**QP Code:129380** **Reg. No.:……**

# First Year MHA Degree Supplementary Examinations March 2022
## Operations Research
# (2013 Scheme)

**Time: 3 Hours** **Max Marks: 100**

- ***Answer all questions to the point neatly and legibly • Do not leave any blank pages between answers • Indicate the question number correctly for the answer in the margin space***
- ***Answer all parts of a single question together • Leave sufficient space between answers***
- ***Draw table/diagrams/flow charts wherever necessary • Ordinary calculator can be used***

**Essays:** **(2x20=40)**

1. Solve the PERT

| Activity | Immediate Predecessor | Optimistic Weeks | Most Likely Weeks | Pessimistic Weeks |
|---|---|---|---|---|
| A | - | 4 | 7 | 10 |
| B | A | 2 | 8 | 20 |
| C | A | 8 | 12 | 16 |
| D | B | 1 | 2 | 3 |
| E | D,C | 6 | 8 | 22 |
| F | C | 2 | 3 | 4 |
| G | F | 2 | 2 | 2 |
| H | F | 6 | 8 | 10 |
| I | E,G,H | 4 | 8 | 12 |
| J | I | 1 | 2 | 3 |

   - Draw the network.
   - What is the estimated time of the critical path
   - What is the probability of completion of the project before week 42
2. Solve the LPP through graphical method. Maximize $Z = 12X + 25Y$
   Subject to: $12X + 3Y \geq 36$
   $15X - 5Y \leq 30$
   $X \geq 0, Y \geq 0$

**Short Essays:** **(2x10=20)**

3. Machine A cost Rs. 9000. Annual operating cost is Rs. 200 for the first year and then increases by Rs. 2000 every year. Determine the best age to replace the machine. If the optimum replacement policy is followed, what will be the average yearly cost of owning and operating the machine. Machine B costs Rs. 10000. Annual operating cost is Rs. 400 for the first year and then increases by Rs. 800 every year. You now have a machine of type A, which is one-year-old. Should you replace it with B, if so, when.
4. For a pharmacy shop in a hospital, the daily demand of a medicine with associated probabilities is given below: Find the average demand for the given random numbers 25, 39, 65, 76, 12, 05, 73, 89, 19, 49.

| Daily Demand | 0 | 10 | 20 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|
| Probability | 0.01 | 0.20 | 0.15 | 0.50 | 0.12 | 0.02 |

**Short notes:** **(8x5=40)**

5. Discuss the assumptions and model of linear programming problem.
6. Explain about the critical path method and the various floats.
7. What is Hungarian method in assignment problem.
8. Explain about the lead time, reorder time, economic order quantity and safety stock in inventory problems.
9. Elaborate about duality concepts in linear programming problem.
10. Mention the techniques of operations research and its limitations
11. Elaborate on decision making under uncertainty.
12. Brief about the various queueing models in detail.

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