2023 – 2024

B.TECH. (CIVIL ENGG.) – VII SEMESTER

END SEMESTER EXAMINATION

FOUNDATION ENGINEERING

(CEC-4120)

Duration: 2 Hours Max. Marks: 60

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

1(a).	What are the basic assumptions of Rankine's theory of earth pressure? Find out the critical height of unsupported vertical cut for foundation soil having unconfined compressive strength of 80 kN/m^2, unit weight of 20 kN/m^3 and angle of shearing resistance of 0.0°.	CO1	[07]
1(b).	A road side retaining wall of 8.5 m height is subjected to an active lateral earth pressure. The soil has unit weight of 19 kN/m^3 and angle of shearing resistance of 30°. If the road has a uniformly distributed surcharge of 15 kN/m^2, determine the total active earth pressure exerted on the wall and its position from the base of the wall.	CO1	[08]
	OR		
1(b)'.	Differentiate between cantilever and anchored sheet pile walls. A cantilever sheet pile wall supports soil mass up to a height of 7.0 m. The unit weight of the soil, γ = 16 kN/m^3, angle of shearing resistance, ϕ = 32° and unit cohesion, c = 0.0 kPa. Draw the pressure diagrams on both sides of sheet pile and determine the safe depth of embedment of cantilever sheet pile wall. Neglect friction between the surface of sheet pile and backfill.	CO1	[08]
2(a).	Briefly describe the various ways by which the stability of an existing road embankment is increased.	CO2	[07]
	OR		
2(a)'.	Explain with neat sketch the under damped case of free vibration. A vibrating system consisting of a weight of 200 N and a spring stiffness of 15 kN/m is viscously damped such that the ratio of any two consecutive amplitudes is 1.1/0.85. Determine, natural frequency, logarithmic decrement and damping factor. Also check whether the vibrating system is over damped, critical damped or under damped.	CO2	[07]
2(b).	Compute the safe height for an embankment rising at an angle of 50° to the horizontal, and to be made with a soil having unit weight of 20 kN/m^3, cohesion of 20 kN/m^2 and angle of internal friction of 15°. Factor of safety may be considered as 2.5. Make use of Taylor's method.	CO2	[08]
3(a).	Explain with neat sketches, any two of the following: (i) General shear failure (ii) Plate load test (iii) Differential settlement	CO3	[07]
3(b).	A circular footing of 3.0 m diameter is resting on clayey soil at a depth of 2.0 m below the ground surface. The soil having unit weight of 17.5 kN/m^3, cohesion of 35 kN/m^2 and angle of shearing resistance of 20°. The Terzaghi's bearing capacity factors for local shear failure condition are N'c= 12.0, N'q = 4.0 and N'γ = 2.0. Determine the safe bearing capacity of the soil. Also find out the safe load carrying by the square footing having size of 2 m × 2 m and resting at the same depth as that of circular footing.	CO3	[08]

Contd....2.

4(a). With the help of neat sketches, explain the different types of piles based on the mechanism of load transfer. CO4 [07]

OR

4(a)'. What are the causes of negative skin friction and how it affects the load carrying capacity of a pile? Suggest some measures to be taken to reduce the negative skin friction. CO4 [07]

4(b). Determine the allowable pile load capacity of the 30 cm diameter driven concrete pile as shown in Figure 1. Take the value of factor of safety as 2.5. CO4 [08]

Table 1: Taylor's Stability Numbers for c – ϕ soils [For Question No. 2 (b)]

i \ ϕ_m	0°	5°	10°	15°	20°	25°
90°	0.261	0.239	0.218	0.199	0.182	0.166
75°	0.219	0.195	0.173	0.152	0.134	0.117
60°	0.191	0.162	0.138	0.116	0.097	0.079
45°	(0.170)	0.136	0.108	0.083	0.062	0.044
30°	(0.156)	(0.110)	0.075	0.046	0.025	0.009
15°	(0.145)	(0.068)	0.070	(0.023)	-	-

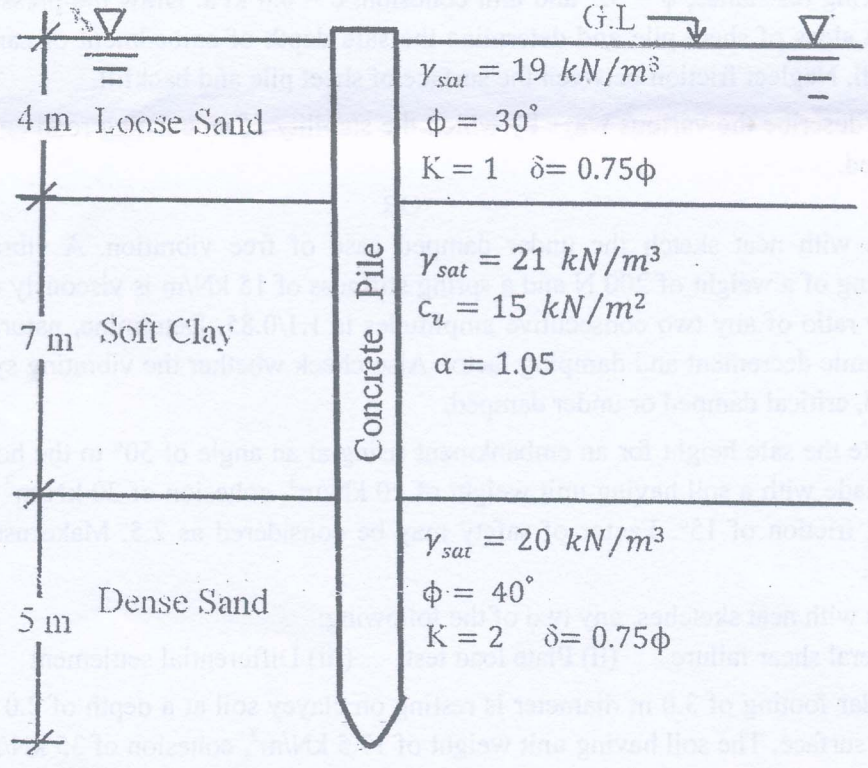


Figure 1 [For Question No. 4(b)]

2023-24
B. Tech. (VIII SEMESTER) EXAMINATION
(CIVIL ENGINEERING)
IRRIGATION ENGINEERING

(CEC-4130)

Maximum Marks: 60 **Credits: 04** **Duration: Two Hours**

Answer All Questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q. No.	Questions	M.M.	CO
1 (a)	Explain the term field capacity. Derive an expression for estimating the depth of readily available soil moisture per meter depth stored in the root zone.	[7]	CO1
	OR		
1 (a')	What do you understand by intensity of irrigation. Explain various types of command areas of a canal system.	[7]	CO1
1 (b)	A crop is to be grown in a field having field capacity of 27% and wilting point 14% below the field capacity. Calculate the storage capacity in 85 cm depth of the soil, with the dry weight density of 15 kN/m^3. If the irrigation is required when the soil moisture falls to 18%, find the water depth required to be supplied, take the field application efficiency as 80%. Also calculate the water needed at the canal outlet if the water lost in the water-courses and the field channels is 15% of the outlet discharge.	[8]	CO1
2 (a)	Briefly discuss the forces considered in Sheild's Entrainment curves method. An irrigation channel is to be constructed in coarse alluvium gravel with D-75 size of 4.5 cm. Manning's rugosity coefficient (n) can be taken as 0.026. The channel has to carry 3.55 cumecs of discharge and the longitudinal slope is 0.012. The banks of the channel will be protected by grass against scouring. Find the minimum width of the channel.	[8]	CO2
2 (b)	Discuss the advancements in Lacey's theory over the Kennedy's theory for designing an irrigation channel. Design a trapezoidal regime channel using Lacey's theory for 45 cumecs discharge. Take silt factor as 1.15. Assume suitable side slope of the channel.	[7]	CO2
	OR		
2 (b')	Write notes on any TWO of the following: i) Canal losses ii) Different types of lining of canals iii) Importance of sediment transport	[7]	CO2

Contd ....2.

3 (a) Explain the principle on the basis of which silt is removed from the river water for diverting relatively clear water into the offtaking canal. Discuss along with neat sketch the design aspects of silt excluder tunnels. [3+4] CO3

OR

3 (a') Along with the sketch, derive an expression for principal stresses developed at the toe of a gravity dam while considering tail water and earthquake forces. [7] CO3

3 (b) Figure 1 gives the cross-sectional view of a weir. Determine the residual pressures at the key points. Draw the sub soil hydraulic gradient line and determine the thickness of floor at point P. Use Khosla's curves for pressure calculations. [8] CO3

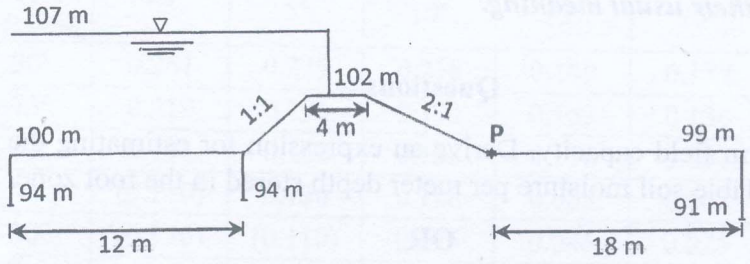


Figure 1

4 (a) The following hydraulic data pertains to a bridge site of the river. [7] CO4

i) Maximum discharge Q = 12,000 cumecs
ii) Highest flood level HFL = 204 m
iii) River bed level = 200 m
iv) Lacey's silt factor f = 1.0

Design the suitable launching apron for guide bunds shank portion as per Spring's recommendations, accompanied by a neat sketch to train the river along proposed bridge structure.

OR

4 (a') Discuss briefly the classification of guide banks according to their layout upstream of the work and their effect on the worst possible embayment towards approach bank. [3+4] CO4

Calculate the dominant discharge '$Q_{dominent}$' and peak discharge 'Q_{max}' of an alluvial stream having developed a meander length (M_l) of 5 km. Also calculate the meander belt (M_b) as against the calculated peak discharge.

4 (b) The flowing hydraulic data pertains to a canal site. [8] CO4

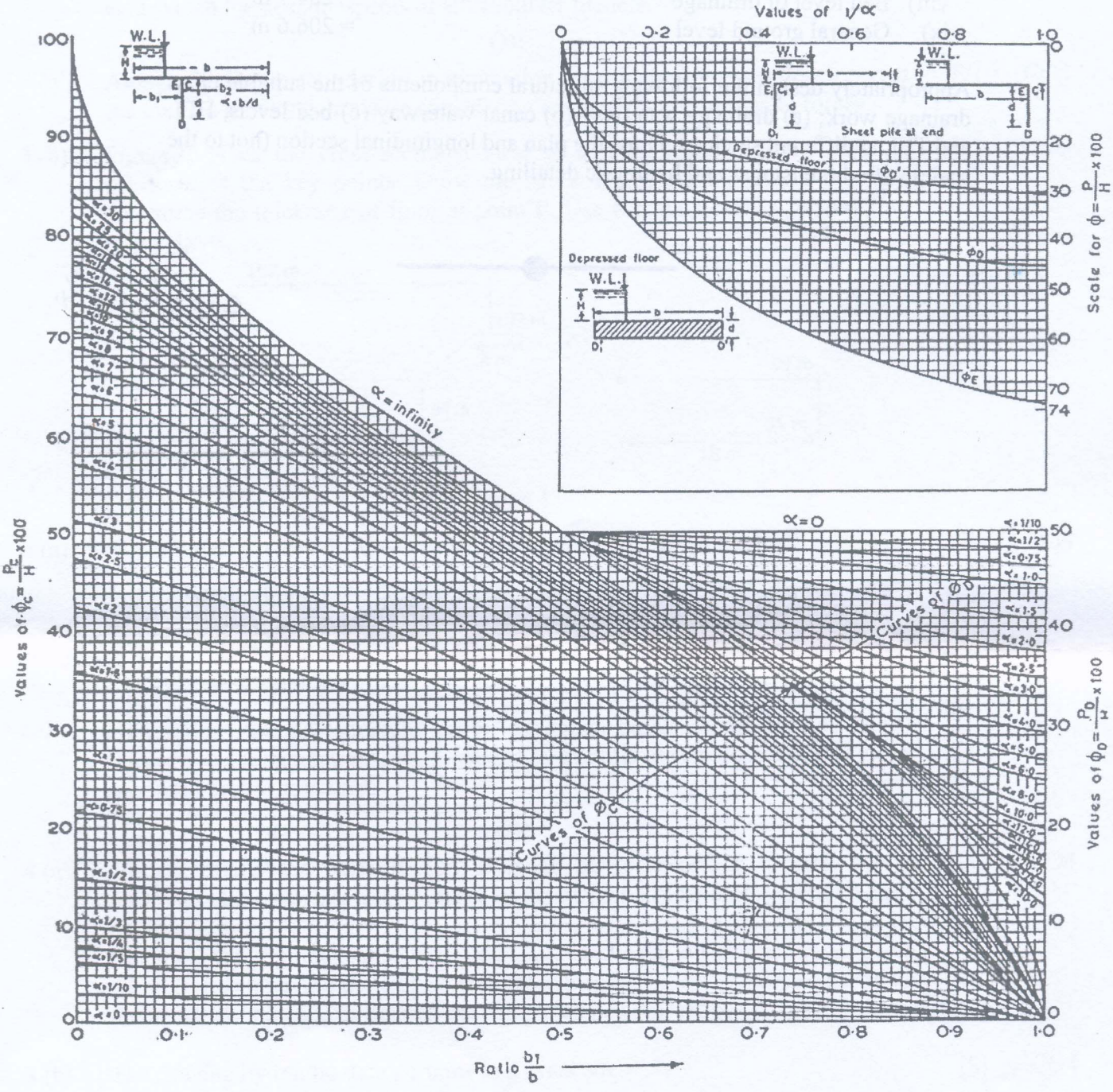
i) Canal discharge = 45 cumecs
ii) Bed width of canal = 40 m
iii) Full supply depth = 1.8 m
iv) Bed level of canal = 206.5 m
v) Side slopes of canal = $1\frac{1}{2}$ H: 1V
vi) High flood discharge of drainage = 500 cumecs
vii) High flood level of drainage = 207.2 m

Contd... 3.

viii) Bed level of drainage = 204.7 m
ix) General ground level = 206.6 m

Appropriately design the following structural components of the suitable cross drainage work; (a) drainage waterway (b) canal waterway (c) bed levels, HFL and TEL at different sections. Draw the plan and longitudinal section (not to the scale) with dimensional and hydraulic detailing.

contd....4.



Khosla's Uplift Pressure Curves

2023-24

B.TECH.(AUTUMN SEMESTER) EXAMINATION

(CIVIL ENGINEERING)

DAM ENGINEERING

(CEE-4580)

Maximum Marks: 60 **Credits: 04** **Duration: Two Hours**

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No.	Question	M.M.
1(a)	List various forces acting on a gravity dam. Discuss the role of galleries in Gravity dam.	[05] CO 1
1(b)	Give step-wise procedure for the computation of wave height in the design of gravity dam as suggested by IS 6512:1984. (T. Saville approach)	[10] CO 1
	OR	
1'(b)	Calculate stresses developed at toe and heel of a gravity dam profile as shown in Fig.1 under the influence of major forces and silt pressure. Take unit weight of dam material as 25 KN/m^3, Uplift pressure coefficient as 0.7.	[10] CO 1

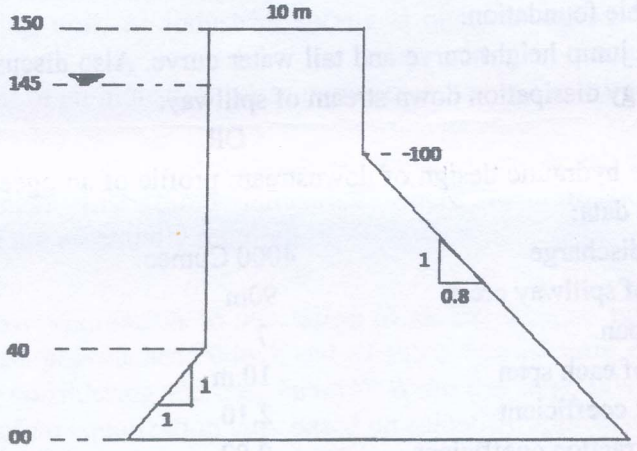


Fig. 1
All R.L. are in meter

2 (a)	Write short note on stress developed in elementary profile of a gravity dam.	[05] CO 2
2(b)	Design first two zones of a 50m high concrete gravity dam by the method of zoning. Take unit weight of dam material as 24 kN/m^3, coefficient of uplift pressure as 0.75, fetch of reservoir 12km and wind speed 90 km/h.	[10] CO 2

Contd....2.

OR

2'(b)	Discuss the method for determining the hydrodynamic pressure of water due to horizontal earthquake considering ellipse cum parabolic variation.	[10]	CO 2
3(a)	Briefly explain thin cylinder theory for design of an arch dam.	[05]	CO 3

OR

3'(a)	Derive the value of the most economical central angle for an arch dam.	[05]	CO 3
3(b)	Design a deck slab of a buttress dam 120 m high inclined 35° to the horizontal and simply supported over the buttresses, centre to centre spacing of the buttresses may be taken as 5.50m. The depth of the reservoir is 120 m above the river bed. Using usual R.C.C. equations, tabulate the design calculations at an interval of 20 m. Take $\gamma_w = 1000Kg/m3$, $\gamma_s = 2400Kg/m3$. For M-15, R = 8.75 , J = 0.87, permissible shear stress of concrete is 10 Kg/cm^2.	[10]	CO 3
4(a)	Name any two non rigid dams of India. Draw the neat sketch of a zoned embankment dam resting on pervious stratum showing its various components.	[05]	CO 4
4(b)	Write short notes on roll of relief wells in the safety of earthen dams resting on deep permeable foundation.	[05]	CO 4
4(c)	Explain jump height curve and tail water curve. Also discuss their role in deciding the energy dissipation down stream of spillway.	[05]	CO 4

OR

4'(c)	Give the hydraulic design of downstream profile of an ogee spillway with the help of given data:	[05]	CO 4

Design discharge	4000 Cumec
Height of spillway crest	90m
No. of span	7
Length of each span	10 m
Spillway coefficient	2.10
Pier contraction coefficient	0.02
Abutment contraction coefficient	0.10

2023-2024

B.Tech Civil

AUTUMN ~~END~~ SEMESTER EXAMINATION

(CEE- 4590)

Industrial Pollution Control

Duration: Two hours | Credits - 04 | Maximum Marks: 60

Instructions:

Attempt all the questions in order of sequence.

Assume suitable data/value, if not given or missing.

CO denotes to Course Outcome

Notations / Abbreviations have their usual meanings.

Q.No.1a	Differentiate between grab and composite sampling for liquid wastes. Which method is representative for the design of wastewater treatment plants? Support your answer by giving an example.	[5] CO1
Q.No.1b	In order to plan and design an effluent treatment plant for any manufacturing unit, an industrial survey is necessary. Describe the steps that you may undertake to carry out the survey and development of an industrial waste management plan for any industry of your choice.	[5] CO1, CO2
Q.No.1c	What do you mean by neutralization, segregation, and equalization of liquid wastes? List three industries where neutralization and segregation are essentially required.	[5] CO1, CO3
	Or	
Q.No.1 c'	There are two approaches to the design of an equalization tank. List both of these approaches. Which out of these two is more efficient and proper considering the cost factors? Write the steps involved in the design of an equalization tank based on scientific approach.	[5] CO2
Q.No.2a	The 5-d 20^0C BOD of wastewater is 426 mg/l. What will be its ultimate BOD? If the sample has been incubated at 30^0C what will be its 5-day BOD. (k=0.21 per day).	[5] CO2
Q.No.2b	What do you mean by the coagulation and flocculation processes for wastewater treatment? Briefly write the procedure of a test that is conducted to find out the optimum dosing of a coagulant. An alum @ 2.5mg/l is added in 650m3/day of wastewater. Calculate the total amount of alum required per month and its cost. (Assume 1 kg alum @ Rs. 40).	[05] CO1, CO2

contd.....2.

Q.No.2c	For wastewater flow of 4,500 m3/d, calculate the size of the sedimentation tank, and volume of an aeration basin when incoming BOD is 4315mg/l and required BOD is 30mg/l maintaining MLSS of 4750 mg/l.	[05] CO2
	Or	
Q.No.2'	Write a case study on any industry of your choice while highlighting its manufacturing operations, pollution generation sources, its treatment, units, standards, and disposal. Prepare a neat sketch (flow diagram) of the operations in the selected industry and pollution control measures.	[15] CO1, CO2, CO3, CO4
Q.No.3a	A bag house is to design to handle (your enrollment no.) m3/min of air. The filtration takes place at constant pressure so that the air velocity through each bag decreases during the time between clearing according to the relation U= 1/0.267+0.08t where U is in m3/m2 of the cloth and t is time in sec. The bags are shaken in sequence row by row on a 30 min cycle. Each bag is 25 cm in diameter and 2.5 m height. The bag house is to be square in x-section with 25 cm spacing between bags and 30 cm clearance from walls. Calculate the number of bags required.	[5] CO5
Q.No.3b	Dust has particles with migration velocity of 0.69 m/s for a total air flow of 86 m3/sec, what must be the number of collecting plates each having area of 63 m2. Assume collection efficiency to be 98%.	[5] CO5
Q.No.3c	Name gaseous air pollutants, their properties and significance in the tabular form.	[5] CO5
	Or	
Q.No.3'c'	Describe the various metrological factors, which should be kept in view in diffusion theories.	[5] CO5
Q.No.4a	Consider the Gaussian Plume model used to determine pollutant concentration. a) Simplify the equation to calculate ground level pollutant concentration crosswind at some distance from the center line. Show all work and assumption(s). b) Explain Gaussian Plume model with neat diagram. c) Describe two assumptions behind the Gaussian Plume model.	[05] CO5
Q.No.4b	What is meant by global warming? State any two effects. What can you do to reduce air pollution as a result of industrial activities in our country?	[5] CO5
Q.No.4c	Explain the type of instruments used for analysis of ambient air particulates and provide an example of their use.	[5] CO5

2023-24
DEPARTMENT OF CIVIL ENGINEERING
BTECH VII SEMESTER (END SEMESTER EXAMINATION)
CONSTRUCTION MANAGEMENT - II
CEH 4110

Maximum Marks: 60 **Duration: Two Hour**

Answer all the questions.
All parts of a question should be attempted in one continuation in one copy
Use of Normal distribution table(s) is allowed. Assume suitable data, if missing

Q. No.	Question	M. M	CO
1 (a)	Define the following i. WBS ii. Triple Constraints iii. CCB iv. MBWA (Hint: this is one of the recommended ways of managing a big construction site) v. Scope	7.5	CO1
1(b)	List the key factors attributable to a successful construction project. Plot a hierarchical chart of key stakeholders of a construction project. Also write down the important responsibilities of the key stakeholders.	7.5	CO1
	OR		
1(b')	Discuss and highlight the problems facing the construction industry. Write down the economic and social benefits of construction industry to the local community. Plot a well labelled project lifecycle diagram of a typical construction project.	7.5	CO1
2 (a)	Write down the quality system requirements in context of building construction project.	7.5	CO2
	OR		
2 (a')	i. Write a short note on the quality plan of a construction project.	4	CO2
	ii. Write down a typical action plan for quality system development and certification.	3.5	CO2
2 (b)	Enlist and discuss briefly the different methods and techniques used for quality improvement.	7.5	CO2

Contd.... 2.

3 (a) A construction company has an opportunity to submit a bid for the construction of a new apartment building. From the specifications provided by the developer, the PERT network with the three-time estimate (in week) for each activity are shown in Fig. 1. Determine: **07** CO3

(a) Critical path and its standard deviation.

(b) Probability of completing the work in 38 weeks.

(c) Completion time duration for which the company should bid to provide 95% probability of completing the project in time.

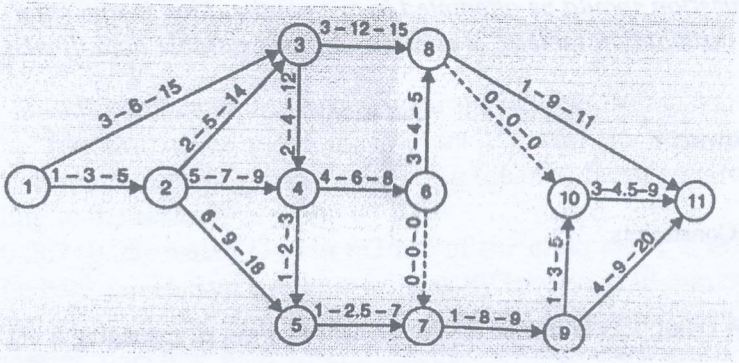


Fig. 1

OR

3(a)' Using the activities and durations listed in the following table, construct the network. Calculate the project duration and prepare a table showing the total float and non-critical activities. **07** CO3

Activity	Duration (days)
Order material for frame work	1
Await delivery of material	2
Set up toll to fabricate frame	4
Fabricate frame	3
Test frame for strength	1
Obtain pre-cut cladding panel from the store	10
Fix panel on frame	2
Prepare the final complete assembly	1

contd.... 3.

3(b) A company has two grades of inspectors 1 and 2 who are to be assigned to a quality inspection work. It is required that at least 1800 pieces are inspected per 8-hour day. Grade1 inspectors can check pieces at the rate of 25 pieces per hour with an accuracy of 98%. Grade 2 inspector can check at the rate of 15 pieces per hour with an accuracy of 95%. The wage rate for the grade 1 inspector is Rs. 40 per hour while that of grade 2 is Rs. 30 per hour. Each time an error is caused by the inspector the cost to the company is Rs. 20. The company has eight grade 1 and ten grade 2 inspectors. The company wants to determine the optimal assignment of inspectors to minimize total inspection cost. ? Formulate as Linear Programming Problem and solve it by Graphical method. **08** CO4

4(a) Four operators O1, O2,O3 and O4 are available to a manager who has to get four jobs J1, J2, J3 and J4 done by assigning one job to each operator. Given the time needed by different operators for different jobs in the matrix below: **07** CO4

	J1	J2	J3	J4
O1	12	10	10	8
O2	14	12	15	11
O3	6	10	16	4
O4	8	10	9	7

1. How should the manager assign the jobs so that the total time needed for all four jobs is minimum?
2. If job J2 is not be assigned to operator O2, what should be the assignment over how much additional total time will be required?

4(b) A company has three warehouses W1, W2 and W3. It is required to deliver a product from these warehouses to three customer A, B and C. The warehouses have the following units in Stock: **08** CO4

Warehouses	W1	W2	W3
No of Units in stock:	65	42	43

And cutomer requirements are:

Customer	A	B	C
No of Units	70	30	50

Contd ....4.

The table below shows the cost of transporting one unit from warehouse to the customer:

		Warehouse		
		W1	W2	W3
Customers	A	5	7	8
	B	4	4	6
	C	6	7	7

Find the optimal transportation route. Use Vogel's approximation method for finding initial basic feasible solution.