

GBP-004
M.B.A. (RD) (II Semester) Examination, 2021
MBR-519: Operations Research

Time: Two Hours]

[Maximum Marks: 60

Note: Attempt any **four** questions. **All** questions carry equal marks.

1. There are five jobs each of which must go through machines A, B and C in order ACB. The processing times of these jobs on the machines are given by the following table. Determine the sequence of jobs that will minimize the total elapsed time. Also find minimum elapsed time and idle time on each machine.

Jobs	Processing time (in hours) on machines		
	A	B	C
1	6	4	3
2	8	8	2
3	7	6	5
4	10	7	6
5	6	8	4

2. Solve the following L. P. P. by simplex method

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

$$\text{Subject to, } 2x_1 + 3x_2 \leq 8,$$

$$2x_2 + 5x_3 \leq 10,$$

$$3x_1 + 2x_2 + 4x_3 \leq 15,$$

$$x_1, x_2, x_3 \geq 0.$$

3. Find an initial basic feasible solution of following transportation problem using VAM and check whether the solution is optimal or not. If not, optimize it.

		Destinations				
		D ₁	D ₂	D ₃	D ₄	Supply
Factory	F ₁	7	2	10	4	70
	F ₂	12	6	3	9	55
	F ₃	11	13	5	8	70
Demands		85	35	50	45	

4. The owner of a small machine shop has four mechanics available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each job, which are as follows:

		Mechanics			
Jobs		A	B	C	D
J₁		62	71	87	48
J₂		78	84	92	64
J₃		50	61	111	87
J₄		111	73	71	77
J₅		82	59	81	80

By using the Hungarian method, find an assignment of mechanics to the jobs that will result in maximum profit. Which job should be declined?

5. Solve the following game:

		Player B			
Player A		1	4	-2	-3
		-1	0	3	4
		2	1	4	5
		0	3	-7	-5

6. The following table shows jobs of a network along with their time estimates:

Jobs	1-2	1-3	2-4	3-4	3-5	4-6	5-6
t_o(days)	3	2	2	2	1	4	1
t_m(days)	6	5	4	3	3	6	5
t_p(days)	9	8	6	10	11	8	15

- (i) Draw the network diagram
- (ii) Find the expected duration and variance of each activity.
- (iii) Find the critical path and project duration.
- (iv) Find total float free float for non-critical activities.