Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FOURTH SEMESTER EXAMINATION JUNE-2025

(Branch : Civil Engineering)

CE-4401 SURVEY – I / CE-4301 SURVEYING

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Answer any five questions. All questions carry equal marks. Assume suitable data, wherever necessary and mention them clearly.

1(a) A Road embankment 90 m long is 10 m wide at the formation level & has the side slope 2 to 1. The ground levels at every 15 m along the centre line are as under : ***06***

Distance (m)	0	15	30	45	60	75	90
R. L. (m)	175.6	177.5	178.9	179.8	178.3	180.6	179.5

The formation level at zero chainage is 180.0 and the embankment has a rising gradient of 1 in 15. The ground is level across the centre line. Calculate the volume of earthwork by Trapezoidal formula.

(b) Compare completely Radiation and Intersection methods of plane tabling. ***08***

2(a) Write brief note on Profile leveling. ***06***

(b) What is meant by Contouring? Describe with sketches, the characteristics of contours. ***1,7***

3(a) The following lengths and bearings were recorded in running a traverse ABCDE, the length and bearing of EA having been omitted : ***06***

Line	AB	BC	CD	DE	EA
Length in m	210	325	390	240	?
Bearings	118°30'	68°30'	302°30'	224°30'	?

Calculate the length & bearing of the line EA.

(b) Explain Repetition and Reiteration methods for measurement of horizontal angles in theodolite survey. ***4,4***

4(a) The elevation of a point P is to be determined by observations from two adjacent stations of a tachometric survey. The staff was held vertically upon the point and the instrument is fitted within an anallectic lens, the constant of the instrument being 100. Calculate the elevation of point P from the following data, taking both the observations as equally trustworthy : ***06***

Inst. station	Height of axis	Staff point	Vertical angle	Staff readings	Elevation of station
A	1.50	P	+ 4°30'	1.230, 2.055, 2.880	275.00 m
B	1.45	P	- 5°30'	0.785, 1.800, 2.815	300.00 m

Also calculate the distance of A and B from P.

(b) Outline the tangential method of tachometry and deduce the expression for horizontal and vertical distances : ***2,3,3***

(i) When both the observed angles are angles of elevation
(ii) When one of the observed angles is angles of elevation and the other as an angle of depression.

P.T.O.

5(a) Define reciprocal leveling. The following notes refer to the reciprocal levels taken with one level : ***1,3,2***

Instrument at	Staff reading on		Remarks
	P	Q	Distance between
P	1.320	2.550	P & Q = 2500 m
Q	0.830	2.200	R. L. of P = 500.00

Find the true reduced level of Q and the combined correction for curvature and refraction.

(b) Derive the formulas for determining elevation & distance of particular point, when base of the object is inaccessible for instrumental axis at the same & different levels. ***5,3***

6(a) Define Contour Interval. Describe briefly indirect method of contouring. ***1,5***

(b) What is meant by plane tabling? Write the name and use of different accessories used in plane table surveying and explain back sighting method of Orientation in plane table surveying. ***1,3,4***

7(a) Derive the tachometric equation D = KS + C for horizontal sight. ***06***

(b) How is a theodolite traverse survey balanced? Explain in brief traversing by the method of included angles in theodolite surveying**.** ***5,3***

8(a) Write technical short notes on **any four** : ***3½×4***

(i) Curvature and refraction correction
(ii) Tacheometric constants
(iii) Total Station
(iv) Route Surveying
(v) Advantages of plane table Surveying.

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FOURTH SEMESTER EXAMINATION JUNE-2025

(Branch : Civil Engineering)

CE-4402 ENVIRONMENTAL ENGINEERING – I
CE-4304 ENVIRONMENTAL ENGINEERING (WATER SUPPLY ENGINEERING)

Time : Three Hours ***Maximum Marks : 70*** ***Min. Pass Marks : 22***

Note : Attempt any five questions. Each question carries equal marks. Assume data suitably if missing.

1(a) Discuss the methods used for population forecasting and their significance in planning water infrastructure projects. ***07***

(b) A water supply scheme has to be designed for a city having a population of 1,20,000. Estimate the total draft (in MLD) which is required for an average water consumption of 220 lpcd. Use Kuching's method to calculate fire demand. ***07***

2(a) Effluent from an industry 'A' has a pH of 4.2. The effluent from another industry 'B' has double the hydroxyl (OH^-) ion concentration than the effluent from industry 'A'. Calculate the pH of effluent from the industry 'B'. ***04***

(b) Ion concentrations obtained for a ground water sample having pH 8.1 are given below : ***03***

Ion	Ca^{2+}	Mg^{2+}	Na^{+}	HCO^{3-}	SO_4^{2-}	Cl^-
Ion concentration (mg/lit)	100	6	15	250	45	39
Atomic Weight	Ca = 40	Mg = 24	Na = 23	H = 1 O = 16 C = 12	S = 32 O = 16	Cl = 35.5

Calculate the Total and carbonate hardness (mg/lit as $CaCO_3$) present in the above water sample.

(c) What are the various physical characteristics of drinking water? Explain in detail. Also mention their permissible limits as per IS code. ***07***

3(a) Draw a neat flow chart of water treatment plant and explain it. ***07***

(b) What is intake structure? What are the requirements of intake structure? ***07***

4(a) Determine the surface area of a settling tank for 0.5 m^3/s design flow using the design overflow rate as 32.5 $m^3/d/m^2$. Find the depth of the clarifier for the overflow rate and detention time of 95 minutes. Assume length to width ratios for settling tank between 2:1 to 5:1 and length not to exceed 100 m. Recommend the dimensions of the tank. ***07***

(b) What is Coagulation? Discuss the mechanisms of coagulation. ***07***

P.T.O.

5(a) Design a rapid sand filter system for a water supply of 11 MLD to a township. All the principal components shall be designed. Enumerate your assumptions during the design steps. ***10***

(b) Explain in brief combined gravity and pumping system in water distribution. ***04***

6(a) Explain the various sources of water used in rural water supply systems. What are the considerations for selecting a source for a rural water supply scheme? ***07***

(b) How do conservancy systems affect groundwater quality in rural areas? Propose measures to minimize any adverse effects. ***07***

7(a) Explain the different layouts of water distribution system with neat sketch. ***07***

(b) What do you mean by "Break Point Chlorination" and "Super Chlorination"? Explain. ***07***

8 Explain briefly about the following (**any four**) : ***14***

(i) Sources of Water (ii) Types of intake structures (iii) Aeration
(iv) Skimming Tank (v) Water Softening Processes

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FOURTH SEMESTER EXAMINATION JUNE-2025

(Branch : Civil Engineering)

CE-4403 CONCRETE TECHNOLOGY

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Draw the flow diagram for the manufacturing process of cement and explain briefly.

(b) Name the different chemicals constituents of Portland cement. Write down the physical properties of cement.

2(a) Discuss the various factors affecting the workability of concrete. Name the different methods of determining the workability of concrete in detail.

(b) What is Creep and Shrinkages in concrete? List various factors affecting the creep of concrete.

3(a) Discuss the basic consideration and factors influencing the choice of mix design.

(b) Write about quality of water in concrete mix. How it will affect the strength of concrete?

4 Design a concrete mix of M-40 grade for reinforced concrete structure by using Indian Standard Recommendations subjected to moderate exposure conditions with the following data :

(i) Standard deviation : 6.6
(ii) Specific gravity of saturated surface dry fine and coarse aggregate : 2.65 & 2.85

5(a) Write in detail about batching equipments for production and concreting.

(b) How the temperatures affect the curing of concrete?

6(a) Explain about the non-destructive testing of concrete in detail.

(b) Discuss the repair technology for concrete structure.

7(a) What do you understand by a light weight concrete? Describe its properties and uses.

(b) Describe ready mix concrete and the precautions required for it to maintain the quality of concrete.

8(a) Write a detailed note on Ferro cement.

(b) Discuss the Fiber Reinforced Concrete. Where is it used?

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FOURTH SEMESTER EXAMINATION JUNE-2025

(Branch : Civil Engineering)

CE-4404 QUANTITY ESTIMATION & COSTING

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Discuss the uses and importance of estimate. ***07***

(b) Differentiate between the following : ***07***

(i) Carpet area and built up area
(ii) Revised estimate and supplementary estimate

2(a) Explain the following : ***07***

(i) Plinth area rate and cubical content rate
(ii) Measurement sheet and abstract sheet

(b) Prepare a preliminary estimate of a building project having total plinth area of all buildings of 2000 m^2 with the following data : ***07***

(i)	Plinth area rate	:	Rs. 3,000 per m^2
(ii)	Extra for special architectural treatment	:	2.5% of building cost
(iii)	Extra for water supply and sanitary installations	:	5% of building cost
(iv)	Extra for internal installation	:	15% of building cost
(v)	Extra for services	:	6.5% of building cost
(vi)	Contingencies	:	3 %
(vii)	Supervision charges	:	8 %

3(a) Explain the following : (i) CSR (ii) Factors involved in the rate of an item. ***07***

(b) What is the rate analysis of cement concrete 1:2:4 in foundation? ***07***

4(a) Discuss about the various factors which affect the cost of work. ***07***

(b) Explain the following : ***07***

(i) Overhead charges (ii) Contingencies (iii) Work charge establishment.

5(a) State the various percentages for different services in building work. ***07***

(b) Discus in detail various causes which will raise the cost of work due to various reasons during execution of work. ***07***

6(a) Define the following terms : ***07***
(i) Net Income (ii) Year's purchase (iii) Sinking fund (iv) Scrap value.

(b) State and explain the various methods of valuation. ***07***

P.T.O.

7(a) Define depreciation. Discuss in brief various methods of calculating depreciation. ***07***

(b) A colonizer intends to purchase a land of 10000 m^2 area located in suburb of a big city to develop it into plots of 700 m^2 each after providing necessary roads and parks and other amenities. The current sale prize of small plot in neighborhood is Rs. 5,000 per m^2. The colonizer wants a net profit of 20%. Work out the maximum price of the land at which colonizer may purchase the land. ***07***

8 Estimate the quantity of earth work for a portion of 320 m length of a road, from the following data : ***14***

- Formation width of road is 10 m,
- Site slopes are 2:1 in banking and 1.5:1 in cutting :

Station	Distance	R. L. of ground (m)	R. L of formation (m)
25	1000	51.00	50.00
26	1040	50.90	Downward gradient of 1 in 200 ↓
27	1080	50.50	
28	1120	50.80	
29	1160	50.60	
30	1200	50.70	
31	1240	51.20	
32	1280	51.40	
33	1320	51.30	

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FOURTH SEMESTER EXAMINATION JUNE-2025

(Branch : Civil Engineering)

CE-4405 WATER RESOURCES ENGINEERING - I

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) What are the different types of irrigation efficiencies and crop irrigation requirements? ***07***

(b) Derive expressions for time required to cover the given area in border flooding and maximum area irrigated with the supply ditch. ***07***

2(a) A 30 cm well completely penetrates an unconfined aquifer of saturated depth 40 m. After a long period of pumping at a steady rate of 1500 lpm, the drawdown in two observation wells 25 and 75 m from the pumping well were found to be 3.5 m and 2.0 m respectively. Determine the transmissibility of the aquifer. What is the drawdown at the pumping well? ***07***

(b) What are the common methods used for reclaiming waterlogged land? ***07***

3(a) What are the methods of estimating missing rainfall data? Explain. ***03***

(b) In a catchment, there are four rain-gauge stations, P, Q, R & S. Normal annual precipitation values at these stations are 780 mm, 850 mm, 920 mm & 980 mm respectively. In the year 2013, stations Q, R & S, were operative but P was not. Using the normal ratio method, the precipitation at station P for the year 2013 has been estimated as 860 mm. If the observed precipitation at stations Q & R for the year 2013 were 930 mm & 1010 mm respectively; what was the observed precipitation (in mm) at station S for that year? ***04***

(c) Explain the double mass curve technique. ***07***

4(a) Explain the various factors affecting the distribution of runoff in time. ***07***

(b) The following are the ordinates of flood hydrograph from a catchment area of 750 km² due to 6 hr storm. Derive the 6 hr unit hydrograph of the basin. Assume base flow 40m³/sec. ***07***

Time (hr)	6	12	18	24	30	36	42	48	54	60	66	72	78
Discharge (m^3/sec)	40	64	210	355	400	350	250	200	140	100	70	60	40

5(a) Enlist the various methods of flood estimation. Explain Gumbel's method. ***07***

(b) A horizontal stratified soil deposit consists of three layers each uniform in itself. The permeability of the layers are 8×10^{-4} cm/s, 50×10^{-4} cm/s & 15×10^{-4} cm/s and their thickness are 6 m, 3 m & 12 m respectively. Find the effective average permeability of the deposit in horizontal and vertical directions. ***07***

P.T.O.

6(a) A culvert is designed for a flood frequency of 100 years and a useful life of 20 years. The probability of flood to occur at least once in n-successive years. ***02***

(b) The rainfall during three successive 2 hour periods are 0.5 cm, 2.8 cm and 1.6 cm. The surface runoff resulting from this storm is 3.2 cm. Calculate ϕ index value of this storm. ***05***

(c) What are the various advantages and disadvantages of sprinkler irrigation? ***07***

7(a) What are the various methods of improving ground water storage? ***07***

(b) What do you mean by synthetic unit hydrograph? Explain. ***07***

8(a) What is the classification of irrigation water having the following characteristics? ***07***

(i) Conc. of Na, Ca & Mg are 22, 3 & 1.5 m-eq per liter respectively and the electrical conductivity is 200 micro mhos per cm at 25°C?
(ii) What problems might arise in using this water on fine textured soil?
(iii) What remedies do you suggest to overcome this trouble?

(b) Write short note on **any four** : ***07***

(i) Crop Rotation
(ii) Consumptive use
(iii) S- Curve hydrograph
(iv) Duty and Delta
(v) Crop Period & Base Period

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