

QP CODE: 25047390



Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2025

Third Semester

M Sc OPERATIONS RESEARCH AND COMPUTER APPLICATIONS

Core Course - CE020301 - REPLACEMENT, RELIABILITY AND NETWORK MODELS

2019 ADMISSION ONWARDS

D272A71C

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Define terms: Activity, Event, Merge Event, Burst Event.
2. What is meant by multi-commodity flow?
3. Write down the steps used in solving Network Model using Fulkerson's Rule.
4. Write applications of PERT/CPM techniques.
5. Define individual replacement policy.
6. What do you mean by replacement? Describe some important replacement situations.
7. What is the difference between MTTF and MTBF?
8. Briefly explain perfect and imperfect switches.
9. What is difference between reliability and availability?
10. What is the preventive maintenance?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

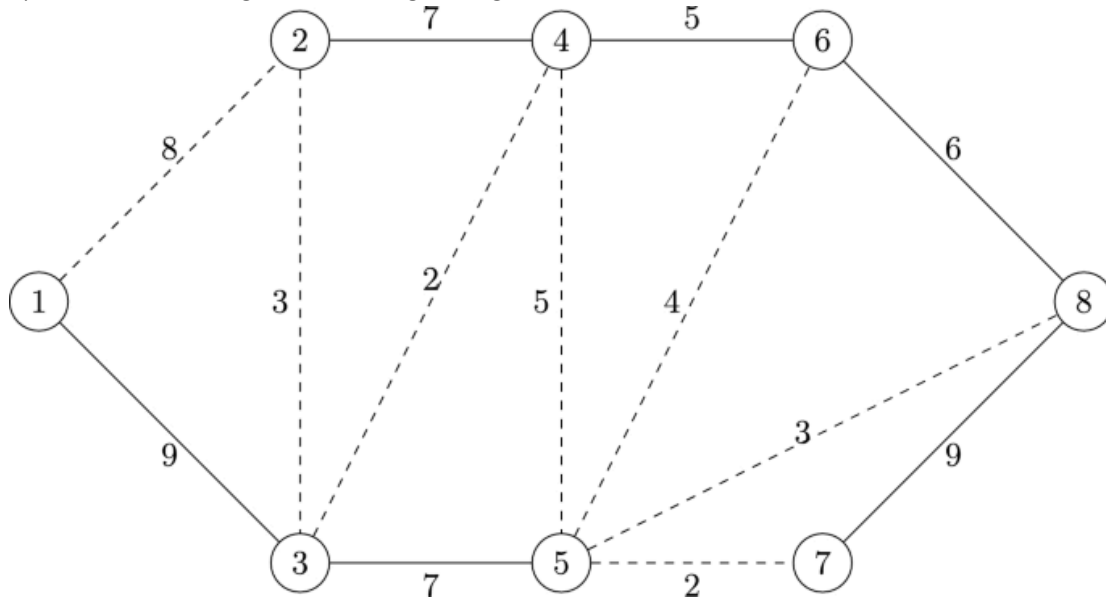
Weight 2 each.

11. Explain Dijkstras algorithm with suitable example.





12. I) Explain minimum spanning tree algorithm.
 II) Solve the following network using the algorithm.



13. Explain the basic concepts of constructing a network diagram in operations research? Briefly explain network simplex method.
14. Draw network diagram from following details and calculate critical path from it.

Activity	A	B	C	D	E	F	G	H	I	J
Time	15	15	3	5	8	12	1	14	3	14
Immediate Predecessor	--	--	A	A	B,C	B,C	E	E	D,G	F,H,I

15. The cost of a machine is Rs. 61,000 and its scrap value is Rs.1000. The maintenance costs found from the past experiences are as follows.

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	1000	2500	4000	6000	9000	12000	16000	20000

When should the machine be replaced?

16. Write a note on Poisson distribution
17. Write note on : (i) Gamma Disribution (ii) Waibull Distribution
18. How do you calculate reliability from failure rate?

(6×2=12 weightage)

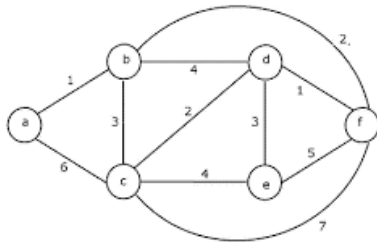
Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Explain the method of constructing a network diagram.
 Determine the maximum flow between nodes from source to sink in the network:





20. Draw the Network Diagram for the following activities and find the critical path.

Job	A	B	C	D	E	F	G	H	I	J	K
Job time(days)	13	8	10	9	11	10	8	6	7	14	18
Immediate predecessors	--	A	B	C	B	E	D,F	E	H	G,I	J

21. An engineering company is offered a material handling equipment A. It is priced at Rs.60,000 including cost of installation, and the costs for operation and maintenance are estimated to be Rs.10,000 for each of the first five years, increasing every year by Rs.3,000 in the sixth and subsequent years. The company expects a return of 10 percent on all its investment. What is the optimal replacement period?

22. What are the application areas of k-out-of-n systems? Also give a specific example.

(2×5=10 weightage)

