



HBY-1026-33 Seat No. _____

B. Sc. (Sem. IV) Examination

April / May - 2015

- (1) *Mathematics : ES-22 (Business Mathematics - IV)*
(2) *ESMATH-32 : Business Mathematics-II (Elective)*

Time : 3 Hours]

[Total Marks : 50

(1) Mathematics : ES-22 (Business Mathematics - IV)

1 Attempt any five : 25

- (1) In a group of people, 28 like Gujarati movies, 30 like Hindi movies, 42 like English movies, 5 like both Gujarati and Hindi movies, 8 like Hindi and English movies, 8 like Gujarati and English movies and 3 like Gujarati, Hindi and English movies, what is the least number of people in the group ?
- (2) Prove that $p \vee q = p \vee r$ or $p \wedge q = p \wedge r$ then $q = r$. And also prove that Negation is uniquely.

- (3) State and prove De-Morgan's laws.
- (4) $A \subset U$ and $B \subset U$, such that $n(A) = 20$,
 $n(B) = 30$, $n(U) = 100$, $n(A \cap B) = 10$ then find
 $n(A' \cap B')$.
- (5) Show that the following statement are true by

- (i) Direct Method
- (ii) Contra positive method.

If $x^5 + 16x = 0$, then $x = 0$.

- (6) Construct the Truth table.

- (i) $(p \wedge q) \vee r$
- (ii) $(p \vee q) \wedge r$
- (iii) $[(\sim p) \vee (\sim q)] \wedge r$

2 (a) Attempt any four :

16

- (i) In how many ways can the letters of the word PERMUTATIONS be permuted ?

Also find,

- (a) How many start with P and end in S?

- (b) In how many of them vowels are together ?

- (ii) A reception committee consisting of 6 students for the annual function of a school is to be formed from 8 boys and 5 girls. In how many ways can we do it if the committee is to contain (i) Exactly 4 girls (ii) At most 2 Girls ?
- (iii) How many arrangements can be made with the letters of the word MATHEMATICS and in how many of them vowels occurs together ?
- (iv) In how many ways can seven digit numbers greater than 10,00,000 be formed using digits 1,2,0,2,4,2,4 ?

(v) If $\binom{n}{r-1} = 36$, $\binom{n}{r} = 84$, $\binom{n}{r+1} = 126$, find n and r .

(b) Attempt any three :

9

(i) Find r , If $5 \cdot {}_4P_r = 6 \cdot {}_5P_{r-1}$.

(ii) Prove $\binom{2n}{n} = \frac{2^n [1 \cdot 3 \cdot 5 \cdot 7 \cdots (2n-1)]}{n!}$.

(iii) If m vertical bars meet n horizontal bars, how many rectangles will be formed ?

(iv) How many three digit numbers are there which are multiples of 5 ?

(Without repetition of digits)

(2) **ESMATH-32 : Business Mathematics-II (Elective)**

Instructions : (1) All questions are compulsory.

(2) Figures to the right indicate marks of the corresponding question.

1 (a) Attempt any two : 10

(i) The probability (i) that A can solve a problem in statistics is $\frac{4}{5}$ (ii) that B can solve it is $\frac{2}{3}$ (iii) that C can solve it is $\frac{3}{7}$. If all of them try independently, find the probability that the problem will be solved.

(ii) Explain : Statistical definition of probability and mutually exclusive events.

(iii) Two players A and B toss an unbiased die alternatively. He who first throws a six wins the game. If A begins, what is the probability that B wins the game ?

(b) Attempt any two : 10

(i) If A and B are two events such that

$$P(A) = \frac{2}{3}, P(\bar{A} \cap B) = \frac{1}{6} \text{ and } P(A \cap B) = \frac{1}{3}.$$

Find $P(B)$, $P(A \cup B)$, $P(A/B)$ and $P(\bar{A} \cap \bar{B})$.

- (ii) Two students X and Y work independently on a problem. The probability that X will solve it is $\frac{3}{4}$ and the probability that Y will solve it is $\frac{2}{3}$. What is the probability that the problem will be solved.
- (iii) A box contains 4 identical dice out of which three are fair and the fourth is loaded in such a way that the face marked as 5 appears in 60% of the tosses. A die is selected at random from the box and tossed. If it shows 5, what is the probability that it was a loaded die ?

(c) Answer the following :

5

- (i) 5 red and 2 black balls, each of different sizes are randomly laid down in a row. Find the probability that the two end balls are black.
- (ii) Prove that: $P(A') = 1 - P(A)$, for an event A.
- (iii) State : Baye's theorem.
- (iv) Find the probability of throwing a total of six in a single throw with two unbiased dice.
- (v) State conditional probability theorem.

2 (a) Attempt any two : 10

(i) Assuming that it is true that 2 in 10 industrial accidents are due to fatigue, find the probability that

(a) Exactly 2 of 8 industrial accidents will be due to fatigue

(b) At least 2 of the 8 industrial accidents will be due to fatigue.

(ii) Define the Binomial distribution and discuss its applications.

(iii) The scores made by candidate in a certain test are normally distributed with mean 500 and S.D. 100 what percent of candidates receive scores 600 ?

(b) Attempt any two : 10

(i) A book contains 100 misprints distributed randomly throughout its 100 pages. What is the probability that a page observed at random contains at least two misprints. Assume Poisson distribution.

(ii) Discuss the probability distribution of a discrete random variable.

- (iii) If it rains, an umbrella salesman earns Rs. 100 per day. If it is fair, he loses Rs. 15 per day. What is his expectation if the probability of rain is 0.3 ?

(c) Answer the following :

5

- (i) Write the probability mass function of normal distribution.
- (ii) Is there any fallacy in the statement "the mean of a Binomial distribution is 20 and its S.D. 7".
- (iii) A coin is tossed six times. What is the probability of obtaining 6 heads ?
- (iv) If mean of a poisson distribution is 4 then find its S.D.
- (v) Define mean in Binomial distribution.