B. CONS. ENGG. FOURTH YEAR 4TH SEMESTER EXAM.-2023

COMPUTER AIDED CONSTRUCTION MANAGEMENT

Time : Three hours **Full Marks : 100**

Group / Part : FULL

Instructions : Answer any 10 (ten) questions

1. (a) What is the desired resource profile of human resource and construction materials in a project? 2

   (b) What are the scheduling approaches of human resource and construction materials in a project? 4

   (c) What are the challenges faced in construction management? 4

2. (a) What are factors affecting project cash flow? 2

   (b) Explain the methods of reducing negative cash flow? 4

   (c) Why is it necessary and advisable to set up a project specific calendar while scheduling in MS Project? 2

   (d) Name one computer program frequently used in solving geo-technical problems. What is the analytical technique used in this program? 2

3. (a) Briefly explain the latest technologies used in surveying. 5

   (b) Why is it said that construction management is an optimization exercise? 3

   (c) What are the 3 steps used for optimizing a mathematical function through "Solver"? 2

4. (a) Enumerate the difference between NPV and IRR. 5

   (b) A machine with a life of 3 years was purchased at a cost of Rs. 10,00,000/- Yearly running expense of the machine was 45,000/- and scrap value of the machine was 'NIL'. If the income from the machine is Rs. 3,00,000/-, Rs. 6,00,000/- and Rs. 5,90,500/- in 1st, 2nd, and 3rd year respectively, find the IRR for this investment. 5

5. A project details are given below:

ID	Activity	Dependency	Normal duration (day)	Crash duration (day)	Normal cost (Rs.)	Crash cost (Rs.)
1	A	-	120	100	12,000	14,000
2	B	-	20	15	1,800	3,800
3	C	B	40	30	16,000	22,000
4	D	C	30	20	1,400	2,000
5	E	D, F	50	40	3,600	4,800
6	F	B	60	45	13,500	18,000

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Given fixed cost: Rs. 400 per day

(a) Draw the network diagram and find the cost. 3+1

(b) What should be the first activity that is to be crashed and why? 2

(c) Crash the activity mentioned in (b) above and draw network diagram. Find the revised cost. 2+1

(d) How does the critical path change after crashing the first activity? 1

6. (a) Why is it necessary to resort to the probabilistic determination of time for project activities? 2

(b) How does PERT incorporate probabilistic duration? 3

(c) In a project, mean duration of critical activities is 64.5 weeks and the standard deviation is 4.5 weeks. What is the probability that the project could be completed in 67 weeks if it follows normal distribution? Given: proportion of area under standard normal curve between ordinates z=0 and given value of z are: 3

z	0.55	0.56	0.57	0.58	0.59	0.60
Proportion of Area	0.209	0.212	0.216	0.219	0.222	0.226

(d) How does Monte Carlo simulation help in estimating duration of project? 2

7. (a) What are the factors affecting project cash flow? 4

(b) What is the retainage? Name the components of retainage. 4

(c) How does 'front-end loading' help in reducing negative cash flow? 2

8. (a) Explain production, procurement, management, hammock and dummy activities with examples. 5

(b) In a network diagram what information could you get from 'forward pass' and 'backward pass'? 3

(c) Define float of an activity. How is it related to critical path? 2

9. (a) Two schedule alternatives with associate resource profile are shown in the table below:

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Profile 1	Weeks	0-4	4-8	8-12	12-16	16-20
	Resource requirement	3	9	6	6	1
Profile 2	Weeks	0-4	4-8	8-12	12-16	16-20
	Resource requirement	5	5	8	5	2

Based on method of moments (M_x), which profile would you choose and why? 5

(b) What are the benefits of storing data/information of a project in a cloud set up? 5

10. (a) Explain the role of digital twin, 3D printing and IoT in construction. 2+3+3

(b) What is smart building? 2

11. (a) What do you mean by abstract and detailed estimate? 3

(b) Explain the principle of rate analysis. 4

(c) Write a short note on 'COBie'. 3

12. (a) Explain S-curve method of cost and schedule control. 4

(b) Explain BCWS, BCWP and ACWP with respect to 'Earned Value Technique.' 4

(c) How do you calculate cost variance in 'Earned Value Technique.' 2