Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19

Year and Program 2018-19, MBA

Course Code MMC 502

Day and Date
monday
20th may, 2019

School Of Commerce & Management

Operation Research

End Semester Examination

Department : F.Y.MBA

Semester – Even(II)

Time: 3 hrs, Max Marks: 100

(10·30 to 1·30 pm)

Instructions: 1) All Questions are compulsory.
2) Non programmable calculator is allowed.

		Marks	COs	Blooms Level

Q.1   Answer/Solve the following

a)   "OR is the application of scientific methods , techniques and tools to problems involving the operations of a system so as to provide those in control of the system with optimum solutions to the problems. Justify Your answer.   10   CO1   L2

b)   A manufacturer produces two types of models M1 and M2. Each model of the type M1 requires 4 hrs of grinding and 2 hours of polishing: where as each model of the type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturers have 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M1 model is Rs. 3.00 and on model M2 is Rs.4.00. Whatever is produced in a week sold in the market. Construct the equation to the manufacturer should allocate to his production capacity to the two types of models, so that he may makes maximum profit in a week?   10   CO2   L3

OR

b)   Solve the Liner Programming Problem using Simplex method to   10   CO2   L3

Max $Z = 3X_1 + 2X_2$

Subject to , $X_1 + X_2 \le 4$

$X_1 - 2X_2 \le 2$,   and $X_1 , X_2 \ge 0$

ESE
page- 1/5

Q.2   Answer/Solve the following

a)   A company has 5 jobs to be done on five machines. Any job can   10   CO3   L5
be done on any machine. The cost of doing the jobs in different
machines is given below. Decide which jobs can be assigned to
different machines so as to minimize the total cost.

		Machines				
		A	B	C	D	E
Job	1	13	8	16	18	19
	2	9	15	24	9	12
	3	12	9	4	4	4
	4	6	12	10	8	13
	5	15	17	18	12	20

b)   A company has three plants A, B and C And 4 Warehouses P,   10   CO4   L3
Q, R, and S . The number of units available at the plants is 11,
13, 19 and the demand at P, Q, R, and S are 6, 10, 12, and 15
resp. The unit cost of the transportation is given in the following
table. Solve the following transportation problem and obtain
initial basic feasible solution by VAM .

		Warehouses				
		P	Q	R	S	Supply
Plants	A	21	16	25	13	11
	B	17	18	14	23	13
	C	32	17	18	41	19
	Demand	6	10	12	15	

OR

b)   A product is produced by 4 factories F1, F2, F3, and F4. Their   10   CO4   L5
unit production cost are Rs. 2, 3, 1, and 5 respectively.
Production capacity of the factories is 50, 70, 40, and 50 units
respectively. The product is supplied to 4 stores S1, S2, S3, and
S4. The requirements of which are 25, 35, 105 and 20
respectively. Unit cost of transportation is given below. Decide
the transportation plan such that total production and
transportation cost is minimum.

ESE
page-2/5

		Stores			
		S1	S2	S3	S4
Factory	F1	2	4	6	11
	F2	10	8	7	5
	F3	13	3	9	12
	F4	4	6	8	3

Q.3 Answer/Solve the following

a) Construct and draw a network for the project of erection of steel   10   CO5   L4
works for a shed . The various activities of the project are as
under.

Activity	Description	Preceded by	Duration
A	Erect site workshop	-	8
B	Fence site	-	10
C	Bend reinforcement	-	8
D	Dig foundation	A	10
E	Fabricate steel work	A	16
F	Install concrete pillars	B,D	17
G	Place reinforcement	C	18
H	Concrete foundation	C	14
I	Erect steel work	F,G	9
J	Paint steel work	E,I,H	4
K	Give finishing touch	J	2

OR

a) The following table shows the jobs of a network along with their   10   CO5   L4
time estimates. The time estimates are in days. Construct the
network diagram and identify the critical path

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	3	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

ESE
page-3/5

Q.4   Answer/Solve the following

a)   A machine operator has to perform two operations, turning and   10   CO6   L5
threading, on a number of different jobs. The time required to
perform these operations (in minute) for each job is known.
Determine the order in which the jobs should be processed in
order to minimize the total time required to turn out all the jobs.

Job	Time for turning (minute)	Time for threading (minute)
1	3	8
2	12	10
3	5	9
4	2	6
5	9	3
6	11	1

b)   A machine operator has to perform three operations : turning ,   10   CO6   L5
threading and knurling on a number of different jobs. The time
required to perform these operations (in minutes) for each job is
known. Determine the order in which the jobs should be
processed in order to minimize the total required to turn out all
the jobs. Also find the idle times for the three operations.

Job	Time for turning(minute)	Time for threading(minute)	Time for knurling (minute)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

c)   What do you understand by zero-sum and non zero-sum games?   10   CO6   L1
What do you mean by strategy and saddle point.

OR

c)   Explain for what type of business problems might game theory   10   CO6   L1
be helpful?

ESE

Page-4/5

Q.5   Answer the following

a)   Workers come to tool store room to receive special tools   10   CO5   L5
(required by them) for accomplishment a particular project
assigned to them. The average time between two arrivals is 60
seconds and the arrivals are assumed to be in possion
distribution. The average service time (of the tool room
attendant) is 40 seconds. Determine

    a) Average queue length

    b) Average number of workers in the system

    c) Mean waiting time of an arrival

    d) Probability that the tool room attendant remain idle

b)   A repair shop attended by a single mechanics has an average of   10   CO5   L5
4 customers per hour who bring small appliances foe repair. The
mechanic inspects them for defects and quite often can fix them
right away or otherwise render a diagnosis. This takes him 6
minutes on the average. Arrival are possion and service time has
the exponential distribution. You are required to solve

    a) The proportion of time during which the shop is empty.

    b) The probability of finding at least one customer in the
shop.

    c) The average number of customers in the system

*****

ESE

Page-5/5