameter, the discharge and speed of similar runner working under a head of 30 m and developing 2000 kW. Find the specific speed of the runner. 7M

UNIT–V

9. a) With neat sketch, explain the principle and working of centrifugal pump. 7M

   b) Define the terms load factor, utilization factor and capacity factor. 7M

OR

10. a) Draw and discuss the operating characteristics of centrifugal pump. 7M

    b) A centrifugal pump is running at 1000 rpm. The outlet vane angle of the impeller is 45^o and the velocity of flow a outlet is 2.5 m/s. The discharge through the pump is 200 liters per second when the pump is working against a total head of 20 m. If the manometric efficiency of the pump is 80%, determine i) the outside diameter of the impeller ii) the width of the impeller at outlet. 7M

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Hall Ticket Number :										

R-15

Code: 5GC42

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Probability and Statistics

(Common to CE, ME and CSE)

Max. Marks: 70 Time: 3 Hours

PART-A

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

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UNIT–I

1. Given P(A)=1/4, P(B)=1/3 and $P(A\cup B)=1/2$, then evaluate $P(A/B)$, $P(B/A)$, $P(A\cap B')$ and $P(A'/B')$ 14M

OR

2. A random variable X has the following probability function values of X.

x:	-2	-1	0	1	2	3
p(x):	0.1	K	0.2	2k	0.3	k

Find the value k, $P(X\geq -1)$, $P(X\leq 2)$, mean and variance 14M

UNIT–II

3. a) The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that (a) exactly two will defective, (b) at least two will be defective and (c) none will be defective. 7M

   b) Fit a Poisson distribution to the frequency distribution

x:	0	1	2	3	4
f:	46	38	22	9	1

7M

OR

4. a) The weekly wages of workers in a company are normally distributed with mean of Rs. 700 and standard deviation of Rs. 50. Find the probability that the weekly wage of a randomly chosen worker is (i) between Rs. 650 and Rs. 750, and (ii) more than Rs. 750. 7M

   b) For the normal distribution with mean 2 and standard deviation 4, evaluate (i) $P(-6<x<3)$, (ii) $P\{x\geq 5\}$ and (iii) $P(\{|x|<4\})$. 7M

UNIT–III

5. A population consists of the four numbers 3, 7, 11, 15. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means. 14M

OR

6. a) The standard deviation of the life-times of television tubes manufactured by a company is estimated as 100 hours. Find how large a sample must be taken in order to be 99% confident that the error in the estimated mean life-time will not exceed 20 hours 7M

   b) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14. 7M

UNIT–IV

7. a) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population 7M

   b) Experience had shown that 20% of a manufactured product is of the top quality. In one day production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level 7M

OR

8. The mean yield of wheat from a district A was 210 pounds with S.D 2.5 inches per acer from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a sample of 150 plots. Assuming that the S.D of yield in the entire state was 11 pounds. Test whether there is any significant difference between the mean yield of crops in the two districts 14M

UNIT–V

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

	No. of units inspected	No. of defectives
Machine I	375	17
Machine II	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$ 14M

OR

10. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees

Employees

Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

14M

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Hall Ticket Number :										

R-15

Code: 5G643

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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. Derive an expression for a fixed beam carrying a point loads with eccentrically loaded on a beam?

OR

2. A fixed beam AB of span 7.00 m is subjected to a concentrated couple of 75kN-m applied at a section C 4.5m from the end A. Find the end moments from first principles and draw the B.M and S.F. diagrams.

UNIT–II

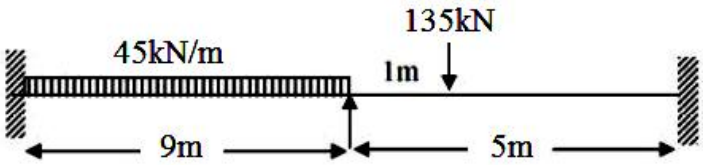
3. A continuous beam consists of three successive spans of 9m, 12m and 8m carries loads of 40kN/m, 30kN/m and 20kN/m respectively on the spans. Determine the bending moments and reactions at the supports and also draw shear force and bending moment diagrams.

OR

4. A continuous beam ABC consists of two consecutive spans AB and BC 6m each and carrying a distributed load of 75kN/m run. The end A is fixed and the end C is simply supported. Find the support moments and the reactions.

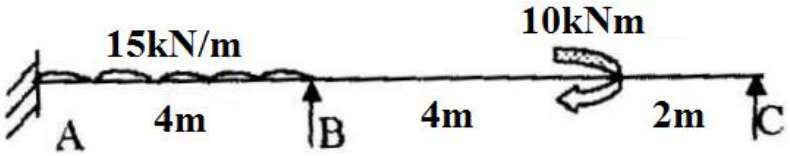
UNIT–III

5. Evaluate the bending moment and shear force diagrams of beam in below figure by slope deflection method.



OR

6. a) Draw the bending moment diagram and shear force diagram for the continuous beam shown in figure below using moment distribution method. Assume EI is constant for two spans.



UNIT–IV

7. Two point loads of 6000N and 3000N spaced 4M apart cross a girder of 10 m span from left to right, with smaller loading leading. Draw the SF and BM diagrams. Find the position and amount of absolute maximum bending moment.

OR

8. a) Draw the influence line diagram for a shear force at any section of a simply supported beam.

   b) Find the maximum force in the member shown in the figure below (figure2) when a uniformly distributed load of 15kN/m longer than the span crosses the bridge.

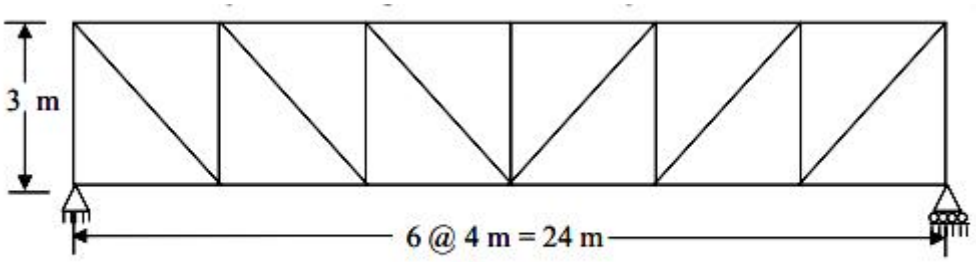


Figure 2

UNIT–V

9. a) Distinguish between pin jointed and rigidly jointed structure with suitable examples?

   b) Differentiate the statically determinate structures and statically indeterminate structures with suitable examples?

OR

10. Find the stresses in all the members of the given frame, in which the cross sectional areas of vertical members are 3000mm^2 each and those of all other members are 2200mm^2. E = 2x10^5 N/mm^2.

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Hall Ticket Number :										

R-15

Code: 5G641

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

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) Derive the expressions for hoop stress and longitudinal stresses induced in a thin cylindrical shell subjected to internal pressure. 7M

   b) Find the thickness of metal necessary for a thick cylindrical shell of internal diameter 150 mm to withstand an internal pressure of 50 N / mm^2. The maximum hoop stress in the section is not to exceed 150 N / mm^2. Draw the stress distributions. 7M

OR

2. a) A thin cylindrical shell 600 mm in diameter with wall thickness of 15 mm and 2.5 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

   b) Derive expressions for radial and circumferential stresses induced in a thick cylinder subjected to internal and external pressures. 7M

UNIT–II

3. a) Define: Pure torsion, Polar modulus, Torsional rigidity, and Stiffness of shaft. 7M

   b) Two co-axial springs, one placed inside the other and made of steel wires of the same diameter, support an axial compressive load of P applied on a rigid plate fixed on the top of the springs. The numbers of coils in the two springs are 10 and 12 while the mean radii of the coils are 40 mm and 60 mm respectively. Both the springs are of equal length before loading. If the wire diameter be 8 mm and the stress in the wire is not to exceed 80 N/mm^2, calculate safe maximum value of P. 7M

OR

4. a) Stating the assumptions, derive the Torsion formula for circular shafts. 7M

   b) The central load on a carriage spring is 10 kN and the span of the spring is 1 m. Its central deflection is not to exceed 22 mm. If the bending stress is limited to 200N/mm^2, determine the thickness, width and number of plates. Assume E=2X10^5N/mm^2 and width of plates as 15 times the thickness. Also compute the radius of each plate. 7M

UNIT–III

5. a) Derive Rankine's formula applied to medium columns. 7M

   b) Determine the crippling load for a T–section of dimensions 10cm X 10cm X 2cm and length 5m, when it is used as a strut with both ends fixed. Take E=2X10^5 N/mm^2. 7M

OR

6. a) Define: Euler's stress, slenderness ratio, equivalent length, buckling factor. 7M

   b) The connecting rod (CR) of a small petrol engine is made up of a mild steel tubular section 2.5 cm OD and 1 cm ID. Calculate the safe load on the CR if it is designed as a column with both ends pinned. Assume that the length of the CR is 60 cm. Safe buckling stress is 8 kN/cm^2. Factor of safety is 6. 7M

UNIT–IV

7. A masonry retaining wall is 100 m high and retains earth weighing 1800 kg/m^3. The top and bottom widths of the retaining wall are 1 m and 4 m respectively. The angle of repose is 30^0. Weight of masonry is 2400 kg/m^3. Determine the maximum and minimum stresses in the wall. 14M

OR

8. A chimney is 50 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 3 MN. Determine the maximum and minimum stresses. 14M

UNIT–V

9. a) Define flexural rigidity, section modulus, bending axis of a beam and shear centre of a section. 7M

   b) Determine the shear centre for a channel section having dimensions of 15 cm X 2cm for web and 8 cm X 2 cm for each flange. 7M

OR

10. Find the principal axes of inertia and principal moments of inertia of an unequal leg angle (L) iron section of dimensions 15 cm X 10 cm X 3 cm with respect to the axes passing through its centroid. 14M

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Hall Ticket Number :										

R-15

Code: 5GC43

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Environmental Science

(Common to CE & ME)

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) Write a note on multidisciplinary nature of environmental studies. 7M

   b) How would environmental awareness help to protect our environment? 7M

OR

2. a) Write a note on public awareness of environmental studies. 7M

   b) Explain briefly the importance of environmental studies. 7M

UNIT–II

3. a) Define Mineral resources. Explain about use and environmental effects of extracting mineral resources. 7M

   b) Describe the impact of over grazing. 7M

OR

4. Discuss in brief account on role of an individual in the conservation of natural resources. 14M

UNIT–III

5. a) Explain the Forest ecosystem with suitable examples. 7M

   b) Write the formation of nitrogen cycle. 7M

OR

6. a) Discuss the desert ecosystem with suitable examples. 7M

   b) Explain brief about the conservation methods of biodiversity. 7M

UNIT–IV

7. a) Define Thermal pollution. Discuss in brief account on causes, effects and control measures of Thermal pollution 7M

   b) Write the effects of nuclear radiation on environment. 7M

OR

8. a) Write a detailed note on consequences of soil pollution. 7M

   b) Describe the causes of ozone layer depletion. 7M

UNIT–V

9. a) Explain in detail about the advantages of rain water harvesting. 7M

   b) Write a note on forest conservation act. 7M

OR

10. a) Describe family welfare programmes in India. 7M

    b) Value education has an important effect on environmental conservation. Justify. 7M

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