Group B(b)

Answer **any one** out of two questions : 6x1=6

3. A function is defined on [0, 1] by
$f(x) = 1$, if x is rational
$= 0$, if x is irrational
Show that f is not integrable on [0, 1].

4. What do you mean by numerical differentiation? Use Lagrange's interpolation formula to derive a formula for numerical differentiation. 6

Group B(c)

Answer **any two** out of four questions : 2x2=4

5. Prove that $B(m+1,n)=\frac{m}{m+n}B(m,n)$

6. Evaluate : $\lim_{x\to 0+} x^x$.

7. Write short notes on : Newton's forward interpolation.

8. $\frac{dy}{dx}=x3+y,\ y(0)=1.$ Compute y(0·02) by Eular's Method of iteration, correct upto 4 decimal places, taking step length h = 0·01.

Total Pages : 4

End Semester Examination of Semester–I, 2015
Subject : STATISTICS (HONS.) (UG)
Paper : 101 (Gr. A + Gr. B)
Full Marks : 40
Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question.

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers wherever necessary.

Group A (Probability Theory)

Group A(a)

Answer **any one** out of two questions : 10x1=10

1. a) Let A and B be events with probabilities $P(A)=\frac{3}{4}$ and $P(B)=\frac{1}{3}$. Then show that $\frac{1}{12}\le P(A\cap B)\le\frac{1}{3}$.

   b) State and prove Baye's theorem, Give an example. 3+7

2. Suppose n fair dice are thrown at a time. What is the probability of getting a sum 'S' of points on the dice? 10

Group A(b)

Answer **any one** out of two questions : 6x1=6

3. At a party, n men take off their hats. The hats are then mixed up, and each man randomly selects one. We say that a match occurs if a man selects his own hat, what is the probability of (i) no matches and (ii) exactly k matches.

4. a) If $P(B_i \cap C)>0$ for all υ, $\upsilon=|C|>m$, v and events B_i are mutually exclusive and exhaustive, show that

$$P(A|C)=\sum_{i=1}^{m} P(B_i|C)\,P(A|B_i \cap C)$$

b) Prove or give a counter example, if E_1 and E_2 are independent then they are conditionally independent given F. 3+3

Group A(c)

Answer **any two** out of four questions : 2x2=4

5. Explain Kolmogosov's axiometric definition of probability with an example.

6. S = {1, 2, ..., n} and suppose that A and B are independently, exactly likely to be any of 2^n subsets (including the null set and S itself) of S, show that

$$P\{A \subset B\}=\left(\frac{3}{4}\right)^n.$$

7. Let A_r, $r \geq 1$, be events such that $P(A_r) = 1$ for all r, show that $P\left(\bigcap_{r=1}^{\infty} A_r\right)=1.$

8. Let G be the event that an accessed is guilty, and T the event that some certainty is true. Some lawyers have argued on the assumption that $P(G|T)=P(T|G)$. Show that this holds if and only if P(G) = P(T).

Group B

Group B(a)

Answer **any one** out of two questions : 10x1=10

1. a) Derive Newton-Raphson's method for finding real simple root of f(x) = 0 and discuss its convergence. 5

b) Interpret Trapezoidal rule geometrically. Find $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule. 1+4

2. a) Define uniform continuity and absolute continuity of a function with examples. 2+2

b) i) Define Gamma and Beta integrali.

ii) Show that $\sqrt{\pi}\sqrt{2p}=2^{2p-1}\sqrt{p}\sqrt{\pi+\frac{1}{2}}$, if $p>0$.

4+2