Paper Code: B

Course Code:MTH302
Course Title:PROBABILITY AND STATISTICS

Time Allowed: 01:30hrs. **Max Marks: 30**

Read the following instructions carefully before attempting the question paper

1. *Match the Paper Code shaded on the OMR Sheet with the Paper code mentioned on the question paper and ensure that both are the same*
2. *This question paper contains 30 questions of 1 mark each. 0.25 marks will be deducted for each wrong answer.*
3. *All questions are compulsory.*
4. *Do not write or mark anything on the question paper and/or on rough sheet(s) which could be helpful to any student in copying, except your registration number on the designated space.*
5. *Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.*

Q(1) A random variable 'X' has the following prbability function:

$X = x$	0	1	2	3
$P(X = x)$	1/6	1/6	1/3	k

Then k =?

(a) 2/3 (b) 5/6 (c) 1/3 (d) 1

CO2,L2

Q(2) A random variable 'X' has the following prbability function:

x	0	1	2	3
P(X=x)	1/6	1/3	1/3	1/6

Then P[X<3]=?

(a) 2/3 (b) 5/6 (c) 1/3 (d) 1

CO2,L2

Q(3) A coin is tossed three times. Let the r.v. 'X' denotes the number of the heads. Then P[X=2]=?

(a) ⅛ (b) 3/4 (c) ¼ (d) 3/8

CO2,L2

Q(4) A probability density function is given by: $f(x) = \begin{cases} ke^{-x/4}, & x > 0 \\ 0, & otherwise \end{cases}$. Then 'k'=?

a) $\frac{1}{4}$ b) 4 c) $\frac{-1}{4}$ d) -4

CO2,L2

Q(5) A probability density function is given by: $f(x) = \begin{cases} 2(1-x), & 0 < x < 1 \\ 0, & otherwise \end{cases}$. Then $P\left(X < \frac{1}{2}\right)$=?

(a) 2/3 (b) 1/3 (c) 4/9 (d) 5/9

CO2,L2

Q(6) A probability density function is given by: $f(x) = \begin{cases} 2(1-x), & 0 < x < 1 \\ 0, & otherwise \end{cases}$

Then for $0 < x < 1$, the cumulative distribution function is given by:

a) $x^2 - 2x$ b) $2x - x^2$ c) $2x + x^2$ d) None of these

CO2,L2

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Q(7) The variance of a random variable X is given by:

(a) $E(X^2) - [E(X)]^2$ (b) $E(X^2) - E(X)$

(c) $E(X) - E(X^2)$ (d) $E(X) + E(X^2)$

CO2,L2

Q(8) A random variable 'X' has the following probability function:

$X = x$	−3	6	9
$P(X = x)$	1/6	1/2	1/3

Then $E(X) =$?

(a) 5/2 (b) 11/2 (c) 13/2 (d) 9/2

CO1,L1

Q(9) $E(4X - 3) = ?$

a) $4E(X)$ b) $4E(X) + 3$ c) $4E(X) - 3$ d) $E(X) - 3$

CO1,L1

Q(10) A random variable X has a mean $\mu = 8$, a variance $\sigma^2 = 9$. Then the least value of $P(-7 < X < 23)$ is:

a) $\frac{1}{9}$ b) $\frac{8}{9}$ c) $\frac{1}{25}$ d) $\frac{24}{25}$

CO1,L1

Q(11) Six coins are tossed 6400 times. Using the Poisson distribution, the approximate probability to get six heads zero time is

a) e^{100} b) e^{-100} c) e^{-1} d) e^{10}

CO3,L3

Q(12) In a book of 520 pages, 390 typographical error occur. Assuming Poisson law for the number of errors per page, then the probability of a page has no error is

a) 0.75 b) $e^{0.75}$ c) $e^{-0.75}$ d) e^{2}

CO3,L3

Q(13) A and B play a game in which their chances to winning are in the ratio 3:2. If p be the probability that A wins then probability that A wins x times out of 5 times is given by

(A) $P(X = x) = C_x^5 \left(\frac{3}{5}\right)^x \left(\frac{2}{5}\right)^x$ (B) $P(X = x) = C_x^5 \left(\frac{3}{5}\right)^x \left(\frac{2}{5}\right)^{5-x}$

(C) $P(X = x) = C_x^{5-x} \left(\frac{3}{5}\right)^x \left(\frac{2}{5}\right)^x$ (D) $P(X = x) = C_x^5 \left(\frac{3}{5}\right)^5 \left(\frac{2}{5}\right)^x$

CO3,L3

Q(14) With the usual notations, if $n = 6$ and $9P(X = 4) = P(X = 2)$, then probability of success 'p' for a binomial distribution is given by

(A) $8p^2 - 2p + 1 = 0$ (B) $8p^2 - 2p - 1 = 0$

(C) $8p^2 + 2p + 1 = 0$ (D) $8p^2 + 2p - 1 = 0$

CO3,L3

Q(15) If $X \sim B(n, p)$ a binomial distribution and E denotes the expectation (mean) then $E\left(\frac{X}{n} - p\right)^2 = \ldots$

(A) p/n (B) q/n (C) pq/n (D) n/pq

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Q(16) Consider the statements: CO3,L3

(i) For a binomial distribution variance is always less than mean.

(ii) For a geometric distribution variance is always less than mean.

(A) Statement (i) is correct but not (ii).

(B) Statement (ii) is correct but not (i).

(C) Both the statements (i) and (ii) are correct

(D) Both the statements (i) and (ii) are not correct.

CO3,L3

Q(17) The relation between Gamma and normal distributions is given by

(i) If $X \sim N(0,1)$ then $\left(\frac{x^2}{2}\right) \sim \gamma\left(\frac{1}{2}\right)$.

(ii) If $X \sim N(\mu, \sigma^2)$ then $\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2 \sim \gamma\left(\frac{1}{2}\right)$.

(a) Statement (i) is correct but not (ii).
(b) fistatement (ii) is correct but not (i).
(c) Both the statements (i) and (ii) are correct.
(d) Both the statements (i) and (ii) are correct.

Q(18) CO3,L3

Statement 1: The exponential distribution may be regarded as a special case of Gamma Distribution.

Statement 2: If $X \sim e^{\theta}$ then $X \sim \gamma(\theta, 1)$.

(a) The statements 1 and 2 both are correct.
(b) The statements 1 and 2 both are not correct.
(c) Only the statements 1 is correct.
(d) Only the statements 2 is correct.

Q(19) CO3,L3

Let X be a normal variate with mean 30 and standard deviation 5 then the value of standard normal variate Z lies in the set if $26 \leq X \leq 40$

a) [0.8,2] b) [-0.8,2] c) (0.8,2) d) (-0.8,2)

Q(20) CO3,L3

Let X be a normal variate with mean 30 and standard deviation 5. If the probability of standard normal variate is $P(0 \leq Z \leq 1) = 0.3413$ then the probability $P(|X - 30| \leq 5) = \cdots$

a) 0.6826 b) 0.2358 c) 0.8991 d) 0.0012

CO3,L3

Q(21)

Let A and B and C are three mutually exclusive and exhaustive events such $P(A) = \frac{1}{2}P(B)$ and $P(B) = 2P(C)$. Then the probability of event A is

a) $\frac{4}{13}$ b) $\frac{1}{3}$ c) $\frac{2}{3}$ d) None of these

CO1,L1

Q(22)

A coin is weighted so that heads is twice as likely to appear as tails, then the probability of appearing head is

a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) $\frac{1}{4}$

CO1,L1

Q(23) The probability that at least one event A or B occurs is 0.4 and the probability that both occurs simultaneously is 0.55 , then value of $P(\bar{A}) + P(\bar{B})$ is

a) 0.35 b) 0.95 c) 0.75 d) None of these

CO1,L1

Q(24)

Twenty five books are placed at random in a shelf. Then the probability that a particular pair of books shall always be together

a) $\frac{22}{25}$ b) $\frac{23}{25}$ c) $\frac{1}{25}$ d) $\frac{4}{25}$

CO1,L1

Q(25)

In a random arrangement of the letters of the word 'MATHEMATICS', the probability that all vowels come together is

a) $\frac{4}{165}$ b) $\frac{4}{945}$ c) $\frac{2}{216}$ d) None of these

CO1,L1

Q(26)

Let A and B are two independent events such that $P(\bar{A}) = 0.7$, $P(B) = k$, and $P(A \cup B) = 0.8$ then the value of k is

a) $\frac{3}{7}$ b) 1 c) $\frac{2}{7}$ d) None of these

CO1,L1

Q(27)

The probability that A hit the target is 1/4 and the probability that B hit the target is 2/3. If both shoot at target independently. The probability that target is hitted

a) $\frac{11}{12}$ b) $\frac{11}{24}$ c) $\frac{13}{24}$ d) $\frac{3}{12}$

CO1,L1

Q(28)

Let A and B are the events such that $P(A) = 3/5$, $P(B) = 5/10$ and $P(B|A) = 2/3$, then the value of $P(A \cap B)$ is

a) $\frac{2}{3}$ b) $\frac{3}{4}$ c) $\frac{1}{4}$ d) None of these

CO1,L1

Q(29)

Two six faced unbiased dice are thrown. Then the probability that sum of numbers shown is 7 or product is 12, is

a) $\frac{2}{6}$ b) $\frac{5}{36}$ c) $\frac{5}{18}$ d) $\frac{2}{9}$

CO1,L1

Q(30)

Suppose a student is selected at random from 80 students where 30 are taking mathematics, 20 are taking chemistry, and 10 are taken mathematics and chemistry both. The probability that a student is taking mathematics or chemistry is

a) $\frac{2}{3}$ b) $\frac{1}{8}$ c) $\frac{1}{2}$ d) None of these

CO1,L1

--End of Question paper--