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Fourth Semester B.E. Degree Examination, December 2010
Building Construction

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions,
selecting at least TWO questions from each part.
2. Any missing data may be suitably assumed.**

PART – A

- 1 a. Classify the foundations. When do you provide mat foundation? (05 Marks)
- b. Enlist various methods to determine the bearing capacity of soils; comment on various methods to improve bearing capacity of soils. (05 Marks)
- c. Design a rectangular combined footing for two columns A and B spaced at 3.4 m c/c for the following data : Column A : 300 mm × 300 mm, carries an axial load, 50 t
Column B : 400 mm × 400 mm, carries an axial load 70 t. Restrict the width of footing to 1800 mm, SBC of soil is 15 t/m². (10 Marks)
- 2 a. With neat sketches, discuss the main features of English and Flemish bond in brick masonry. (08 Marks)
- b. Name the various types of stone masonry. Explain with a sketch any two of them. (08 Marks)
- c. Name the types of joints provided in stone masonry. With a neat sketch, explain plugged joint. (04 Marks)
- 3 a. How are arches classified? How do you assess the stability of an arch? (05 Marks)
- b. Differentiate between lintel, chejja /balcony. Classify lintels. What are the functions of lintels? Sketch the reinforcement in lintel. (08 Marks)
- c. What do you understand by shoring? Describe in brief, raking the shores. (07 Marks)
- 4 a. List the requirements of an ideal floor, explain the method of laying of polished granite flooring. (10 Marks)
- b. State the advantages and disadvantages of sloped and flat roofs, state where they are used. (10 Marks)

PART – B

- 5 a. What are the requirements of good stairs? Explain with neat sketch dog legged and open well stair. (10 Marks)
- b. Explain with neat sketches, different types of doors that are available in the market. (10 Marks)
- 6 a. What are the characteristics of a good paint? Explain the methods of painting on new wood surface. (10 Marks)
- b. What are the objectives of plastering? Explain the method of stucco plastering. (10 Marks)
- 7 a. What do you mean by “cost effective construction”? What are the materials generally used in cost effective construction? (05 Marks)
- b. Explain the following :
i) L panel ii) Micro concrete tiles iii) Precast doors and windows. (09 Marks)
- c. Explain the purpose and advantages of stabilized mud block. (06 Marks)
- 8 a. With neat sketches, give the details of formwork for RCC rectangular and circular columns. (08 Marks)
- b. Explain shop forming with advantages and uses. (06 Marks)
- c. What is damp proof course? Enlist the various causes and method of damp proofing. (06 Marks)

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**Fourth Semester B.E. Degree Examination, December 2010
Structural Analysis – I**

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Write the assumptions made in the analysis of a pin-jointed plane truss. (04 Marks)
- b. Define the degrees of freedom of a structure. (02 Marks)
- c. Determine the magnitude and nature of forces in all the members of the pin-jointed plane truss shown in Fig.Q1(c), by the method of joints. (14 Marks)

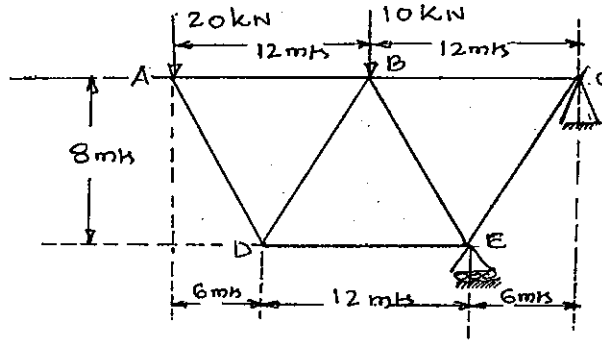


Fig.Q1(c)

- 2 a. Determine the slope and deflection at the free end 'B' of the cantilever beam, shown in Fig.Q2(a), by using moment area method. Take $E = 2 \times 10^5 \text{ N/mm}^2$ & $I = 2 \times 10^8 \text{ mm}^4$. (10 Marks)

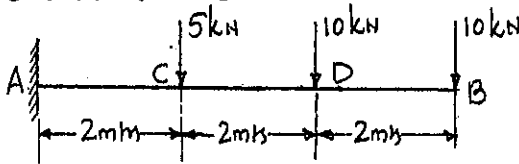


Fig.Q2(a)

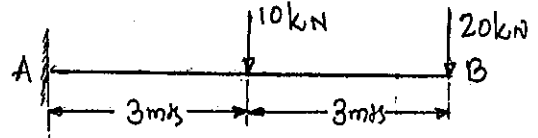


Fig.Q2(b)

- b. Determine the slope and deflection at the free end of a cantilever beam shown in Fig.Q2(b), by conjugate beam method. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 2 \times 10^8 \text{ mm}^4$. (10 Marks)

- 3 a. State and prove the Maxwell's reciprocal theorem. (08 Marks)
- b. Determine the horizontal displacement of the roller end 'A' of the frame, shown in Fig.Q3(b). Take $EI = 800 \text{ kN.m}^2$ throughout. (12 Marks)

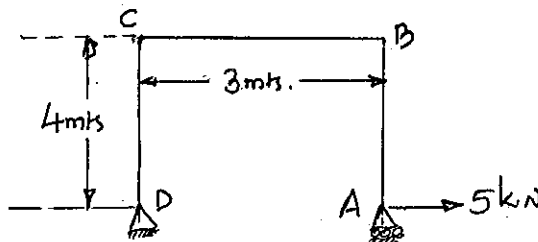


Fig.Q3(b)

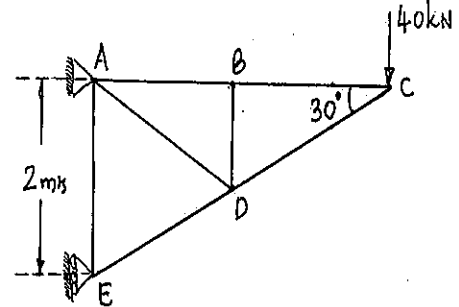


Fig.Q4

- 4 Find the vertical and horizontal deflections at joint 'C' for the pin-jointed truss shown in Fig.Q4, by using unit load method. The cross-sectional areas of the members 'CD' and 'DE' are each 2500 mm^2 and those of the other members are each 1250 mm^2 . Take $E = 200 \text{ kN/mm}^2$ (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. A three hinged parabolic arch of span 30 m and rise 5 m, carries a uniformly distributed load of 40 kN/m, on the whole span and a point load of 200 kN at a distance of 5 m from the right end. Determine the bending moment, normal thrust and radial shear at a section 5 m from the left end or left support. (10 Marks)
- b. A light flexible cable 18m long is supported at two ends at the same level. The supports are 16 m apart. The cable is subjected to the uniformly distributed load of 10 kN/m of horizontal length over its entire span. Determine the reaction developed at the support, the tension that occurs at the support and its inclination to the horizontal. (10 Marks)

- 6 a. Analyze the propped cantilever beam shown in Fig.Q6(a), by consistent deformation method. Draw the BMD and SFD. (10 Marks)

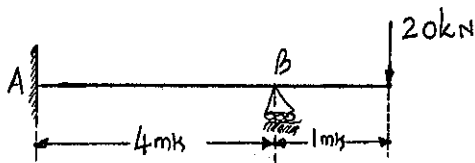


Fig.Q6(a)

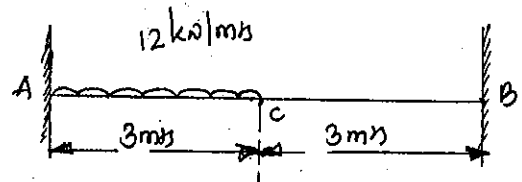


Fig.Q6(b)

- b. Analyze the beam shown in Fig.Q6(b), by strain energy method. Also, draw the BMD. (10 Marks)

- 7 Analyze the continuous beam shown in Fig.Q7, by Clapeyron's three moment theorem. Draw the shear force and bending moment diagrams. EI is constant. (20 Marks)

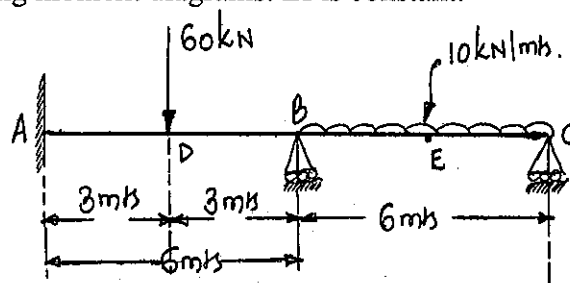


Fig.Q7

- 8 A parabolic arch, hinged at the end has a span 30 m and a rise 5 m. A concentrated load of 12 kN acts at 10 m from the left hinge. The second moment of area varies as the secant of the slope of the rib axis. Calculate the horizontal thrust and the reactions at the hinges. Also, calculate the maximum bending moment in the arch. (20 Marks)

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Fourth Semester B.E. Degree Examination, December 2010
Surveying - II

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Missing data, if any, may be suitably assumed.

PART – A

- 1 a. Define the terms: Trunion axis, centering, lining in. (06 Marks)
- b. Briefly explain the temporary adjustments of a vernier theodolite. (04 Marks)
- c. Briefly describe the procedure for measuring the magnetic bearings, using a theodolite. (06 Marks)
- d. Differentiate between i) face left and face left conditions ii) clamping screws and tangent screws. (04 Marks)
- 2 a. For a dumpy level to be in proper adjustments, what are the conditions that are to be satisfied? (06 Marks)
- b. List the conditions to be satisfied by a vernier theodolite to be in permanent adjustment. (06 Marks)
- c. Briefly explain the test and adjustment of horizontal axis of a vernier theodolite. (08 Marks)
- 3 a. With the help of a neat sketch, explain the single plane method for determining the elevation of an inaccessible object. (10 Marks)
- b. What are the components of a total station? (04 Marks)
- c. List the uses of a total station. (06 Marks)
- 4 a. Explain the method of determining the constants of a tacheometer, in the field. (06 Marks)
- b. Sighted horizontally, a tacheometer reads 1.645 and 2.840 corresponding to stadia wires, on a vertical staff 120 m away. The focal length of the object glass is 200 mm and the distance from the object glass to trunion axis is 150mm. Calculate the stadia interval. (06 Marks)
- c. A tacheometer is setup at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff:

<u>Staff station</u>	<u>Vertical angle</u>	<u>Staff intercept</u>	<u>Axial hair readings</u>
P	+ 8°36'	2.350	2.105
Q	+ 6°6'	2.055	1.895

The instrument is fitted with anallactic lens and the constant is 100. Compute the length of PQ and the RL of Q. Take the RL of P as 321.500m. (08 Marks)

PART – B

- 5 a. Define the following, with respect to a simple circular curve:
Apex of the curve, point of tagency, central angle, mid ordinate. (06 Marks)
- b. List the various methods of setting out simple curves. Explain the method of successive bisection of chords. (06 Marks)
- c. Determine the first 6 offsets to be setout at 10m intervals along the tangents to setout a curve of radius 400m by the method of perpendicular offsets. (08 Marks)

- 6 a. Define a compound curve. A compound curve consisting of two simple circular curves of radii 350 m and 500 m is to be laid between two straights. The angles of intersection between the tangents and the two straights are 55° and 25° . Calculate the various elements of the compound curve. (10 Marks)
- b. A reverse curve is to be set between two parallel tangents 10m apart. The distance between the tangent points, measured parallel to the tangents is 80m. If the radius of the first branch is 150 m, calculate the radius of the second branch. Also, calculate the lengths of the two branches. What would be the equal radius of the branches of the reverse curve? (10 Marks)
- 7 a. List the requirements of a transition curve. (06 Marks)
- b. On a railway track of 1.68m width, the designed speed is 90 kmph. Transition curves are to be provided to join a circular curve with a radius of 500 m between two straights of the track. The rate of change of radial acceleration is limited to 0.3 m/s^3 . Determine the following:
 i) Length of transition required ii) shift of circular arc iii) Super elevation required. (08 Marks)
- c. Why are the vertical curves provided on highways? What are the different types of vertical curves employed? (06 Marks)
- 8 a. The following perpendicular offsets were taken at 5m intervals from a traverse line to an irregular boundary line.
 2.10, 3.15, 4.50, 3.60, 4.58, 7.85, 6.45, 4.65, 3.14m.
 Compute the area enclosed between the traverse line and the irregular boundary, from the first to the last offset. Use the trapezoidal rule. (06 Marks)
- b. Calculate the area of a plan from the following readings of a planimeter:
 Initial reading = 8.348
 Final reading = 1.435
 The zero of the disc passed the fixed index mark twice in the clockwise direction. The anchor point was placed outside the plan and the tracing point was moved in clockwise direction. Take $M = 100 \text{ cm}^2$. (06 Marks)
- c. In a contour plan of a proposed reservoir, the areas enclosed by various contours are given below:
- | | | | | | | |
|---------------|-----|-----|-----|-----|-----|-----|
| Contour (m) : | 100 | 105 | 110 | 115 | 120 | 125 |
| Area (ha) : | 3 | 8 | 10 | 15 | 20 | 25 |
- Determine the capacity of the reservoir if the full reservoir level is 125.00. Use prismoidal formula. (08 Marks)

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Fourth Semester B.E. Degree Examination, December 2010
Hydraulics and Hydraulic Machines

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Missing data, if any, may be assumed.

PART – A

- 1 a. Distinguish between :
 - i) Open channel flow and pipe flow.
 - ii) Hydraulic depth and hydraulic mean depth
 - iii) Gradually varied flow and rapidly varied flow and
 - iv) Uniform and steady flow. (04 Marks)
- b. Show that the most economical trapezoidal section for an open channel, is the one, which has the three sides tangential to the semicircle, described on the water line. (06 Marks)
- c. A trapezoidal channel with side slopes of 1 : 1 has to be designed to convey $10\text{m}^3/\text{sec}$, so that the amount of concrete lining for the bed and the sides is the minimum.
 - i) Calculate the area of lining required for one metre length of the canal.
 - ii) If rugosity coefficient $n = 0.015$, calculate the bed slope of the canal for an uniform flow. (10 Marks)
- 2 a. Explain the term hydraulic jump. Derive an expression for the depth of hydraulic jump in terms of upstream Froude's number. (08 Marks)
- b. Explain the working of a venturiflume, with a neat sketch. (04 Marks)
- c. In a rectangular channel, there occurs a jump, corresponding to $Fr_1 = 2.5$. Determine the critical depth and loss of head, in terms of initial depth y_1 . (08 Marks)
- 3 a. What is the water hammer phenomenon? Also, explain the surge tanks and their use, with neat sketches. (05 Marks)
- b. What is the Buckingham π theorem? Obtain an expression for the discharge Q , through a sharp crested triangular notch. Assume that Q depends on the central angle ' α ' of the notch, head ' H ', gravitational acceleration ' g ', the density ' ρ ', viscosity ' μ ' and surface tension ' σ ' of the fluid. (08 Marks)
- c. A 1.25m diameter pipe has to be provided to convey oil of specific gravity 0.85 and kinematic viscosity 2.75×10^{-12} stokes at $1.25\text{ m}^3/\text{sec}$. In order to model the flow, if a 120mm diameter pipe is used to convey water of kinematic viscosity 0.01 stokes, what should be velocity and discharge in the model? (07 Marks)
- 4 a. Explain the impulse momentum principle. Mention two examples where it is applied. (04 Marks)
- b. A metal plate of 10mm thickness and 200mm square, is so hung that, it can swing freely about the upper horizontal edge. A horizontal jet of water of 20mm diameter, impinges with its axis perpendicular and 50mm below the edge of hinge and keeps steadily inclined at 30° to the vertical. Find the velocity of the jet if the specific weight of the metal is 75.54 kN/m^3 . (08 Marks)
- c. A jet of water 75mm in diameter, having a velocity of 20 m/s, strikes a series of the flat plates, arranged around the periphery of a wheel, such that, each plate appears successively before the jet. If the plates are moving with a velocity of 5 m/s, compute the workdone per second on the plate and efficiency of the jet. (08 Marks)

PART – B

- 5 a. Show that the maximum efficiency for a jet striking a single curved vane, symmetrical about the axis of the jet moving in the direction of the jet is $16/27$. (10 Marks)
- b. A jet of water, having a velocity of 45 m/s, impinges without shock on a series of vanes, moving at 15 m/s, the direction of motion of vanes being inclined at 20° to that of the jet. The relative velocity at the outlet is 0.9 of that of the inlet and the absolute velocity of water at the exit is to be normal to the motion of vanes. Find
 i) Vane angles at the entrance and the exit, ii) work done on vanes per unit weight of water supplied by the jet and iii) the hydraulic efficiency. (10 Marks)
- 6 a. Differentiate between :
 i) Impulse and reaction turbines
 ii) Radial and axial flow turbines
 iii) Inward and outward radial flow turbines and
 iv) Kaplan and propeller turbines. (04 Marks)
- b. What are draft tubes? Obtain an expression for efficiency of draft tubes. (08 Marks)
- c. A single jet pelton wheel turbine is required to develop a power of 6000 kW. Overall efficiency of the turbine is 87%. Available head at the nozzle is 760m of water. Coefficient of velocity of nozzle is 0.97. Speed ratio is 0.46. Outlet angle of the vane is 15° . Relative velocity of water leaving the bucket is 0.85 times the relative velocity at the inlet. Find the diameter of the jet, discharge and the force exerted by the jet on the buckets. (08 Marks)
- 7 a. What is a governor in a turbine? Explain with a neat sketch the governing of a reaction turbine. (06 Marks)
- b. Derive an expression for the specific speed of a turbine. Mention its significance. (06 Marks)
- c. The following data were obtained from the main characteristics of a Kaplan turbine of runner diameter 1m. $P_u = 41.71$, $Q_u = 108.6$, $N_u = 63.6$. Estimate the runner diameter, the discharge and speed of a similar runner, working under a head of 30m and developing 4000 kW. Determine the specific speed of the turbine. (08 Marks)
- 8 a. What are manometric efficiency, mechanical efficiency and overall efficiency, of a centrifugal pump? (06 Marks)
- b. What is the minimum speed for starting of a centrifugal pump? Derive an expression for the same. (06 Marks)
- c. The impeller of a centrifugal pump is 1 m in diameter and 0.1m wide. It delivers $2\text{m}^3/\text{s}$ of water through a height of 45m while running at 600 rpm. If the blades are curved backward and the outlet angle is 30° , calculate the manometric efficiency and the power required to run the pump. Estimate the minimum speed to start the pump if the impeller diameter is 0.6m. (08 Marks)

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Fourth Semester B.E. Degree Examination, December 2010

Building Planning and Drawing

Time: 4 hrs.

Max. Marks:100

Note: 1. PART – A is compulsory, Answer TWO questions from PART –B(Q. 2 to Q. 5).
2. Suitable data may be assumed, if necessary.

PART – A

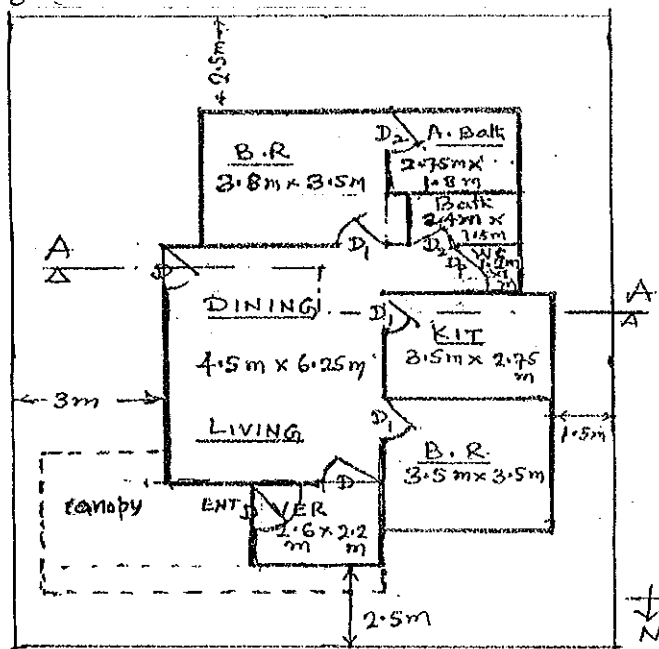
1 The line sketch of a residential building is given in Fig. Q1.
Draw to a suitable scale.

- a. Plan at sill level. (25 Marks)
- b. Front elevation. (15 Marks)
- c. Section on A – A. (15 Marks)
- d. Schedule of openings. (05 Marks)

All walls are 300 mm thick B.B.M (Burnt Brick Masonry) built on S.S.M(Size Stone Masonry) foundation, roof is RCC, and the roof height is 3.0 m and lintel level is 2.1 m from plinth level.

PART – B

- 2 Draw a doglegged staircase that is needed to connect two floors separated by 3.20 m height, with the staircase room of size 3.8 × 2.1 m. Draw sectional elevation showing both the flights and plan. (20 Marks)
- 3 Draw the working drawing for an isolated footing for a column of size 230 × 450 mm reinforced with 8 number of 16 mm dia and 4 numbers of 12 mm dia HYSD bars together with 8 mm dia stirrups @ 190 mm c/c, size of the footing 1.4 m × 1.6 m with the thickness of footing depth 430 mm. The footing mat comprises of 12 mm dia HYSD bars @ 140 mm c/c both ways. (20 Marks)
- 4 Prepare a bubble diagram (connectivity diagrams) and develop line diagram for primary health centre, with the following facilities. i) Entrance and waiting space, ii) Doctor’s room–2 Nos, iii)Examination room, iv)Operation theatre, v)Medical store, vi)Office, vii) Laboratory, viii)Male ward–10 beds, ix)Female ward–10 beds, x)Toilet block. (20 Marks)
- 5 Sketch the sanitary and water supply layout details on the line diagram of a residential building shown in Fig. (20 Marks)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.