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SB-3656

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

March / April – 2011

Paper - IBT - 105-205 : Mathematics & Biostatistics

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

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. (BIO TECH) (SEM. - I & II)**

Name of the Subject :

☛ **PAPER - IBT - 105-205 : MATHEMATICS & BIOSTATISTICS**

☛ Subject Code No. : **3 6 5 6** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) This paper centains two sections.
(3) Answer each section in separate answer book.
(4) Figres to the **right** indicates **full** marks.
(5) Notations used are standared .

SECTION - I

1 (a) If $A=\begin{bmatrix}3 & 4\\ 1 & 2\end{bmatrix}$ and $B=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ then prove that **5**

$(AB)^{-1} \neq A^{-1}.B^{-1}$.

(b) Simplify **5**

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

(c) Using matrix inversion method solve : **5**

$4x+7y=13$; $-5x+9z=55$; $x+y+z=6$

OR

1 (a) Find the inverse of the following matrix : **5**

$$A = \begin{bmatrix} 2 & -1 & 4 \\ -3 & 0 & 1 \\ -1 & 1 & 2 \end{bmatrix}$$

(b) Simplify : **5**

$$\sqrt{3+\sqrt{5}} + \sqrt{3-\sqrt{5}}$$

(c) Solve the quadratic equations : **5**

(i) $(x+8)(x+9) = 18 \times 19$

(ii) $(x-1)(x-2) = (a-1)(a-2)$

2 (a) If $A = \{1,2\}$, $B = \{2,1\}$ and $C = \{0,1\}$ then verify **5**

$A \times (B \cup C) = (A \times B) \cup (A \times C)$.

(b) If $f(x) = x(x-1)(2x-1)$ then prove that **5**

$f(x+1) - f(x+2) = -6(x+1)^2$.

(c) Evaluate : $\lim\limits_{x \to 0} \dfrac{f(x+1) - f(x-1)}{x}$ where **5**

$f(x) = x^2 + 1 : x \in R$.

OR

2 (a) Using definition of derivative differentiate **5**

$y = 2x^2 + 3x - 1$

(b) Find $\dfrac{dy}{dx}$ for $y = \dfrac{2x+3}{x^2+2}$. **5**

(c) If $A = \{x \mid x \in N ; |x^3 - 2| \leq 25\}$ **5**

$B = \{y \mid y \in N ; 1 < y < 5\}$

$C = \{z \mid z \in N ; z^4 = 81\}$

Then verify $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

3 Answer following : 5

(i) If $A = \begin{bmatrix} 0 & 3 \\ 1 & 2 \end{bmatrix}$ find A^2

(ii) Construct the quadratic equation whose roots are $= \frac{1}{3}$ and –3.

(iii) If $A = \{2, 1, 2\}$ find $p(A)$.

(iv) If $y = \sqrt[3]{x^2}$ find $\frac{dy}{dx}$.

(v) Define symmetric matrix.

SECTION - II

1 (a) Describe the different measure of central tendency with their merits and demerits. 6

(b) Define correlation coefficient and write a detailed note on method of Karl Pearson's correlation. 7

(c) The production of butter fat during 6 consecutive days was recorded for 200 cows. Calculate the average butter fat for the following frequency distribution : 5

Butter Fat (in Kgs)	2-4	4-6	6-8	8-10	10-12	12-14
NO.of cows	5	65	52	36	34	8

OR

1 (a) Write a detailed note on graphical presentation of data. 7

(b) Differentiate between correlation and regression analysis. 6

(c) Blood pressure of 8 patients was recorded as : 155, 140, 145, 158, 130, 135, 138, 148. Calculate standard deviation for BP. 5

2 (a) Write a note on multistage sampling. **6**

(b) State Binomial probability distribution. A student in quantitative analysis has been that the probability of obtaining a successful endpoint in a particular titration is 0.7. This student carries out six such titrations and obtained only one successful endpoint. Should he think of a career that does not involve chemistry ? **6**

OR

2 (a) Explain Poisson distruibution with their properties and advantages. **6**

(b) A study of size of metastatic carcinoid tumors in the heart was conducted an article. Based on this study, we assume that length of metastatic carcinoid tumors in the heart are normally distributed with mean 1.8 cm and S.D. 0.5 cm. Find the precentages of metastatic carcinoid tumors in the heart that **6**

(i) Are between 1 cm and 2 cm long.

(ii) Exceed 3 cm in length.

3 Write short note on any **one** of the following : **5**

(i) Simple random sampling.

(ii) Use of statistics in Bio-Science.

(iii) Use of SPSS for biological data.
