T.E (Electrical, Electronics, Instrumentation Biomedical & Electronics & Telecommunication) (Sem V) (Rev)

exam-mah-4-7 75

Con.3337-07. (REVISED COURSE) ND-347

15/6/2007 Applied Mathmatics V

(3 Hours) [Total Marks : 100

N.B.(1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions out of the remaining **six** questions.

1. (a) Seven dice are thrown 729 times. How many times do you expect at least four dice to show three or five ? 20
(b) "The lines of regression between x and y are Parallel to the lines of regression between 2x and 2y". State true or false and justify.
(c) If 30 dictionaries in a library contain total 61,327 Pages, then prove that one of the dictionary has at least 2045 Pages.
(d) For $x, y \in z$, xRY if and only if $2x + 5y$ is divisible by 7. Is R an equivalence relation ?
(e) A random sample of 16 values from a normal population showed a mean of 41.6 inches and the sum of the squares of the deviations from this mean equals to 135. Obtain 95% fiducial limits for the mean.

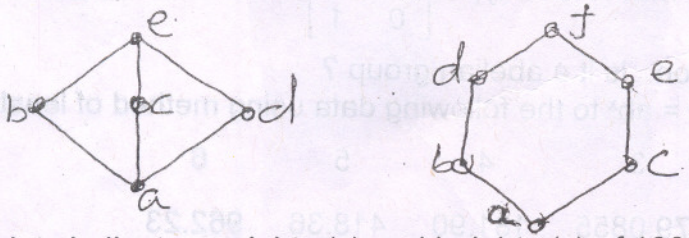
2. (a) The probability of a successful rocket launching is 'P'. If launching attempts are made until 3 successful launchings have occurred what is the probability that fewer than 5 attempts will be necessary ? If launching attempts are made until 3 consecutive successful launchings occur, what is the probability that fewer than 5 attempts will be necessary ? 6
(b) Investigate the association between the darkness of eye colour in father and son from the following data 6

Colour of father's eye

Colour of son's eyes	Dark	Not Dark	Total
Dark	48	90	138
Not Dark	80	782	862
Total	128	872	1000

(c) Determine whether the set of all ordered pairs (a,b) of real numbers ($a \neq 0$) under * defined by $(a, b)*(c, d) = (ac, bc + d)$ is an abelian group. 8

3. (a) Show that the lattices whose Hasse diagrams are given below are not distributive. 6



(b) The given data indicates weights (x) and heights (y) of 1000 men. $\bar{x} = 150$ lbs, $\bar{y} = 68$ inches, $\sigma x = 20$ lbs, $\sigma y = 2.5$ inches, $r = 0.6$, where $\bar{x}$ and $\bar{y}$ are means and σx and σy are standard deviations of x, y respectively. 'r' denotes the correlation-coefficient between x and y. John weighs 200 lbs Smith is five feet tall. Estimate the hight of John and weight of Smith. From the value of height of John estimate his weight. Why it is different from 200 ? 6
(c) The incomes of a group of 10,000 persons were found to be normally distributed with mean Rs. 520 and standard deviation Rs. 60. 8
Find :—
(i) the number of persons having incomes between Rs. 400 and 550
(ii) the lowest income of the richest 500.

4. (a) The length of time (in minutes), a lady speaks on telephone is found to be a random variable with probability density function 6

$f(x) = A e^{-x/5}$ for $x \geq 0$

$= 0$ elsewhere

find 'A' and the probability that she will speak for

(i) more than 10 minutes

(ii) less than 5 minutes.

(b) Is the following function injective, surjective ? 6

$f : R \to R$, $f(x) = 2x^2 + 5x - 3$

(c) If x and y are two correlated variables with the same standard deviation and having correlation coefficient V, show that correlation coefficient between x and (x + y) is 8

$\sqrt{(1+r)/2}$.

5. (a) Define and explain the terms :— 6

(i) Errors in testing of Hypothesis

(ii) Level of significance

(iii) Two tailed and one tailed tests.

(b) Prove the absorption laws :— 6

(i) $x \wedge (x \vee y) = x$

(ii) $x \vee (x \wedge y) = x$

(iii) For all $x, y \in B$ (Boolean algebra) if $x \wedge y = x$ show that $x \wedge \overline{y} = 0$

(c) Obtain the rank correlation coefficient from the following data, state Spearman's coefficient of rank correlation 8

x	:	10	12	18	18	15	40
y	:	12	18	25	25	50	25

6. (a) Obtain moment generating function of standard normal variate and also obtain first two moments about origin. 6

(b) Let A = {2, 3, 6, 12, 24, 36} and R be the Relation 'is divisible by' ie aRb means a/b. Obtain the relation matrix and draw Hasse diagram. 6

(c) Prove that Z_4 is a ring under addition and multiplication modulo 4. 8

7. (a) 'G' is a set of all square matrices of type $\begin{bmatrix} 1 & m \\ 0 & 1 \end{bmatrix}$ where $m \in Z$, prove that 'G' is a group under multiplication. Is it a abelian group ? 6

(b) Fit a curve of the form $y = ab^x$ to the following data using method of least squares. 6

x	:	2	3	4	5	6
y	:	34.385	79.0855	181.90	418.36	962.23

(c) (i) State **true** or **false** and justify "The mean of Poisson distribution is 2 and the variance is 3". 2

(ii) Fit the data to Poisson distribution 6

No of Printing Mistakes	:	0	1	2	3	4
frequencies (Pages)	:	123	59	14	3	1