

## II B.Tech. II Semester Regular Examinations May 2015

**Hydraulics and Hydraulic Machinery**  
( 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) What is a boundary layer? Difference between laminar and turbulent boundary layer. 7M  
b) Find the displacement thickness, momentum thickness and energy thickness for given by  $\frac{u}{U} = 2\frac{y}{\delta} - \left(\frac{y}{\delta}\right)^2$  where U= free stream velocity, u= velocity of boundary layer,  $\delta$ = thickness of boundary layer. 7M
2. a) Derive an expression for the discharge through a channel by Chezy's formulae. 6M  
b) Find the discharge through a trapezoidal channel of width 8m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 2.4m and value of Chezy's constant (C) = 50. The slope of the bed of the channel is given 1 in 4000. 8M
3. a) Define hydraulic jump and explain under what circumstances it occurs. 7M  
b) Obtain an expression for the depth after the hydraulic jump and the loss of head due to the jump. Write the assumptions made. 7M
4. a) Show that the force exerted by a jet of water on an inclined fixed plate in the direction of the jet is given by  $F_x = \rho a v^2 \sin^2\theta$ , where a = Area of the jet, v = Velocity of the jet and  $\theta$  = inclination of the plate with the jet. 7M  
b) A blade turns the jet of diameter 3cm at a velocity of 20m/sec by  $60^\circ$ . Determine the force exerted by the blade in the fluid. 7M
5. a) What is draft tube? What are its functions? 6M  
b) Describe functions of various main components of Pelton turbine with neat sketch? 8M
6. a) What are unit quantities? Define the quantities for turbine. 6M  
b) A Pelton is having a mean bucket diameter 1m and is running at 1000rpm. The net head on the Pelton wheel is 700m. if the side clearance angle is  $15^\circ$  and discharge through nozzle is  $0.1\text{m}^3/\text{sec}$  find  
(i) power available at the nozzle and (ii) hydraulic efficiency of the turbine 8M
7. a) What do you mean by manometric efficiency and mechanical efficiency of centrifugal pump? 6M  
b) A centrifugal pump delivers water against a net head of 14.5m and design speed of 1000rpm. The vanes are curved back to an angle of  $30^\circ$  with the periphery. The impeller diameter is 300mm and outlet width is 50mm determine the discharge of the pump if manometric efficiency is 95%. 8M
8. a) What are the main components of hydropower plants? and explain each in detail 7M  
b) List out twelve important hydropower plants in India? 7M

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**Probability and Statistics**

( Common to CE, ME &amp; IT )

Max. Marks: 70

Time: 03 Hours

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Find the mean, median and mode for the following:

Mid Value	15	20	25	30	35	40	45	50	55
Frequency	2	22	19	14	3	4	6	1	1

7M

- b) Find the rank correlation 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

7M

2. a) A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C 3 times in 4 shots. They fire a volley. What is the probability that (i) two shots hit, (ii) at least two shots hit? 7M
- b) There are three bags: first containing 1 white, 2 red, 3 green balls, second 2 white, 3 red, 1 green ball and third 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Find the probability that the balls so drawn came from the second bag. 7M

3. a) A random variable X has the following distribution

X	1	2	3	4	8	9
P(x)	k	3k	5k	7k	9k	11k

Determine (i) k (ii) mean (iii)  $P(X) \geq 3$  7M

- b) If X is a continuous random variable and K is a constant then prove that (i)  $V(X+K) = V(X)$  (ii)  $V(XK) = K^2V(X)$  7M
4. 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 (i) exactly two will be defective. (ii) at least two will be defective. (iii) none will be defective. 7M
- b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and S.D. of the distribution. 7M
5. Determine the mean and standard deviation of sampling distribution of variances for the population 3, 7, 11, 15 with  $n = 2$  and the sampling is with replacement. 14M
6. a) A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs. 487/- with a standard deviation of Rs. 48/-. With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 and 502? 7M
- b) If we can assert with 99% that the maximum error is 0.16 and P is 0.3, find the size of the sample. 7M
7. a) A sample of 900 members is found to have a mean of 3.4 cm, Can it be reasonably regarded as a truly random sample from a large population with mean 3.25 cm and standard deviation 1.61 cm. 7M
- b) From a random sample of 10 pigs fed on diet A, the increases in weight in a certain period were 10, 6, 16, 17, 13, 12, 8, 14, 15, 9 lbs. For another random sample of 12 pigs fed on diet B, the increase in the same period were 7, 13, 22, 15, 12, 14, 18, 8, 21, 23, 10, 17 lbs. Test whether diets A and B differ significantly as regards their effect on increases in weight? 7M
8. a) A manufacturer claims that only 4% of his products are defective. A random sample of 500 was taken among which 100 were defective. Test the hypothesis at 0.05 level. 7M
- b) If 57 out of 150 patients suffering with certain disease are cured by allopathy and 33 out of 100 patients with same disease are cured by homeopathy, is there reason to believe that allopathy is better than homeopathy at 0.05 level of significance. 7M

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Time: 03 Hours

Answer any five questions

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Missing data may be assumed suitably wherever necessary

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1. a) Derive the equation for hoop stress of a thin cylindrical shell subjected to an internal pressure of 'p'. 7M  
 b) A thin spherical shell is of diameter 1.2m and shell thickness 6mm. Find the increase in diameter and increase in volume of the shell, When water is admitted in it. The pressure of water is 1.2N/mm<sup>2</sup>. Take  $\mu = 0.30$  and  $E = 2 \times 10^5$  N/mm<sup>2</sup>. 7M
2. A compound cylinder is composed of a tube of 250mm internal diameter at 25mm wall thickness. It is shrunk on to a tube of 200mm internal diameter. The radial pressure at the junction is 8N/mm<sup>2</sup>. Find the variation of hoop stress across the wall of the compound cylinder, if it is under an internal fluid pressure of 60N/mm<sup>2</sup>. 14M
3. a) Compare the weight of a solid shaft with that of a hollow one to transmit a given power at a given speed with a given maximum shearing stress, the inside diameter of hollow shaft being two-thirds of the outside diameter. 7M  
 b) At a certain cross section, a shaft of 80mm diameter is subjected to a bending moment of 6KN.m and a twisting moment of 9KN.m. Find the maximum direct stress induced in the section indicating the position of plane on which it acts. 7M
4. a) A leaf spring 1000mm in length is required to carry a central load of 2500N. If the central deflection is not to exceed 30mm, determine (i) Thickness of plates, (ii) Number of plates, (iii) the radius to which the plates are to be bent. Bending stress is limited to 200N/mm<sup>2</sup>,  $E=2 \times 10^5$  N/mm<sup>2</sup>. Width of each plate=10 times its thickness. 7M  
 b) Derive the Equation for deflection ( $\delta$ ) of close coiled helical spring subjected to an axial load of W. 7M
5. a) A solid round bar 60mm in diameter and 2.5m long is used as a strut. One end of the strut is fixed while its other end is hinged. Find the safe compressive load for this strut using Euler's formula. Assume  $E= 2 \times 10^5$  N/mm<sup>2</sup> and factor of safety = 3. 6M  
 b) Determine the section of a cast iron hollow cylindrical column 3m long with one end hinged and the other end fixed. The column carries an axial load of 800kN. The ratio of internal to external diameter is 5/8. Use a factor of safety=4, Take  $f_c = 550$  N/mm<sup>2</sup> and Rankine's constant =  $\frac{1}{1500}$ . 8M
6. A concrete dam of trapezoidal section having water in vertical face is 16m high. The base of the dam is 8m wide and top is 3m wide. Find (a) the resultant thrust on the base per meter length of the dam, (b) the point where the resultant thrust cuts the base and (c) intensities of maximum and minimum stresses across the base. Take weight of concrete as 24kN/m<sup>3</sup> and the water level coinciding with the top of the dam. Draw also the stress distribution diagram below the base of the dam. 14M
7. Determine the principal moments of inertia for an unequal angle section 125mm x 75mm x 10mm. 14M
8. A curved beam in the form of a quadrant of a circle of radius 'R' and having a uniform cross section is in a horizontal plane. It is fixed at 'A' and free at 'B'. It carries a vertical concentrated load 'W' at the free end 'B'. Compute the shear force, bending moment and twisting moment values. Also determine the vertical deflection of the free end 'B'. 14M

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**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 beam of uniform cross section and 6 m span is fixed at the ends. It carries a udl of 10 kN / m in the central 2 m length in addition to a concentrated load of 20 kN at 1 m from the left hand support. Draw SFD and BMD giving salient values.
2. A two span continuous beam is fixed at one and supported by a roller at the other end. Draw SFD and BMD, if it carries a udl of 20 kN/m in the left span of 5 m and a central point load of 50 kN in the right span of 4 m. Take EI as constant.
3. Analyse the continuous beam shown in fig.1 by moment distribution method and draw BMD if the hinge support sinks by 10 mm. Take  $EI = 6 \times 10^9 \text{ kN-mm}^2$  for all spans.

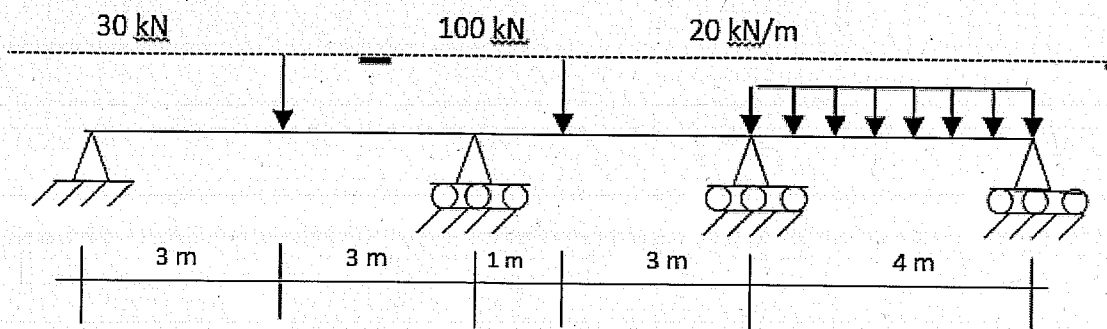


fig.1

4. Analyze the beam shown in fig. 2 using slope deflection method and draw the shear force diagram. Assume uniform EI.

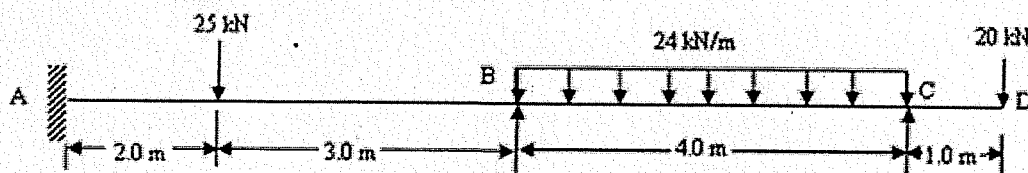


Figure 2

5. Determine the vertical deflection at the bottom central node of the truss shown in fig.3 by unit load method. Take the length of all the members as 3 metres each and  $AE=3 \times 10^5 \text{ kN}$  for all members

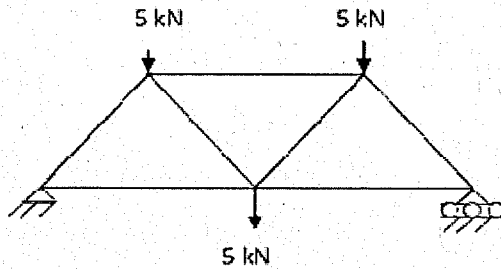


fig. 3

Code : 1G643

6. Two point loads 80 kN and 45 kN, spaced at 4 m, crosses a simply supported girder of span 12 m. Construct the maximum BMD.
7. For the truss shown in Figure 4, draw the influence line diagram for the force in the member BC and AB

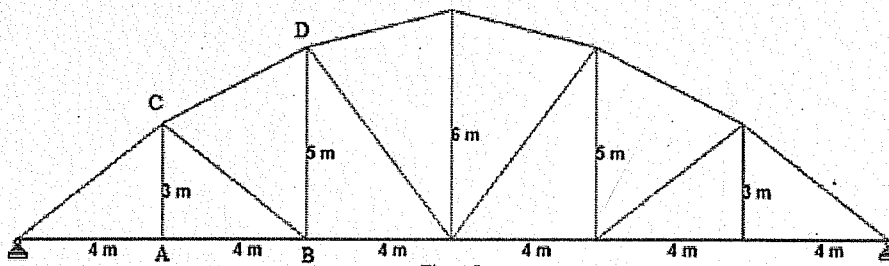


Figure 4

8. Find the forces in the members of the truss shown in fig. 5 by Castigliano's method. Height of the truss = 3 m and Panel length = 4 m

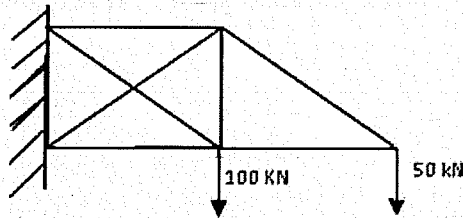


fig. 5

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II B.Tech. II Semester Regular Examinations May 2015  
**Building Planning and Drawing**  
 ( Civil Engineering )

Max. Marks: 70

Time: 03 Hours

**PART-A****(Answer any THREE questions 14 x 3 = 42 Marks)**

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1. a) What are the building byelaws? Explain briefly the objectives of building bye laws. 8M
- b) Explain the building bye laws with reference to
  - i) Open space requirements
  - ii) Height limitations
  - iii) Plinth area regulations 6M
2. a) Write short notes on
  - i) Aspect 6M
  - ii) Grouping
  - iii) Circulation in buildings
- b) Describe various types of residential buildings 8M
3. Explain about planning of Hospitals and Industrial buildings. 14M
4. a) Explain the Scheduling and Monitoring of a project. 7M
- b) The network for a project is shown in fig.1. Determine the expected time for each path. Which path is critical?

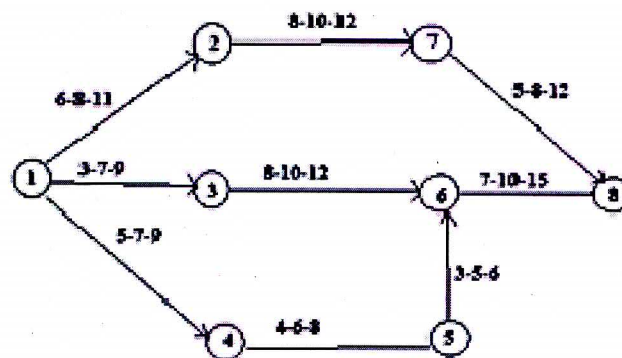


Fig.1

5. a) What are the factors affecting orientation of a building? 7M
- b) How do you achieve roominess and flexibility in a building? Explain with examples. 7M

## PART-B

(Answer any ONE question on drawing sheet 1 x 28 = 28 Marks)

6. a) Draw to a suitable scale fully dimensioned plan and elevation of a fully paneled door of 1000mmX 2000mm. 13M
- b) Draw neat sketches to represent the following in building drawings.
- Iron and Steel
  - Gravel
  - Earth
  - Brick Masonry
  - Stone masonry

15M

7. The line plan of a two bed rooms residential building is shown in fig.2.  
Specifications: - Foundation: cement concrete 1:5:10. Base 800mmX700mm On coursed. Rubble stone masonry: 600mmX500mm. Basement:-Coursed rubble stone masonry: 400mmX700mm. Superstructure: - Brick work in cm 1:3, 300mm thick. Ceiling height: 3000mm; RCC roofing: 150mm. Provide doors, windows, ventilators, lintels and sunshades as per standard dimensions. Draw

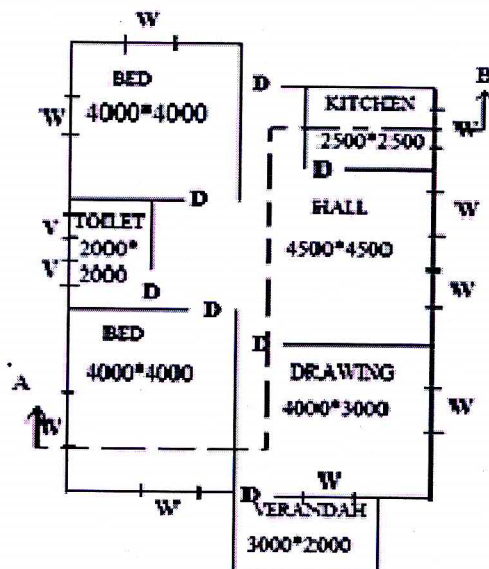


Fig.2

28M

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## II B.Tech. II Semester Regular Examinations May 2015

**Environmental Science**  
( Common to Civil, ME & CSE )**Max. Marks: 70****Time: 03 Hours**

Answer any five questions

All Questions carry equal marks (14 Marks each)

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1. a) Define environment. Discuss the various segments of environment. 9M  
b) Write briefly about the importance of Environmental studies. 5M
2. a) Discuss the role played by the non-conventional energy resources towards the protection of the environment. 7M  
b) Explain dams and their effects on forests and tribal people. 7M
3. a) Discuss the changes caused by agriculture and overgrazing. 7M  
b) Discuss the role of an individual in conservation of natural resources. 7M
4. Define pollution. Describe the sources, adverse effects and control measures of noise pollution. 14M
5. Write a brief note on
  - a) Food Chains 4M
  - b) Food webs 4M
  - c) Energy flow through an ecosystem 6M
6. a) Explain about threats to biodiversity. 8M  
b) List the main biogeographic zones in India. 6M
7. Discuss briefly the provisions of the following Acts.
  - a) The water (Prevention and control of pollution) Act, 1974 5M
  - b) The Air (Prevention and control of pollution) Act, 1981 5M
  - c) The Forest conservation Act, of 1980. 4M
8. a) What is the role of information technology (IT) in environment and human health? 7M  
b) Explain in detail about Women and Child welfare programme. 7M

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