26/5/2016

DOON UNIVERSITY, DEHRADUN

End Semester Examination, Second Semester, 2015-16

School of Technology

Class: Integrated M.C.A.
Semester: IV

Course: Operational Research
Course Code: STM-525

Time Allowed: 3Hours *Maximum Marks: 100*

Note: **Attempt all five questions in Section A. Each question carries 4 marks.**
Attempt any five questions in Section B. Each question carries 8 marks.
Attempt any four questions in Section C. Each question carries 10 marks.

SECTION: A
(Very Short Answer Type Questions)

(Marks:5X4=20)

1. Explain briefly the following terms
   (i) Kendall's notation and classification of queuing models
   (ii) Unbounded solution in LPP
   (iii) Replacement problem
   (iv) Saddle point in game theory
2. Solve the following 2x2 game:

		Player B	
		I	II
Player A	a	-4	6
	b	2	-3

3. Explain pure birth and death process, and find the expressions for P_0 and P_n.
4. Solve the following LPP using simplex method

   Maximize $Z = 5x_1 + 7x_2$

   Subjected to : $x_1 + x_2 \leq 4$

   $3x_1 + 8x_2 \leq 24$

   $10x_1 + 7x_2 \leq 35$

   $x_1, x_2 \geq 0.$
5. Determine the optimal sequence of jobs that minimizes the total elapsed time to complete the following jobs in the order AB

	Processing Time(hrs)	
Jobs	A_i	B_i
1	6	3
2	2	7
3	10	8
4	4	9
5	11	5

SECTION: B
(Short Answer Type Questions)

(Marks: 5X8=40)

6. Solve the following sequencing problem of jobs on six machines A, B, C, D, E and F in the order ABCDEF. Processing times(in hrs) are given below.

	Processing Times					
Jobs	A_i	B_i	C_i	D_i	E_i	F_i
1	18	8	7	2	10	25
2	17	6	9	6	8	19
3	11	5	8	5	7	15
4	20	4	3	4	8	12

7. A machine owner finds from his past records that the cost per year of maintaining a machine A whose purchase price is Rs. 6000/- are as given below:

Year	1	2	3	4	5	6	7	8
Maintenance cost Rs.	1000	1200	1400	1800	2300	2800	3400	4000
Resale price Rs.	3000	1500	750	375	200	200	200	200

At what age is the replacement due?

8. Use Big-M method to solve the following LPP:

Maximize $Z = 3x_1 - x_2$

Subjected to: $2x_1 + x_2 \geq 2$

$x_1 + 3x_2 \leq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

9. Obtain the steady state solution of the (M/M/1):(∞,FCFS) queuing system.

10. Solve the following game using dominance principle.

		Player B			
		I	II	III	IV
Player A	a	3	2	4	0
	b	2	4	2	4
	c	4	2	4	0
	d	0	4	0	8

11. Use dual simplex method to solve the following L.P.P.:

Maximize $Z = 6x_1 + 7x_2 + 3x_2 + 5x_4$

Subjected to: $5x_1 + 6x_2 - 3x_3 + 4x_4 \geq 12$

$x_2 + 5x_3 - 6x_4 \geq 10$

$2x_1 + 5x_2 + x_3 + x_4 \geq 8$

$x_1, x_2, x_3, x_4 \geq 0$

SECTION: C
(Long Answer Type Questions)

(Marks: 4X10=40)

12. Solve the following 2×4 game using graphical method.

		Player B			
		I	II	III	IV
Player A	I	2	2	3	-1
	II	4	3	2	6

13. Obtain the steady state solution of the (M/M/S):(∞,FCFS) queuing system.

14. Solve the following L.P.P. using Two-Phase method

Minimize $Z = 2x_1 + x_2$

Subjected to: $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 3$

$x_1, x_2 \geq 0$

15. Use graphical method to minimize the time required to process the following jobs on the machines i.e. for each job machine specify the job which should be done first. Also, calculate the table elapsed time to complete both jobs.

Job 1 Sequence	A	B	C	D	E
Time(in hrs)	3	4	2	6	2
Job 1 Sequence	B	C	A	D	E
Time(in hrs)	5	4	3	2	6

16. Solve the following transportation problem

	Destination					
Origin	**1**	**2**	**3**	**4**	**5**	**Availability**
A	20	19	14	21	16	40
B	15	20	13	19	16	60
C	18	15	18	20	---	70
Demand	30	40	50	40	60	