MS – 325

VI Semester B.Sc. Examination, May 2016
(New Scheme) (Fresh + Repeaters)
STATISTICS – VIII
Operations Research
(70 Marks – 2013-14 and Onwards/60 Marks – Prior to 2013-14)

Time : 3 Hours Max. Marks : 70/60

Instructions : *i) Sections **A** and **B** common to **all** students.*
*ii) Section **C** only for students without **internal** assessment (**2013-14** and Onwards).*
*iii) **70** Marks for students without **internal** assessment (**2013-14** and Onwards).*
*iv) **60** Marks for students with **internal** assessment (Prior to **2013-14**).*
*v) Scientific calculators are **permitted**.*

SECTION – A (**24** Marks)

(**Common to all students**)

I. Answer **any eight** sub-divisions from the following : **(8×3=24)**

1) a) Mention the characteristic features of operations research.

b) Define the following in a LPP :

i) Basic solution ii) Optimum solution

c) What are artificial variables ? Discuss the case of pseudo optimum solution in a LPP.

d) What is meant by an assignment problem ? Give its mathematical formulation.

e) Describe maximin-minimax principle to solve a game problem.

f) Explain the method of finding the probability of completion of a project on scheduled time using PERT.

g) What is meant by independent float of an activity ? Give an expression to compute it.

h) What is an EOQ problem ? Mention the assumptions involved in an EOQ model without shortages.

i) Define traffic intensity 'ρ' in queueing theory. How do you interpret its value ?

i) $\rho = 1$ ii) $\rho < 1$ iii) $\rho > 1$

j) What is a replacement problem ? State the situations in which replacement of items required.

P.T.O.

SECTION – B (**36** Marks)

(Common to all students)

II. Answer **any three** of the following questions : **(3×12=36)**

2) a) Obtain all basic solutions to the system of equations

$x_1 + x_2 + 2x_3 = 4$ and $2x_1 - x_2 + x_3 = 2$. And identify which of the feasible solutions maximizes $z = 2x_1 + 5x_2 - 4x_3$.

b) Write down the steps involved the simplex method of solving LPP. **(5+7)**

3) a) State the mathematical form of a transportation problem. State and prove necessary and sufficient condition for existence of feasible solution to a transportation problem.

b) Explain the Hungarian method of solving an assignment problem. **(7+5)**

4) a) Explain :

i) Laplace criterion

ii) EOL criterion

iii) EMV criterion for arriving at a decision.

b) Obtain optimum mixed strategy of a (2 × 2) two-person zero-sum game without a saddle point. Also obtain value of the game. **(5+7)**

5) a) Explain 'Forward Pass' calculations required for determining the critical path.

b) Distinguish between CPM and PERT.

c) Derive an expression for the minimum cost of maintaining an inventory with shortage under EOQ model. **(3+4+5)**

6) a) Explain the following with reference to a queueing system.

i) Input process ii) Queue discipline

iii) Service mechanism iv) Customer behaviour

b) Derive the condition for arriving at the optimum period of replacement of an item deteriorating in efficiency over a period, assuming time to be a discrete variable. **(6+6)**

SECTION – C (10 Marks)

(For students without internal assessment marks)

III. Answer **any two** of the following questions : **(2×5=10)**

7) Explain graphical method of solving LPP. How do you identify the situations of
   i) Multiple optimum solutions ii) Redundant constraints in this method. **5**

8) a) Discuss the various elements associated with any decision making problem.

   b) Mention the properties of a competitive game. **(3+2)**

9) Explain the following terms :
   i) Lead time and carrying cost
   ii) Time estimates in PERT. **(2+3)**

10) a) State the steady state probability of 'n' customers in M/M/1 :(∞/F1F0) queue system

    b) State group replacement policy. **(2+3)**
