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B1N18093 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2018

BSTAT(PSY1)(C01) – Psychological Statistics

(2017 Admission onwards)

Max. Time: 3 hours Max. Marks : 80

PART-A

Answer ***all*** questions. Each question carries ***one*** mark

1. The data collected by a psychologist from the patients for his own research is a
   a) Primary data b) Secondary data
   c) Experimental data d) Hospital records
2. The intersecting point of less than ogive and greater than ogive gives
   a) Arithmetic Mean b) Median
   c) Mode d) Geometric mean
3. The Harmonic Mean of 5 and 20 is
   a)5 b) 7
   c) 8 d) 12.5
4. Which of the following is a positional average?
   a) Arithmetic mean b) Median
   c) Geometric mean d) Harmonic mean
5. Which one of the following is a correct relation.
   a) GM = AM X HM b) AM = GM X HM
   c) AM^2 = GM X HM d) GM^2 = AM X HM
6. If the average IQ of 5 boys is 90 and that of 10 girls is 120, what is the average IQ of all the 15 students
   a) 90 b) 100
   c) 105 d) 110
7. If the mark obtained for 10 students in Psychology paper is same the standard deviation of marks will be .....
8. Let the Arithmetic Mean (AM) of 5 observation is 100 if all observations are increased by 10, the AM of new set of data will be .....
9. The median of 3, 7, 5, 6, 2, 9, 3, 9, 1, 4 is .....
10. The difference between maximum value and minimum value of a set of data is known as .....
11. The average of squared deviation of observations from arithmetic mean is knows as .....
12. The value of the observation which divides the frequency curve into two equal parts is called as .....

(12 x 1= 12 Marks)

PART-B

Answer any *seven* questions. Each question carries *two* marks.

13. Distinguish between continuous and discrete data.
14. Define Histogram
15. Distinguish between Arithmetic mean and Geometric mean
16. List out any two limitations of Arithmetic mean.
17. Define Quartile Deviation
18. Distinguish between Deciles and Percentiles.
19. Define Coefficient of Variation
20. If 10, 20, 30, 40, 50, are the observations, what is the coefficient of range
21. Define Skewness
22. What do you mean by Kurtosis.

(7 x 2= 14 Marks)

PART-C

Answer any *six* questions. Each question carries *five* marks.

23. What is a questionnaire? What are the characteristics of a good questionnaire used for statistical data collection?
24. What is a histogram? How it is constructed?
25. Explain various measures of dispersion
26. Calculate the standard deviation and coefficient of variation for the following data.

x_i:	6	12	18	24	30	36	42
f_i :	4	7	9	18	15	10	5

27. What is frequency polygon? How it is different from frequency curve?
28. Write a note on relative advantages of Arithmetic Mean Median and Mode?
29. Explain how to compute combined mean and combined variance
30. Calculate Quartile Deviation for following data

Class	:	0-10	10-20	20-30	30-40	40-50
Frequency :		8	15	24	21	12

(5 x 6= 30 Marks)

PART-D

Answer any *three* questions. Each question carries *eight* marks.

31. Following table gives scores of a psychological test and number of persons corresponding to the score.

Score :	0 - 10	10 - 20	20 – 30	30 – 40	40 – 50	50 - 60	60 - 70
Persons	2	4	6	8	5	3	2

Draw ogives of the data and hence find the median. Also verify the result by computation.

32. Find the mean, ,median and mode of the following distribution.

Less than	:	10	20	30	40	50
Frequency	:	5	8	15	21	25

33. Explain the various measures of dispersion.
34. Following table gives Goals scored by two colleges A and B in a football season

No. of Goals	No. of matches	
	College A	College B
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

Which college can be considered more consistent in its performance?

35. Classify frequency curves based on their asymmetry. Explain Pearson's and Bowly's methods for measuring skewness with an example

(3 x 8= 24 Marks)

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B1N18100 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Statistics Degree Examination, November 2018

BSTA1B01 – Basic Statistics & Probability

(2017 Admission onwards)

Max. Time: 3 hours Max. Marks : 80

Part A
(Answer all questions; each question carries 1 mark)

Fill in the blanks (Questions 1-7)

1. The 50^{th} percentile of any frequency distribution is always equal its median: .....(True/False)
2. If the variance of a given frequency distribution is 25, then its standard deviation is ....
3. If the two regression lines in a bivariate data are perpendicular to each other, then the value of correlation coefficient is .....
4. Two variables are said to be positively correlated, if their values move in the ..... direction.
5. Any subset of a sample space of a random experiment is called .....
6. If A and B are two disjoint events, then P(A/B) = ...
7. The classical definition of probability was introduced by ...

Multiple Choice Questions (Questions 8-12)

8. The value of median of the observations : 4, 5, 3, 8 is
   (a) 3 (b) 4 (c) 5 (d) None of these
9. If A and B are two events of a random experiment with P(A) = 0.4 and P(B) = 0.3, then the probability of the sample space is
   (a) 0.7 (b) 0.1 (c) 1 (d) None of these.
10. Which among the following is an exponential equation?
    (a) $Y = a + bX$ (b) $Y = ab^x$ (c) $Y = a + bX + cX^2$ (d) None
11. If mean and median of a frequency distribution are 20 and 28 respectively, then the Distribution is
    (a) Negatively skewed (b) Positively skewed
    (c) Symmetric (d) Normal
12. If A and B are two events such that P(A) = 0.4, P(B) = 0.6, P(AUB) = 0.8, then P(A/B) is
    (a) 4/3 (b) 2/3 (c)1/3 (d) 1/2

(12x1=12 Marks)

Part B
(Answer any seven questions; each question carries 2 marks)

13. Define geometric mean and mention any one merit of it.
14. Define kurtosis and give a formula for measuring it.
15. Define Karl Pearson's correlation coefficient.
16. Define partial correlation and give the formula of partial correlation coefficient in the case of three variables.
17. Define (i) Disjoint events and (ii) Independent events
18. State the axiom of certainty and the axiom of additivity
19. Specify the conditions to be satisfied by a probability mass function.

20. Define the cumulative distribution function of a random variable.
21. Let X be a continuous random variable with probability density function

$$f(x) = k, \quad -2 \le x \le 2$$
$$0, \quad \textit{otherwise}.$$

Determine k.

(7x2=14 Marks)

Part C
(Answer any six questions; each question carries 5 marks)

22. Find the C.V. of a frequency distribution, given that its mean is 120, mode is 123 and Pearson's coefficient of skewness is -0.3.
23. Find the mean and variance of first n natural numbers.
24. Fit a straight line to the following data.

X	1	2	3	4	5
Y	6	8	12	14	18

25. In a tri variate distribution $r_{12} = 0.7$, $r_{13} = 0.5$ and $r_{23} = 0.5$. Find (i) $r_{12.3}$ and (ii) $R_{1.23}$
26. State and prove the multiplication theorem of probability.
27. The contents of urns 1, 2 and 3 are as follows.
    1 white, 2 black and 3 red balls
    2 white, 1 black and 1 red balls, and
    4 white, 5 black and 3 red balls.
    One urn is chosen at random and two balls are drawn from it. They happen to be white and red. What is the probability that they come from urn 3?
28. A continuous random variable X follows the probability law:
    $f(x) = kx^2$, $0 < x < 1$.
    Find (i) the value of k (ii) Probability that X lies between 0.2 and 0.5, and (iii) Probability that $X > \frac{3}{4}$ given $X > \frac{1}{2}$.
29. Suppose that X has p.d.f. : $f(x) = 2x$, $0 < x < 1$. Find the p.d.f. of $Y = 3X + 1$.

(6x5=30 Marks)

Part D
(Answer any three questions; each question carries 8 marks)

30. Explain the various measures of dispersion.
31. Given the following information:
    Regression equations: $8X - 10Y + 66 = 0$, $40X - 18Y - 214 = 0$, Variance of $X = 9$.
    Find (i) the mean values of X and Y (ii) the correlation coefficient between X and Y, and (iii) the standard deviation of Y.
32. (i)Define conditional probability and independence of events.
    (ii) A box contains 6 red, 4 white and 5 black balls. If 4 balls are drawn at random what is the probability that among the balls drawn there is at least one ball of each colour.
33. (i) Give the classical definition of probability
    (ii) State and prove Bayes' theorem
34. A random variable X has the following distribution:

X	0	1	2	3	4	5	6	7	8
p(x)	k	3k	5k	7k	9k	11k	13k	15k	17k

Find (i) the value of k (ii) $P(X < 3)$ (iii) $P(X \ge 3)$ (iv) $P(0 < X \le 5)$

(3 x 8=24Marks)

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1N18101 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Mathematics Degree Examination, November 2018

BSTA1C01 – Basic Statistics & Probability

(2017 Admission onwards)

ax. Time: 3 hours Max. Marks : 80

PART A

Answer all question each question carries one mark

1 Which among the following is a measure of positional average
a) A.M b) G.M c) H.M d) Median

2 What is the G.M of 2,4,8
a) 4 b) 6 c)5 d)7

3 If a constant value 5 is subtracted from each observation of a set, the variance is
a) reduced by 5 b) reduced by 25 c)unaltered d) increased by 25

4 The mean and standard deviation of a set of values are 25 and 5 respectively, if a constant 5 is added to each value the coefficient of variation of the new set of values is
a)250 percent b) 600 percent c)20 percent d) 16.6 prcent.

5 Which of the following measure of dispersion can attain a negative value
a)S.D b) M.D c)Range d) variance.

6 Which measure of dispersion is least affected by extreme values
a)Range b) M.D c) SD D)Q.D

7 The term regression was introduced by
a)R.A Fisher b)Sir Francis Galton b) Karl Pearson c) None of the above

8 If the correlation coefficient is zero, the two lines of regression are at an angle of .....

9 Correlation coefficient is ..... of regression coefficients

10 Mathematical probability cannot be calculated if the outcomes are.....

11 For the events A,B and C P(AUB/C)=.....

12 regression coefficient b_{yx} is .....of the regression line of y on x.

(12x1=12 Marks)

PART B

Answer any seven questions each question carries two marks

13 What are the demerits of Arithmetic Mean?

14 What is the difference between absolute and relative measures of dispersion?

15 What is coefficient of variation and its importance?

16 How can the variance of the combined set of two series be computed.

17 If for a moderately skewed distribution has mean 30 and median 32, find mode.

18 What do you understand by fitting of regression equation?

19 If r_{12} =a , r_{13}= b, r_{23}=c find $r_{12.3}$.

20 What is the probability that both numbers exceed 4 in the toss of two fair dice.

21 A pair of fair dice is thrown. Find the probability p that the sum is 10 or more if 5 appear on the first die.

(7x2=14 Marks)

PART C

Answer any six questions each question carries five marks

22 Find mean deviation from mean and standard deviation of A , a, a+d, a+2d.....a+2nd.

23 you are given the following data

	x	y
Arithmetic Mean	36	85
Standard Deviation	11	8

Correlation coefficient between x and y is 0.66. Find the two regression equations , and estimate the value of x when Y=75

Part-B

[Answer *any 7* Questions. Each question carries 2 marks]

13. Define effective rate of discount.
14. What is meant by perpetuity?
15. If i=8%, calculate $i^{(4)}$.
16. Calculate $\bar{s}_{7|}$ at 4.5% p.a.
17. How much money is needed to endure a series of lectures costing Rs.3000 at the beginning of each year for 5 years, if money is worth 5% compounded annually.
18. Calculate $a_{8|}$ at i=7%.
19. Find I, If P=127.12, R=125, i=7.75% and n=10.
20. Prove that $\bar{s}_{n|} = \frac{(1+i)^n - 1}{\delta}$
21. What you meant by accumulated value?

(7x2=14 Marks)

Part-C

[Answer *any 6* Questions. Each question carries 5 marks]

22. Derive an expression for the accumulated value of an annuity due.
23. Arrange the following in order of magnitude (lowest first) according to the equivalent effective rate of interest.
    a) A rate of discount of 6%p.a.
    b) A force of interest of 6% p.a.
    c) A nominal rate of interest of 6%p.a. convertible every two year
    d) A nominal rate of discount of 6%p.a convertible quarterly
24. a) Write a note on principal of consistency.

    b)Explain commercial rate of discount.

25. Rent on a property is payable continuously for 7 years. The rent in the first year is Rs.5000, there after the annual rent increases by Rs.300 p.a. Calculate the present value of the rent at the start of 7 years, using an annual effective rate of interest of 6%.
26. Calculate the present value at time 0 of payments of Rs.600 at time 0, Rs. 700 at time 1, Rs.800 at time 2 and so on. The last payment is at time 8. Assuming that annual effective rate of interest is 6%.
27. Calculate the accumulated value of Rs.6.34, assuming a force of interest of 9% p.a., after
    i. 3 months
    ii. 3 years
    iii. 7 years and 5 days.

28. Find the present value as at 1 January 2008 of a series of 15 annual payments starting at Rs.700 on 1 January 2009 and increasing by Rs.150 each year. Assume an effective rate of interest of 7% p.a.

29. Find the accumulated value of a payment stream $\rho(t) = 4 + 0.5t$, that is received continuously from time 0 to 8 during which the force of interest is

$$\delta(t) = 0.04 + 0.005t, 0 \leq t \leq 8$$

(6x5=30 Marks)

Part-D

[Answer *any 3* Questions. Each question carries 8 marks]

30. Derive the expression for

    i. The accumulated value of an immediate annuity, at the end of n years with annuity payments payable 'p' times in a period.

    ii. Present value of a deferred annuity immediate.

31. A loan of Rs.6000 is repayable over 5 years by level quarterly installments calculated using a rate of interest of 5% per annum effective.

    a) Calculate the amount of each quarterly installment.

    b) What is the capital content of the sixth repayment?

    c) How much interest is paid in the second year?

    d) Determine when the amount of loan outstanding falls below Rs.1000.

32. A person wants to construct a building a building, for which he takes out a loan for Rs.600000 for 12 years. The effective rate of interest on his loan is 10% per annum, and the repayments towards the loan are to be made monthly in arrears.

    i) What is the monthly repayment towards his loan?

    ii) What is the interest amount payable in the fifth year?

    iii) What is the capital amount repaid in the 40th installment?

    iv) Determine when the amount of loan outstanding falls below Rs.100000.

33. The force of interest is given by

$$\delta(t) = \begin{cases} 0.04 + 0.002t, & 0 \leq t < 10 \\ 0.015t - 0.08, & 10 \leq t < 12 \\ 0.07 \quad , & t \geq 12 \end{cases}$$

    a) Find the expression for the accumulation factor from time 0 to t.

    b) Calculate the accumulation of Rs.150 from time t=0 to t=12

34. Assuming a rate of interest of 7% per annum, calculate the present value as at 1 January 2004 of the following annuities, each with a term of 25 years:

i. An annuity payable annually in advance from 1 January 2005, initially of Rs.3000 per annum and increasing by Rs.500 per annum on each subsequent of 1 January.

ii. An annuity as in part (i), but only 10 increases are to be made, the annuity then remaining level for the remainder of the term.

(3x8=24 Marks)