

B.B.A. Semester - 6 (CBCS) Examination**March/April-2026 (NEW COURSE)****Statistics Group - Advanced Operations Research Techniques (Elective (New))****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Que.1 (A) Give difference between PERT and CPM (07)
- (B) Explain: (1) Marge event (2) Burst event (3) Dummy activity (07)

OR

Que.1	Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N	(14)
	Pre. Acti.	-	A	A	B	D	D	D	B	C, E	G	F, I, J	K	H, G	M	
	Time In weeks	5	2	6	12	10	9	5	9	1	2	3	9	7	8	

A project has the above characteristics;

- (a) Draw a PERT network for this project.
 - (b) Find the various paths and the critical path as well as project completion time.
 - (c) Prepare an activity schedule showing the ES, EF, LS, LF and float for each activity.
 - (d) Will the critical path change if activity G takes 3 weeks instead of 5 weeks? If so what will be the new critical path.
- Que.2 (A) What is replacement? (07)
- (B) Explain different situation of replacement. (07)

OR

- Que.2 A plant manager is considering replacement policy for a new machine. He estimates the following cost (all costs in rupees) (14)

Year	1	2	3	4	5	6
Replacement cost at the beginning of the year	100	110	125	140	160	190
Salvage value at the end of year	60	50	40	25	10	0
Operating Costs	25	30	40	50	65	80

Find an optimal replacement policy and corresponding minimum cost.

- Que.3 (A) What is sequencing problem? (07)
- Que.3 (B) Explain 2 machines n jobs process. (07)

OR

- Que.3 Given the following data (14)

Processing time (in hours)						
Job	1	2	3	4	5	6
Machine X	12	10	9	14	7	9
Machine Y	7	6	6	5	4	4
Machine Z	6	5	6	4	2	4

- (a) Order of processing each job is XZY.
- (b) Sequence Suggested : job 5, 3, 6, 2, 1, 4.
 - (i) Determine the total elapsed time for the sequence suggested.
 - (ii) Is the given sequence optimal?
 - (iii) If your answer to (ii) is "No" determine the optimal sequence and the total elapsed time associated with it.

- Que.4 (A) What is game theory? (07)
 (B) Explain (i) saddle point (ii) two person zero sum game (07)

OR

- Que.4 (A) Player A is paid Rs. 8.00 if two coins turn both heads and Rs.10.00 if two coins turn both tails. Player B is paid Rs. 3.00 when the two coins do not match. Given the choice of being A or B, which one would you choose and what would be your strategy? (07)

- (B) Solve the game by graphic method. $\begin{matrix} 8 & 4 & -2 \\ -2 & -1 & 3 \end{matrix}$ (07)

- Que.5 (A) What is dynamic problem? (07)
 (B) Explain Bellman's principal of optimality. (07)

OR

- Que.5 A ship is to be loaded with stock of 3 items. Each unit of 'n' has a weight of (per unit) 'wn' and can provide return (in thousand Rs.) 'rn'. The maximum cargo weight the ship can take is 4 tons and the details of the three items are as follows : (14)

Item (n)	Weight (wn)	Return (rn)
1	2	31
2	3	47
3	4	44

Find the most valuable cargo load without exceeding the maximum cargo weight by using dynamic programming.
