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RF-3757-58

M. Sc. (Sem. I & II) (Bio-Tech.) Examination

April / May – 2010

Mathematics & Bio-statistics :

Paper - IBT - 105 - 205

Time : **3** Hours] [Total Marks : **70**

RF-3757

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **M. Sc. (Sem. 1 & 2) (Bio-Tech.)**

Name of the Subject :

☛ **Mathematics & Bio-statistics : Paper - IBT - 105 - 205**

☛ Subject Code No. : **3 7 5 7** ☛ Section No. (1, 2,.....) : **1**

Seat No. :

Student's Signature

(2) This paper contains **two** sections.
(3) Answer each section in **separate** answer books.
(4) Figures to the **right** indicate full marks of the question.

1 (a) If $A = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ then prove that $A^2 = I$. **5**

(b) Using matrix method solve following simultaneous equations (if solution exists) **5**

$$x + 2y + 3z = 6$$
$$2x + 4y + z = 7$$
$$3x + 2y + 9z = 14.$$

(c) Simplify : **5**

$$\frac{\sqrt{2}}{\sqrt{4-\sqrt{15}}} - \frac{3}{\sqrt{7+\sqrt{40}}} - \frac{1}{\sqrt{5-2\sqrt{6}}}.$$

OR

1 (a) State quadratic equation and derive its method of solution. **5**

(b) If $A = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} a & b \\ 3 & 5 \end{bmatrix}$ and if $AB = BA$ then find the values of a and b. Also find $3A + 2B$. **5**

(c) If α and β are the roots of the quadratic equation : **5**

$x^2 - 2kx + 8 = 0$ and if $\beta = \alpha/2$ then find the value of k.

2 (a) If $A = \{a / a^2 - 1 < 10;\ a \in Z\}$ **5**

$B = \{b / |b - 1| < 2;\ b \in N\}$

$C = \{c / |c| < 1;\ c \in Z\}$.

then verify $A \times (B \cap C) = (A \times B) \cap (A \times C)$.

(b) Solve the equations :

(i) $(c-a)x^2 + (a-b)x + (b-c) = 0$ (where $a \neq b \neq c \neq 0$.) **2**

(ii) $(x+1)(x+3) = 9800$. **3**

(c) If $f(x) = \dfrac{x^2 - 9}{x - 3}$ where $x \in Z - \{3\}$ and $g(x) = x + 3$ **5**

where $x \in Z$. Is $f(x) = g(x)$? Why ?

OR

2 (a) Prove that $\left(\sqrt{2 - \sqrt{3}}\right) + \sqrt{2 + \sqrt{3}} = \sqrt{6}$. **5**

(b) If $y = \left(1 - \dfrac{1}{1-x}\right)\left(1 - \dfrac{1}{2-x}\right)\left(1 - \dfrac{1}{3-x}\right)$; find dy/dx. **5**

(c) Evaluate : $\lim\limits_{x \to 0} \dfrac{a^{bx} - b^{ax}}{cx}$; where $a, b\ c \in R^+$. **5**

3 Answer following questions : **5**

(i) If α and β are roots of equation $3x^2 - 9x + 4 = 0$ then find $\dfrac{1}{\alpha} + \dfrac{1}{\beta}$.

(ii) Find quadratic equation whose roots are 2/3 and 3/2.

(iii) If $A = \{-2, -1, 0, 1, 2\}$ and $B = \{-1/2, 1/2, 1\}$ find $B \times A$.

(iv) If $A = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1/2 \\ -1/2 \end{bmatrix}$ find AB.

(v) Find $\lim\limits_{x \to 2} \dfrac{x^3 - 8}{x^2 - 4}$.

RF-3758

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☛ Subject Code No. : **3 7 5 8** ☛ Section No. (1, 2,.....) : **2**

Seat No. :

Student's Signature

(2) Answer **all** questions.

(3) Figures to the **right** indicate full marks.

(4) Follow usual notations.

4 (a) Describe the different measures of central tendency of a frequency distribution, mentioning their merits and demerits. **5**

(b) Number of ponds in a town and number of fishes were as follows. Find the rank correlation coefficient : **5**

X :	27	38	20	22	16	15	14	29	21	25
Y :	138	137	148	142	136	134	139	125	143	145

(c) There are 64 beds in a garden and 3 seeds of particular type of flower are shown in each bed. The probability of a flower being white is 1/4. Find the number of beds with 0 and 2 white flowers. **5**

OR

4 (a) Discuss different methods of presentation of data. **5**

(b) Compute coefficient of variation of the following distribution of the body weights (grams) of a sample of animals : **5**

Class :	101-105	106-110	111-115	116-120	121-125
f :	6	22	40	25	7

(c) The probability that a man will be alive in 25 years is 3/5 and the probability that his wife will be alive in 25 years is 2/3. Find the probability that (i) both will be alive (ii) only man will be alive (iii) at least one will be alive. **5**

5 (a) Write a note on uses of SPSS for biological data. **5**

(b) Obtain the equation of the line of regression of yield of rice and water : **5**

Water (inches) :	12	18	24	30	36	42	48
Yield of rice (tones) :	5.27	5.68	6.25	7.21	8.02	8.71	8.42

Estimate the most probable yield of rice for 40 inches of water.

(c) The life time of a certain kind of pace maker has a mean of 300 days and a standard deviation of 35 days. Assuming that the distribution of life times, which are measured to the nearest day is normal, find the probability of pace makers which have life time of (i) more than 370 days (ii) less than 265 days. **5**

OR

5 (a) Write a note on systematic sampling. **5**

(b) A manufacturer, who produces medicine bottles, finds that 0.1 % of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain. (i) no defective, (ii) at least two defectives. **5**

(c) A committee of three is to be chosen from a group consisting of 4 men and 5 women. If the selection is made at random find the probability that (i) all three are men; (ii) two are men. **5**

6 Write a detailed note on any **one** of the following : **5**

(i) Simple random sampling

(ii) Stratified random sampling

(iii) Uses of statistics in Bio-science.
