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B2M19100 (Pages : 3) Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Psychology Degree Examination, March /April 2019

BSTAT(PSY2)C02 – Psychological Statistics

(2018 Admission onwards)

Time: 3 hours Max. Marks : 80

PART-A

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

1. The correlation coefficient +1 indicates ....relationship between two variables.
2. The correlation coefficient is.... of the unit of measurement.
3. If each observation in X is increased by 5 and each observation in Y series are divided by 10, and if the old correlation is 0.5, the value of the new correlation coefficient is...
4. The formula for the regression coefficient of Y on X is.......
5. If A and B are independent events, then P(AB) = ...
6. The square of correlation coefficient is the product of.....
7. The regression coefficients are ...... by change of origin.
8. If one regression coefficient is greater than 1, the other will be.....
9. The classical definition of probability has been proposed by........
10. A variable which takes an infinite number of values over an interval is termed as a.....variable.
11. P (A/B) is not defined when .....
12. The formula for multiple correlation coefficient $R_{1.23}$ is... ....

(12 x 1= 12Marks)

PART-B

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

13. Define mutually exhaustive events .Give example.
14. What is meant by conditional probability? Give example.
15. Give the classical definition of probability.
16. What are the uses of rank correlation?
17. Distinguish between simple correlation and partial correlation ?

18. Why there are two regression lines?

19. How do you interpret the sign of correlation coefficient?

20. If the $\Sigma x = 56$, $\Sigma x^2 = 524$, $\Sigma xy = 364$, $\Sigma y = 40$, $n = 8$, find the regression coefficient of Y

21. Explain the concept of multiple regression.

(7 x 2= 14 Marks

PART-C

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

22. From the following two regression equations, find the correlation coefficient and means of the two series. 2X+18Y-326=0, X+2Y-33=0.

23. If the letters of the word REGULATIONS are arranged at random, what is the cha that there are exactly 4 letters between R and E?

24. State and prove the addition theorem in probability for two events.

25. Obtain the regression equation of Y on X from the data given below.

X	10	16	15	19	26	11	18
Y	60	64	56	57	58	58	43

26. How do you use scatter diagram to have an idea about correlation?

27. What are difference between correlation and regression?

28. A random variable has p.m.f f(x) =kx, when x=1,2,3,4,5. Determine the value of k a compute P(X >= 3).

29. *Given* $r_{12} = 0.93, r_{13} = 0.94, r_{23} = 0.95$, calculate $r_{12.3}$ and $R_{2.13}$.

(6 x 5= 30 Marks)

PART-D

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

0. Calculate rank correlation coefficient for the data given below.

X	100	100	112	114	120	123	124	123	124	131
Y	75	73	75	76	76	82	75	83	68	80

1. A researcher collected the following data during the course of his study.

Dependent Variable X_1	Independent Variable X_2	Independent Variable X_3
$M_1 = 78$	$M_2 = 19.7$	$M_3 = 55$
$sd_1 = 16$	$sd_2 = 12$	$sd_3 = 10$
$r_{12} = 0.7$	$r_{13} = 0.8$	$r_{23} = 0.5$

Set up the multiple regression equation for predicting the value of dependent variable for the given values of both the independent variables.

32. Give the three different approaches to define probability by pointing out each one's advantages and disadvantages.

33. A problem in Statistics is given to 3 students A,B, and C. Their respective chances of solving the problem are 1/3 ,1/4and 1/5 respectively. Find the chance that the problem is solved. Find the chance that only A solves the problem. Find also the chance that exactly two of them solve the problem.

34. a) From the following probability mass function determine k and $P(X>2)$.

X:	-3	-1	0	2	3
P(X=x):	0.2	0.2	0.3	k	0.2

b) Write down the distribution function.

(3 x 8= 24 Marks)

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B2M

106 (Pages : 3) Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Statistics Degree Examination, March /April 2019

BSTA2B02 – Probability Distributions

(2018 Admission onwards)

Time: hours Max. Marks : 80

Part A

(Answer all questions; each question carries 1 mark)

Fill in the blanks

1. If X and Y are two independent random variables, then f(x,y) = ...
2. The distribution for which mean and higher order moments does not exist is ....
3. Standard normal distribution is symmetric about ....
4. The relationship between Beta distribution of the first kind and second kind is ....

State true or false

5. If X is a r.v with mean μ, then $E(X - \mu)^r$ is called the r^{th} raw moment.
6. Moment generating function of a r.v always exists.
7. For any two random variables, $(E(XY))^2 \leq E(X^2)\,E(Y^2)$.

Choose the correct answer

8. $E(X-k)^2$ is minimum when
(a) $k < E(X)$ (b) $k > E(X)$ (c) $k = 0$ (d) $k = E(X)$
9. For any distribution, which of the following is true?
(a) $\mu_{02} = \mu_{20}$ (b) $\mu_{11} = \mu_{22}$ (c) $\mu_{10} = \mu_{01}$ (d) $\mu_{12} = \mu_{21}$
10. If X is a r.v with pdf f(x), then E(X) is called ....
(a) A.M (b) G.M (c) H.M (d) Median
11. If $\mu_{11} = 4$, $\mu_{20} = 2$ and $\mu_{02} = 10$ are the bivariate central moments of the two random variables, then correlation coefficient of X on Y is
(a) 0.2 (b) 0.4 (c) 2 (d) None of these
12. Continuous distribution which lacks memory is ....
(a) Gamma (b) exponential (c) uniform (d) pareto

(12x1=12 Marks)

Part B

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

13. Define mathematical expectation of a random variable.
14. The joint pdf of (X, Y) is given by f(x,y) = kxy, 0<x,y<1. Find k.
15. Define marginal and conditional probability density function.
16. Define probability generating function of a r.v
17. If X and Y are independent random variables, show that $M_{x+y}(t) = M_x(t).M_y(t)$..
18. Define convergence in probability.
19. A r.v X has uniform distribution over (-3,3). Compute P $(|X-2|<2)$.
20. Define gamma distribution.
21. If X and Y are independent random variables, show that Cov (X, Y) = 0.

(7x2=14 Mar

Part C

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

22. If f(x,y) is the joint pdf of (X,Y) and a and b are real numbers, derive the expression for V (aX + bY).
23. If f(x,y) = 4x(1-y), 0<x<1, 0<y<1 is the joint pdf of (X,Y), examine whether X and Y are independent.
24. A man wins a rupee for head and looses a rupee for tail when a coin is tossed. Suppo that he tosses once and quits if he wins but tries once more if he loses on the first tos: What is his expected winning?
25. Derive the mgf of the gamma distribution and hence obtain the mean and variance.
26. X follows Poisson law such that P(X=1) = P(X=2). Find the mean and variance. Also find P(X=4).
27. Give the properties of normal distribution.
28. State and prove the 'lack of memory' property of the geometric distribution.
29. State and prove Bernoulli's law of large numbers.

(6x5=30 Marks)

Part D

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

30. i. State and prove weak law of large numbers.

    ii. If $\{X_n\}$ is a sequence of independent random variables such that $P\left(X_n = \frac{1}{\sqrt{n}}\right) = p_n$, $P\left(X_n = 1 + \frac{1}{\sqrt{n}}\right) = 1 - p_n$. Examine whether weak law of large numbers is applicable to $\{X_n\}$.

31. Derive the central moments of all orders for the normal distribution. Obtain the recurrence relation for the even order central moments.

32. The joint probability distribution of two random variables X and Y is given by $P(X = 1, Y = -1) = \frac{1}{3}$, $P(X = 0, Y = 1) = \frac{1}{3}$, and $P(X = 1, Y = 1) = \frac{1}{3}$. Evaluate the correlation between X and Y.

33. Establish the recurrence formula for central moments of the Binomial distribution. Hence obtain the expression for the first four central moments.

34. Let two independent random variables and Y have the same geometric distribution. Show that the conditional distribution of X given X + Y = n is uniform.

(3x8=24 Marks)

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M19107 (Pages : 3) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Mathematics Degree Examination, March /April 2019

BSTA2C02 –Probability Distributions

(2018 Admission onwards)

e: 3 hours Max. Marks : 80

Part A

Answer all questions.

Each question carries one mark.

ltiple Choice questions

The product moment μ_{11} of a bivariate distribution is called

(a)coefficient of variation (b) coefficient of determination

(c) covariance (d) none of the above

2. If E(X) = 4 , E(Y) = 5 and if X and Y are independent E(2XY) =..........

(a) 90 (b) 40 (c) 80 (d) 18

The points of inflexion of the normal curve are

(a) $\mu \pm \sigma$ (b) $\mu \pm 1$ (c) $\mu \pm 3\sigma$ (d) $\mu \pm 3$

A binomial distribution (n,p) has n =20, p = 1/6 then the distribution is ....

(a)positively skewed (b) negatively skewed (c)symmetric (d) normal

ll in the Blanks

. If X and Y are independent ~~random variab~~les then cov(X,Y) =...

. X is the number shown when a fair die is tossed then X follows .... distribution.

Let the joint p.d.f of two random variables X and Y is

$f(x,y) = 2e^{-x-y}, 0 < X < Y, Y > 0$. The marginal probability function of X is ....

. For aBinomial distribution mean =4 and variance = 4/3 then P(X=0) = ...

. If X is a random variable then $E(e^{tX})$ is known as ....

0. If X_1 and X_2 are independent standard normal variates then $E(X_1 - X_2)^2$ is.......... .

1. The variance of discrete uniform distribution over the range (1,11) is ____________ .

2. Normal distribution was discovered by ....

(12x1=12 Marks)

Part B

Answer any seven questions.

Each question carries two marks.

13. Define Mathematical Expectation.
14. State any four properties of moment generating function
15. Define conditional mean?
16. $E(X) = a$, $E(X^2) = b$, $E(X^3) = c$. Find the third central moment of X?
17. Define discrete Uniform distribution and find its mean?
18. State and prove additive property of two Binomial random variables.
19. Define Pareto Distribution.
20. Find the moment generating function of Geometric distribution?
21. State Bernoulli law of large numbers

(7x2=14 Marks)

Part C

Answer any **six** questions.

Each question carries **five** marks.

22. Derive the relation between raw moments and central moments.And find the first four central moments using this relation?
23. Let $f(x,y)= 2/3(1+x)e^{-y}, 0<X< 1, Y>0$ .Check whether Xand Y are independent?
24. If $f(x,y) = 2, 0<x<1, 0<y<x$ find the conditional distribution of X given $Y = 1$ and that of Y given $X = 2$
25. Derive the recurrence relation for central moments of Binomial distribution.
26. Obtain the moment generating function of Poissonl distribution and hence find mean and variance?
27. For a Normal distribution show that mean, median and mode coincide?
28. Define Exponential distribution. Obtain mean, variance and moment generating of the same.
29. A symmetric die is thrown 600 times. Find the lower bound for the probability of getting 80 to 120 sixes?

(6x5=30 Marks)

Part D

Answer any three questions.

Each question carries eight marks.

t $f(x,y) = x+y, 0<x<1, 0<y<1$. Find correlation coefficient.

termine the first four moments of a random variable whose moment generating nction is $(1-t)^{-3}$

)Define standard normal distribution

)State and prove limiting relation between Binomial and Poisson distribution.

) State and prove Lindberg-Levy CLT.

)State the conditions and prove that B.D $\rightarrow$ Normal distribution.

erive Chebyshev's inequality and use it to derive the weak law of large numbers.

(3x8=24 Marks)

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2M19108 (Pages : 3) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Statistics Degree Examination, March /April 2019

BASC2C02 –Life Contingencies

(2018 Admission onwards)

ime: 3 hours Max. Marks : 80

PART-A

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

1. The curtate future life time of (x) is denoted by ....

   a) S(x) b) K(x) c) T(x) d) f(x)

2. If $F(x) = \frac{x}{120}$, $0 \le x \le 120$, then $f(x)$ is ...

   a) $\frac{x}{120}$ b) 1 c) $1 - \frac{x}{120}$ d) 1/120

3. $S_{(0)}$ is equal to

   a) -1 b) F(0) c) 0 d) 1

4. If $S(x) = 1 - \frac{x}{100}$, $0 \le x \le 100$, then, $\mu(x) = \cdots$.

   a) $\frac{1}{100-x}$ b) $\frac{x}{100}$ c) $\frac{2}{100}$ d) none of these

5. Choose the correct notation for the n- year deferred whole life annuity due.

   a) $n/\ddot{a}_x$ b) n/A_x c) $n/\bar{a}_x$ d) $n/\bar{A}_x$

6. The simplest life insurance contract is ....

7. The amount either as a lump sum or as a series of payments provided by the insurance company is called ....

8. A .... is a contract to pay a benefit if and when the policy holder is diagnosed as suffering from a particular disease

9. Events that depend upon the order in which the lives die are called ....

10. Find a_{65} using (PFA92C20 at 5%).

11. A population is subject to a constant force of mortality 0.01. Calculate the probability that a life aged 20 will die before age 22.

12. Calculate the value of e_{60}^{0} using AM92 ultimate mortality table.

(12 x 1= 12Marks)

PART-B

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

13. Define ${}_tP_{xy}$
14. Define Survival Function.
15. Calculate the probability that a 55 year old dying between ages 68 and 70.
16. Prove that $\mu(x) = \frac{-1}{l_x}\frac{dl_x}{dx}$.
17. Prove the identity $\delta\bar{a}_x + \bar{A}_x = 1$.
18. Define joint life status.
19. Define n-year deferred whole life annuity due.
20. Calculate ${}_4P_{30}$ and ${}_2q_{40}$ from AM92 ultimate mortality at 5% interest.
21. Using the ELT15(males) life table, calculate the probability of 42 year old dying between ages 60 and 65

(7 x 2= 14 Mark

PART-C

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

22. On the basis of life table, evaluate the probability that (30) will:
    a) Live to 80
    b) Die before 60
    c) Die in the tenth decade of life.
23. Write a note on Analytical Laws of Mortality.
24. Prove that $\ddot{a}_x = \sum_{k=0}^{\infty} v^k {}_kP_x$
25. Explain n-year pure endowment insurance.
26. a)A population with limiting age 100 has the following survival function:

    $${}_tP_0 = (1 - \frac{t}{100})^{1/2}, \text{ for } 0 \le t \le 100$$

    Calculate the complete expectation of life at age 50

    b) Prove that $L_x = \int_0^1 l_{x+t}\,dt$
27. Prove that ${}_nq^1_{xx} = \frac{1}{2}{}_nq_{xx}$
28. Explain n-year temporary life annuity.
29. Explain whole life immediate annuity.

(6 x 5= 30Marks)

PART-D

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

30. Explain n year Endowment Assurance contract. Find its Mean and Variance.

31. Derive the relationship between insurance payable at the moment of death and the end of the year of death.

32. Calculate the following using AM92 ultimate mortality

    i. ${}_3P_{40:38}$

    ii. $q_{70:60}$

    iii. $\mu_{35:29}$.

    iv. $P_{35:68}$

    v. ${}_4q_{\overline{60:60}}$

33. A life insurance company issues a joint life annuity to a male, aged 66, and female, aged 67. The annuity of Rs.10000 per annum is payable annually in arrears and continues until both lives have died. The Insurance company values this benefits using PFA92C20 mortality (males or females as appropriate) and 5% p.a. interest.

    i. Calculate the expected present value of this annuity.

    ii. Derive an expression for the variance of the present of this annuity in terms of appropriate single and joint-life assurance functions.

34. Explain the following :

    a) Present values of joint life and last survivor assurance.

    b) Present values of joint life and last survivor annuities.

(3 x 8= 24Marks)