

**S.D.E.**  
**M.B.A. (E) Sem-IV (2 Year Course) : SUMMER - 2019**  
**SUBJECT: ELECTIVE –II: c) OPERATIONS RESEARCH**  
**(PRODUCTION MANAGEMENT)**

Day: Tuesday  
Date: 14/05/2019

Time: 02.00 PM TO 05.00 PM  
Max. Marks: 70

S-2019-5218

**N.B.:**

- 1) Attempt any **FOUR** questions from Section –I and any **TWO** questions from Section– II.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.
- 4) Use of non-programmable **CALCULATOR** is allowed.

**SECTION-I**

- Q.1** Explain Post optimality Analysis with examples. (10)
- Q.2** Discuss FSN analysis of Inventory control technique. (10)
- Q.3** Explain system Reliability with examples. (10)
- Q.4** In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time follows an exponential distribution and the service time. (the time taken to hump a train) distribution is also exponential with an average of 36 minutes. Calculate: (10)
- i) expected queue size (line length)
  - ii) probability that the queue size exceeds 10
- If the input of trains increases to an average of 33 per day, what will be the change in (i) and (ii)?
- Q.5** Write short notes on any **TWO** of the following: (10)
- a) Sensibility Analysis
  - b) ABC Analysis
  - c) Calling Population characteristics

**SECTION-II**

- Q.6** The following maintenance job has to be performed periodically on the heat exchangers in a refinery. (15)

Task	Description	Immediate predecessors	Time (days)
A	Dismantle pipe connection	-	14
B	Dismantle header, closure, and floating head front.	A	22
C	Remove tube bundle	B	10
D	Clean volts	B	16
E	Clean header and floating head front	B	12
F	Clean tube bundle	C	10
G	Clean shell	C	6
H	Replace tube bundle	F, G	8
I	Prepare shell pressure test	D, E, H	24
j	Prepare tube pressure test and make the final reassembly	I	16

- i) Draw a network diagram of activities for the project.
- ii) Identify the critical path. What is its length?
- iii) Find the total float and free float for each task.

**P. T. O.**

**Q.7** Use Dynamic Programming to solve the following linear programming (15)  
problem.

$$\text{Max. } Z = x_1 + 9x_2$$

Subject to the constraints

$$i) 2x_1 + x_2 \leq 25,$$

$$ii) x_2 \leq 11$$

$$\text{and } x_1, x_2 \geq 0.$$

**Q.8** Use Beale's method to solve quadratic programming problem: (15)

$$\text{Maximize } Z = 2x_1 + 3x_2 - 2x_2^2$$

Subject to the constraints

$$i) x_1 + 4x_2 \leq 4$$

$$ii) x_1 + x_2 \leq 2$$

$$\text{and } x_1, x_2 \geq 0.$$

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