

Total No. of Questions: 6

Total No. of Printed Pages: 3

Enrollment No.....

Faculty of Science

End Sem Examination Dec-2023

BT3AE02 Elementary Mathematics

Programme: B.Sc.

Branch/Specialisation: Biotechnology

Maximum Marks: 60



Duration: 3 Hrs.

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. If  $U$  is universal set and  $A$  is any subset of  $U$  then complement of  $A$  is: 1  
(a)  $A - U$     (b)  $U - A$     (c)  $U$     (d) None of these
- ii. If  $f(x) = \frac{x-2}{x+2}$  then the value of  $f(0) =$  1  
(a) 0    (b) 1    (c) -1    (d) None of these
- iii. The equation  $ax^2 + bx + c = 0$  is: 1  
(a) Linear equation    (b) Quadratic equation  
(c) Both (a) and (b)    (d) None of these
- iv. The value of  $\log_2 4 =$  1  
(a) 2    (b)  $\frac{1}{2}$     (c) 4    (d) None of these
- v. The slope of the line  $x - 2y + 3 = 0$  is 1  
(a) 1    (b) 0    (c)  $\frac{1}{2}$     (d) None of these
- vi. The equation of parabola  $y^2 = 4(x-3)$  is symmetric about: 1  
(a)  $X$  axis    (b)  $Y$  axis    (c) line  $y = x$     (d) None of these
- vii. If arithmetic mean of 1, 2, 3, 4,  $x$  is 3 then value of  $x$  is: 1  
(a) 15    (b) 5    (c) 10    (d) None of these
- viii. If the correlation between two variables is +1 then relationship is: 1  
(a) No relationship    (b) Negative relationship  
(c) Positive relationship    (d) None of these
- ix. If a coin is tossed 4 times then the probability of getting 2 heads is: 1  
(a)  $\frac{3}{2}$     (b)  $\frac{3}{4}$   
(c)  $\frac{1}{2}$     (d) None of these

[2]



[3]



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## Programme → B.Sc. END - Sem Examination Solution .

Course Code :- BT3AE02

Branch :- Bio-tech

Course Name :- Elementary  
Mathematics

## Ques 1} MCQ .

- i) b)  $U - A$  +1  
 ii) c) -1 +1  
 iii) b) Quadratic equation +1  
 iv) a) 2. +1  
 v) c)  $\frac{1}{2}$  +1  
 vi) b) Y axis. +1  
 vii) b) 5. +1  
 viii) c) Positive relationship. +1  
 ix) d) None of these +1  
 x) a)  $A \cup B = S$  +1

Ques 2} (i) Let  $U = \{1, 2, 3, 4, 5\}$   
 $A = \{1, 2\}$   
 $B = \{2, 3, 4\}$

To prove -  $(A \cup B)' = A' \cap B'$  ①

L.H.S  $\rightarrow A \cup B = \{1, 2, 3, 4\}$   
 $(A \cup B)' = \{5\}$  ①

R.H.S  $\rightarrow A' = \{3, 4, 5\}$ ,  $B' = \{1, 5\}$  ②  
 $A' \cap B' = \{5\}$

Hence L.H.S = R.H.S.

|| proved ||

ii) Given  $n(A) = 40$   
 $n(B) = 60$   
 $n(A \cap B) = 70$   
 $n(A \cup B) = ?$

By using formula,

$$\begin{aligned} n(A \cup B) &= n(A) + n(B) - n(A \cap B) \\ &= 40 + 60 - 70 \\ &= 100 - 70 \\ &= 30 \end{aligned}$$

$n(A \cup B) = 30$

OR iii) Define

a) Symmetric relation :-

A relation  $R$  on a set  $A$  is said to be symmetric relation if

$$(a, b) \in R \Rightarrow (b, a) \in R \text{ for all } a, b \in A$$

i.e.  $aRb \Rightarrow bRa$  for all  $a, b \in A$ .

b) Identity function :-

An identity function is a function where each element in a set  $B$  gives the image of itself as the same element. i.e.

$$g(b) = b \quad \forall b \in B.$$

c) Constant function :-

A Constant function has the same output even with different input values. A Constant function has the form  $y = b$ , where  $b$  is a constant.

Ques 3)

$$(i) \quad 2x + 3y + 7 = 0 \quad \text{--- (1)}$$

$$x - 2y + 5 = 0 \quad \text{--- (2)}$$

by eqn (1),

$$2x + 3y + 7 = 0$$

$$2x = -3y - 7$$

$$x = -\frac{3y + 7}{2} \quad \text{--- (3)}$$

put the value of  $x$  in eqn (2)

$$x - 2y + 5 = 0$$

$$-\frac{3y + 7}{2} - 2y + 5 = 0$$

$$-3y - 7 - 4y + 10 = 0$$

$$-7y + 3 = 0$$

$$-7y = -3$$

$$y = \frac{3}{7}$$

put the value of  $y$  in eqn (3)

$$x = -\frac{3 \times \frac{3}{7} + 7}{2}$$

$$x = \frac{-9 - 49}{7 \times 2} = \frac{-58}{14} = -\frac{29}{7}$$

$$\boxed{x = -\frac{29}{7}} \quad \boxed{y = 3/1} \quad \text{Ans}$$

①

ii)  $(m+6)x^2 + (m+6)x + 2 = 0$

Given equation,  $(m+6)x^2 + (m+6)x + 2 = 0$

$$D = b^2 - 4ac$$

$$b = (m+6)$$

$$a = m+6$$

$$c = 2$$

②

$$D = (m+6)^2 - 4 \times (m+6) \times 2$$

$$\Rightarrow (m+6)(m+6 - 8)$$

$$D \Rightarrow (m+6)(m-2)$$

# Cases

②

i)  $b^2 - 4ac = 0$

$$(m+6)(m-2) = 0$$

for  $m = -6$ ,  $m = 2$

then roots are real & equal.

ii)  $b^2 - 4ac > 0$

$$(m+6)(m-2) > 0$$

for  $m > -6$  &  $m > 2$

then roots are Real & unequal

②

iii)  $b^2 - 4ac < 0$

$$(m+6)(m-2) < 0$$

for  $m < -6$  &  $m < 2$

then roots are Unequal & imaginary.

OR iii)

$$\log_3 8$$

$$\log_9 16 \log_4 10.$$

(1)

~~$\log_3 8^3$~~

$$\Rightarrow \frac{\log 8}{\log 3}$$

~~$\log_9 4^2 \log_4 10$~~

$$\frac{\log 16}{\log 9} \times \frac{\log 10}{\log 4}$$

(2)

~~$3 \log_8 8$~~

$$\Rightarrow \frac{\log 8}{\log 3} \times \frac{\log 9 \log 4}{\log 16 \log 10}$$

(3)

$$\Rightarrow \frac{\log 8}{\log 3} \times \cancel{\frac{\log 3 \log 4}{\log 4 \log 10}}$$

(4)

$$\Rightarrow \frac{\log 8}{\log 10} \Rightarrow \boxed{\log 8}$$

(5)

Ques 4)  
(i)

$$x^2 = 8y.$$

$$x^2 = 4(2y)$$

$$\therefore a = 2.$$

1) Vertex - (0, 0)

2) Focus - (0, a)  $\Rightarrow$  (0, 2)

3) Length of latus rectum =  $4a = 4 \times 2 \Rightarrow 8$

(ii).

x intercept, a = 3.

y intercept, b = 4.

Equation of line be,

$$\frac{x}{a} + \frac{y}{b} = 1.$$

$$\frac{x}{3} + \frac{y}{4} = 1$$

$$\boxed{4x + 3y = 12}.$$

The slope of line is given by,

$$y = mx + b.$$

Here  $m$  is

$$3y = -4x - 12$$

$$y = -\frac{4}{3}x - \frac{12}{3}$$

$$\boxed{y = -\frac{4}{3}x - 4}$$

$$m = -\frac{4}{3} \quad \& \quad b = -4.$$

OR iii)

$$\begin{aligned} x - 2y + 3 &= 0 \Rightarrow -2y = -x + 3 \Rightarrow y = \frac{x+3}{2}, \\ 2x - y + 7 &= 0 \Rightarrow y = 2x + 7 \end{aligned}$$

(2)

$$\tan \theta = \frac{m_1 - m_2}{1 + m_1 m_2}$$

From 1st equation,  $m_1 = \frac{-1}{\frac{1}{2}} = -2$ .

From 2nd eqn  $\Rightarrow m_2 = \frac{-1}{-1} = 1$ .

(2)

$$\tan \theta = \frac{y_2 - y_1}{1 + y_2 \times y_1}$$

(1)

$$= \frac{\frac{1-4}{2}}{1+1} \Rightarrow \frac{-3}{2}$$

(1)

$$\boxed{\tan \theta \Rightarrow -\frac{3}{4}}$$

Ques 5)

(a) Bar chart :-

Bar graphs are the pictorial representation of data, in the form of vertical or horizontal rectangular bars.

1.5

Bar

(b)

Pie chart :- A pie chart is a circular statistical graphic which is divided into slices to illustrate proportion.

1.5



ii)

$$\begin{aligned} Y &= 3x - 5 & \text{--- (1)} \\ Y &= 2x - 4 & \text{--- (2)} \end{aligned}$$

From eqn (1)

$$3x = Y + 5$$

$$x = \frac{1}{3}Y + \frac{5}{3}$$

$$b_{xy} = \frac{1}{3} \quad \text{--- (3)}$$

From eqn (2)

$$Y = 2x - 4.$$

$$b_{yx} = 2 \quad \text{--- (4)}$$

Correlation between  $X$  &  $Y$

$$r(x, y) = \sqrt{b_{xy} \times b_{yx}}$$

$$= \sqrt{\frac{1}{3} \times 2}$$

$$\boxed{r(x, y) = \sqrt{\frac{2}{3}}} \quad \text{Ans}$$

iii)

Age	No. of Patients	C.F	
5-15	6	6	
15-25	11	17	
25-35	21	38	
35-45	23	61	
45-55	14	75	$\frac{N}{2} = \frac{80}{2} = 40$
55-65	5	80	Median class

$$\text{Median} = l + \frac{N/2 - C.F}{f} \times i$$

$$l = 35, N = 80, c.f = 38, f = 23, i = 10 \quad (1)$$

$$M = 35 + \frac{40 - 38}{23} \times 10.$$

$$= 35 + \frac{2}{23} \times 10$$

$$= 35 + 0.869$$

$$\boxed{M = 35.869} \quad \underline{\text{Any}}$$

Que 6}

(a) Sample Space :-

A Sample Space is a collection of or a set of possible outcomes of a random experiment. If it contains a finite number of outcomes, then it is known as discrete or finite Sample Space.

The Sample Space for a random experiment is written within curly braces {}.

b) Event :-

The entire possible set of outcome of a random experiment is the Sample Space or the individual Space of that experiment.

The event is a subset of the Sample space i.e. E

ii)  $P = 0.8$   
 $q = 0.2$   
 $n = 10, \quad k = 7$

①

In Binomial,  
 $= nC_7 p^7 q^{n-7}$

①

$$= 10C_7 (0.8)^7 (0.2)^3$$

①

$$\Rightarrow \frac{10!}{3! 7!} (0.8)^7 (0.2)^3$$

$$= \frac{10 \times 9 \times 8 \times 7!}{3 \times 2 \times 7!} \times (0.2097)(0.008)$$

①

$$= 120 \times 0.2097 \times 0.008$$

①

$$= 0.201312$$

iii)

Given, Average rate of Value  $\lambda = 3$

①

Poisson random Variable ( $x$ ) = 4.

Poisson distribution,

$$P(X=x) = \frac{e^{-\lambda} \lambda^x}{x!}$$

⑤

$$P(X=4) = \frac{e^{-3} (-3)^4}{4!}$$

①

$$= 0.048 \times (-3)^4$$

$$4 \times 3 \times 2 \times 1$$

①

$$P(X=4) = 0.1680$$