



**SCHOOL OF ENGINEERING**

**SUMMER TERM / MAKE UP END TERM EXAMINATION**

**Semester:** Summer Term 2019

**Date:** 25 July 2019

**Course Code:** MEC 220

**Time:** 2 Hours

**Course Name:** Operations Research for Engineers

**Max Marks:** 80

**Program & Sem:** B. Tech (Mech) & VI Sem (2015 Batch)

**Weightage:** 40%

**Instructions:**

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted

**Part A**

Answer **all** the Questions. **Each** question carries **eight** marks.

(3Qx8M=24)

1. What is inventory? List and explain the costs associated with inventory.
2. Derive an expression for "Economic Order Quantity" i.e. EOQ ( $Q^*$ ) for instantaneous replenishment model without shortages.
3. Construct the network diagram for the project whose activities and their relationships are given below

A<B,C;      C<G,F;      D<G,F;      E,F<H.

**Part B**

Answer **both** the Questions. **Each** question carries **thirteen** marks.

(2Qx13M=26)

4. Select the alternative action for given decision problem with the help of "Minimax Regret criteria".

Alternative action	Events		
	A	B	C
X	2000	1200	1500
Y	3000	800	1000
Z	2500	1000	1800

5. The sales of cakes in a bakery during 100 days has the following distribution:

Sales per day:	25	26	27	28
No. of days	10	30	50	10

The cost of cake is Rs.3 and it is sold at Rs.5. Unsold cakes are given to the poor people free of cost. Apply "Expected Monetary Value (EMV) criteria" to decide the number of cakes to be stocked at the beginning of the day.

### Part C

Answer **both** the questions. **Each** question carries **fifteen** marks. (2Qx15M=30)

6. The following table gives the tasks of a project and their durations in days

Task	A	B	C	D	E	F	G	H	I
Time	23	8	20	16	24	18	19	4	10

A<D,E;            B,D<F;            C<G;            B<H;            F,G,H<I

Draw the network diagram. Find the critical path and project completion time.

7. For the following data, draw the network diagram, calculate the expected time of completion and find the probability of completing the project in 50 weeks.

Activity	Time estimates in weeks		
	$t_o$	$t_m$	$t_p$
A	4	6	8
B	5	7	15
C	4	8	12
D	15	20	25
E	10	18	26
F	8	9	16
G	4	8	12
H	1	2	3
I	6	7	8

Precedence relationships:

A<B,C;    B<D,E;    C<F;    E<G;    D,F<H;    G,H<I.