MONTHLY TEST – NOVEMBER 2022
BUSINESS MATHEMATICS AND STATISTICS

CLASS : 12   **MARKS: 50**

TIME: 1.30 HOUR

PART – A

ANSWER ALL THE QUESTIONS: **10x1 = 10**

1. Normal distribution was invented by

a) Laplace   b) De- Moivre   c) Gauss   d) all the above

2. The components of a time series which is attached to short term fluctuation is

a) Secular trend   b) Seasonal variations   c) cyclic variation   d) Irregular variation

3. If $X \sim N(9,81)$ the standard normal variate Z will be

a) $Z = X – 81/9$ b) $Z = X – 9/81$ c) $Z = X – 9/9$ d) $Z = 9 – X/9$

4. A manufacturer produces switches and experiences that 2 percent switches are defective. The probability that in a box of 50 switches, there are atmost two defective is:

a) $2.5e^{-1}$ b) e^{-1} c) $2e^{-1}$ d) none of the above

5. Which of the following Index number satisfy the time reversal test?

a) Laspeyre's Index number   b) Paasche's Index number

c) Fisher Index number   d) All of them

6. The value of 'b' in the trend line $y = a+bx$ is

a) always positive   b) always negative

c) either positive or negative   d) zero

7. If for a binomial distribution $B(n,p)$ mean $= 4$ and Variance $= 4/3$, the probability, $P(x \geq 5)$ is equal to

a) $(2/3)^6$ b) $(2/3)^5 (1/3)$ c) $(1/3)^6$ d) $4(2/3)^6$

8. The additive model of the time series with the components T, S, C and I is

a) $y = T+S+CxI$ b) $y = T+SxCxI$ c) $y = T+S+C+I$ d) $y = T+SxC+I$

9. How many causes of variation will affect the quality of a product?

a) 4   b) 3   c) 2   d) 1

10. In a binomial distribution, the probability of success is twice as that of failure. Then out of 4 trials, the probability of no success is

a) 16/81   b) 1/16   c) 2/27   d) 1/81

PART – B

ANSWER ANY THREE QUESTIONS. QUESTION NUMBER 15 IS COMPULSORY.   3X2 = 6

11. Write any 2 examples of Poisson Distribution.

12. Fit a trend line by the method of semi averages for the given data

Year	2000	2001	2002	2003	2004	2005	2006
Production	105	115	120	100	110	125	135

13. The average daily procurement of milk by village society in 800 litres with a standard deviation of 100 litres. Find out the proportion of societies procuring milk between 800 litres to 1000 litres per day. [$P(0 < Z < 2) = 0.4772$]

14. Mention the components of the Time series.

15. A Fair coin is tossed 6 times. Find the probability that exactly 2 heads occurs.

PART – C

ANSWER ANY 3 QUESTIONS. QUESTIONS NUMBER 20 IS COMPULSORY.   3x3 = 9

16. A Pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of two successes.

17. Calculate three – yearly moving averages of number of students studying in a higher secondary school in a particular village from the following data.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
No. of Students	332	317	357	392	402	405	410	427	435	438

18. Mention any 3 properties of Normal Distribution.

19. Construct the cost of living index number for 2015 on the basis of 2012 from the following data using Family Budget Method.

Commodity	Price 2010	Price 2015	Weights
Rice	250	280	10
Wheat	70	85	5
Corn	150	170	6
Oil	25	35	4
Dhal	85	90	3

20. The distribution of the number of road accidents per day in a city is Poisson with mean 4. Find the number of days out of 100 days when there will be (i) no accidents (ii) atleast two accidents [$e^{-4} = 0.0183$]

PART – D

ANSWER ALL THE QUESTIONS:-   5x5 = 25

21. (a) If 18% of the bolts produced by a machine are defective, determine the probability that out of the 4 bolts chosen at random

(i) exactly one will be defective.   (ii) none will be defective   (iii) atmost 2 will be defective

(OR)

(b) Calculate the seasonal index for the quarterly production of a product using the method of simple averages.

Year	I Quarter	II Quarter	III Quarter	IV Quarter
2005	255	351	425	400
2006	269	310	396	410
2007	291	332	358	395
2008	198	289	310	357
2009	200	290	331	359
2010	250	300	350	400

22. (a) If the probability that an individual suffers bad reaction from injection of a given serum is 0.001, determines the probability that out of 2000 individuals (a) exactly 3 and (b) more than 2 individuals will suffer a bad reaction. ($e^{-2} = 0.1353$)

(OR)

(b) Compute (i) Laspeyre's (ii) Paasche's (iii) Fisher's Index numbers for the 2010 from the following data.

Commodity	Price		Quantity	
	2000	2010	2000	2010
A	12	14	18	16
B	15	16	20	15
C	14	15	24	20
D	12	12	29	23

23. (a) What is the Probability of guessing correctly atleast 6 of the 10 answers in a TRUE/ FALSE objective test.

(OR)

(b) A Sample of 125 dry battery cells tested to find the length of life produced the following resuet with mean 12 and SD 3 hours. Assuming that the data to be normally distributed, what percentage of battery cells are expected to have life

(i) more than 13 hours   (ii) less than 5 hours   (iii) between 9 and 14 hours.

Value of Z	0.333	2.333	1	0.667
Area	0. 1293	0.4901	0.3413	0.2486

24. (a) X is a normally distributed variable with Mean $\mu= 30$ and standard deviation $\sigma = 4$. Find (a) P $(X < 40)$ (b) P $(X > 21)$ (c) $30 < X < 35)$

Value of Z	2.5	2.25	1.25
Area	0.4938	0.4878	0.3944

(OR)

(b) Determine the equation of a straight line which best fits the following data.

Year	2000	2001	2002	2003	2004
Sales (Rs' 000)	35	36	79	80	40

Compute the trend values for all years from 2000 to 2004.

25.(a) Using the following data, Construct fisher's Ideal index and show how it satisfies Factor Reversal Test and Time Reversal Test?

Commodity	Price in Rupees per unit		Number of units	
	Base year	Current year	Base year	Current year
A	6	10	50	56
B	2	2	100	120
C	4	6	60	60
D	10	12	50	24
E	8	12	40	36

(OR)

(b) From the following data, calculate the trend values using four yearly moving averages.

Year	1990	191	1992	1993	1994	1995	1996	1997	1998
Sales	506	620	1036	673	588	696	1116	738	663