Seat No. : _____

SM-114

September-2020

B.Sc., Sem.-VI

311 : Statistics
(Medical Statistics)
(Old Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** Questions in **Section-I** carry equal marks.
(2) Attempt any **THREE** questions in **Section-I**.
(3) Question-**9** in **Section-II** is **COMPULSORY**.

Section – I **(3 × 14 = 42)**

1. (A) Write a note on discrete time and continuous time population growth model.
   (B) Derive the survival function and hazard rate for two parameter Weibull distribution.

2. (A) What do you mean by Birth and Death rate ? Also explain Population growth and Population growth rate.
   (B) If the survival time follows exponential distribution with parameter λ, derive expression for survival function and hazard rate.

3. (A) What do you mean by Relative Risk ? Explain in detail.
   (B) What is the use of odds ratio and Relative Risk in case control study ?

4. (A) Explain odds and odds ratio.
   (B) What is Epidemiology ? Write a short note on it.

5. (A) Write a general information on history of drug discovery of Malaria.
   (B) Write a short note on clinical trials. Also explain various phases of clinical trials.

6. (A) Write a general information on history of drug discovery of Smallpox.

(B) Explain the history of drug discovery of Penicillin.

7. (A) With reference to clinical trials, explain case control studies.

(B) Write a note on Bio-availability.

8. (A) Explain evidence based medicine.

(B) Explain Bio-equivalence

Section – II

(4 × 2 = 8)

Attempt any **four** questions :

9. (i) What is safety studies ?

(ii) What is cross-over design ?

(iii) What is longitudinal study ?

(iv) What is bio-equivalence trials ?

(v) Which organizations controls medicines in India ?

(vi) What do you mean by continuous time population growth ?

(vii) What is Survival function ?

(viii) What is Hazard rate ?

Seat No. : _____

SM-114

September-2020

B.Sc., Sem.-VI

311 : Statistics
(Medical Statistics)
(New Course)

Time : 2 Hours] **[Max. Marks : 50**

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(3) Question-**9** in **Section-II** is **COMPULSORY**.

Section – I **(3 × 14 = 42)**

1. (A) What do you mean by Birth and Death rate ? Also explain Population growth and Population growth rate.

   (B) Derive the survival function and hazard rate for two parameter Weibull distribution.

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3. (A) What do you mean by Relative Risk ? Explain in detail.

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6. (A) Write a short note on clinical trials. Also explain various phases of clinical trials.

(B) Explain the history of drug discovery of Penicillin.

7. (A) Explain evidence based medicine.

(B) With reference to clinical trials, explain case control studies.

8. (A) Write a note on Bio-availability.

(B) Explain Bio-equivalence.

Section – II

(4 × 2 = 8)

Attempt any **four** questions :

9. (i) List out important phases of clinical trials.

(ii) What is longitudinal studies ?

(iii) What is safety studies ?

(iv) What is the role of drug regulatory bodies ?

(v) What is longitudinal study ?

(vi) Which organizations controls medicines in India ?

(vii) Explain in short case control study.

(viii) Write the purpose of clinical trials.

Seat No. : _____

SM-114

September-2020

B.Sc., Sem.-VI

311 : Statistics
(Operations Research-II)
(New Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** Questions in **Section-I** carry equal marks.
(2) Attempt any **THREE** questions in **Section-I**.
(3) Question-**9** in **Section-II** is **COMPULSORY**.

Section – I **(3 × 14 = 42)**

1. (A) Explain Theory of Duality. How it is useful in solving LPP ?
   (B) Show that the dual of the dual problem is the primal problem itself.

2. (A) Explain the revised simplex method to solve the LPP.
   (B) Explain how can you determine the solution of dual problem by solving a Primal problem.

3. (A) Explain the meaning and uses of duality in LPP.
   (B) Convert the following LPP to its dual problem:

$$\begin{aligned} \text{Max } z &= 3x_1 - 2x_2 + 4x_3 \\ \text{s.t. } 3x_1 + 5x_2 + 4x_3 &\geq 7 \\ 6x_1 + x_2 + 3x_3 &\geq 4 \\ 7x_1 - 2x_2 - x_3 &\leq 10, \text{ and } x_1, x_2, x_3 \geq 0. \end{aligned}$$

4. (A) Solve the following LPP and obtain the solution of its dual problem:

$$\begin{aligned} \text{Max } z &= 2x_1 + x_2 \\ \text{s.t. } x_1 - x_2 &\leq 10 \\ 2x_1 - x_2 &\leq 40 \\ \text{and } x_1, x_2 &\geq 0. \end{aligned}$$

   (B) Solve the following LPP and obtain the solution of its dual problem:

$$\begin{aligned} \text{Max } z &= 5x_1 + 3x_2 \\ \text{s.t. } x_1 + x_2 &\leq 2 \\ 5x_1 + 2x_2 &\leq 10 \\ 3x_1 + 8x_2 &\leq 12 \\ \text{and } x_1, x_2 &\geq 0. \end{aligned}$$

5. (A) Explain the problem of job sequencing.

(B) For the following problem, find the sequence that minimizes total elapsed time (in hours) required to complete jobs on two machines M_1 and M_2. Also find the minimum elapsed time.

Job	A	B	C	D	E
Machine M_1	5	1	9	3	10
Machine M_2	2	6	7	8	4

6. (A) Explain the steps involved in processing n jobs through k machines.

(B) Explain the concept of replacement theory.

7. (A) Write the steps involved in processing the n jobs through two machines.

(B) There are five jobs, each of which is to be processed through two machines M_1 and M_2 in the order M_1, M_2, processing hours are as follows :

Job	1	2	3	4	5
Machine A	5	9	4	3	5
Machine B	2	10	3	6	6

Determine the optimum sequence for the five jobs, and minimum elapsed time. Also, find the idle time of machines A and B.

8. (A) Explain the replacement model for items that deteriorate with time when value of money does not change with continuous time.

(B) Explain the replacement model for items that deteriorate with time when value of money does not change with discrete time.

Section – II

(4 × 2 = 8)

Attempt any **four** questions :

9. (i) What is replacement theory ?

(ii) How can you solve the assignment problem of maximization type ?

(iii) How replacement theory is useful in real life situations ?

(iv) What can you say about the solution of dual problem if its dual problem has unbounded solution ?

(v) What is the use of sequencing problem ?

(vi) What can you say about the solution of dual problem if the primal problem has unique solution ?

(vii) What do you mean by degeneracy in dual Problem ?

(viii) How dual simplex method is different from simplex method ?

Seat No. : _____

SM-114

September-2020

B.Sc., Sem.-VI

311 : Statistics
(Acturial Science Probability Models and Risk Theory)
(Old Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** Questions in **Section-I** carry equal marks.

(2) Attempt any **THREE** questions in **Section-I**.

(3) Question-**9** in **Section-II** is **COMPULSORY**.

Section – I **(3 × 14 = 42)**

1. (A) Write a detailed note on Insurance business in India.

   (B) Explain individual risk model for a short time.

2. (A) Explain insurable and non-insurable risks with examples.

   (B) Write a detailed note on applications of insurance.

3. (A) Describe collective risk model for a single period.

   (B) What is the work of Acturi in insurance ?

4. (A) Explain properties od compound poisson distribution.

   (B) Explain the effect of re-insurance.

5. (A) Describe collective risk model over an extended period.

   (B) Describe claim amount distributions.

6. (A) Explain claim process in detail.

(B) Explain applications of risk theory.

7. (A) Explain the adjustment co-efficient – Discrete time model.

(B) Explain the model for individual claim for random variables.

8. (A) Describe the effect of re-insurance on the probability of ruin.

(B) Explain what is Actuarial Science.

9. Attempt any **Four** : **(4 × 2 = 8)**

(1) Write any two applications of insurance.

(2) What is insurance ?

(3) What is risk ?

(4) What is claim ?

(5) What is p.d.f. of Pareto distribution ?

(6) What is re-insurance ?

(7) What is discrete time risk models ?

(8) What is the need of insurance in this era ?