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| |  |  |  | | --- | --- | --- | | https://kp.christuniversity.in/KnowledgePro/images/01.gif |  | https://kp.christuniversity.in/KnowledgePro/images/03.gif | |  | |  | | --- | | **CHRIST (Deemed to be University),Bengaluru - 560029** | | **Questions View-II Semester** | | **Subject : STA231(STATISTICAL METHODS)** |  |  |  | | --- | --- | | **U1--Introduction to Variables and Generating functions** | | |  | **U1-T1-S1--: Discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations of random variables and its properties, expectation of random variable and its properties.** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 1 | Define joint distribution function. How do you define independence in terms of distribution functions? | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 2 | If X and Y are bivariate random variables, examine their joint distribution function when (i) X is discrete, (ii) X is continuous. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 3 | Explian joint probability distribution and marginal probability function in case of discrete and continuous random variable. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 4 | Explain independence in terms of probability distribution of discrete and continuous random variables. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | |  | **U1-T2-S1--Moments and cumulants, moment generating function, cumulants generating function and characteristic function. Transformation in univariate and bivariate distributions. Bivariate probability distributions; marginal and conditional distributions; independence of variates** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 5 | Explain the terms (i) conditional distribution and (ii) conditional expectation. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 6 | Formulate an expression for variance of a linear combination of independent random variables. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 7 | Define conditional probability function of X given Y. Give the formula for conditional expectation. | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 8 | Define expectation. Give an two properties of expectation. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | |  | **U1-T3-S1--6 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 9 | Check whether the following function is a valid probability density function. Also examine the independence of Y1 and Y2.https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image010.png | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 10 | Check whether the following is bivariate probability function. https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image005.pngCheck for independence of Y1 and Y2. | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 11 | Find the distribution function of the random variable whose pdf is given by: f(x) = 3x2, 0<x<1.  Also obtain the expected value of X. | 6.0 | Simple (Remembering/Understanding) | Application |  |  | | 12 | Suppose that a radioactive particle is randomly located in a square with sides of unit length. That is, if two regions of equal area are considered, the particle is equally likely to be in either region. Let https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image001.pngand https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image002.pngdenote the coordinates of the particle’s location. A reasonable model for the relative frequency histogram for https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image001.pngand https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image002.pngis the bivariate analogue of the univariate uniform distribution:  https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image003.png  Obtain F(0.2, 0.4), https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/62285ed04ce55c8c296e0d61f4b89222/0361d17238b78e1870337ef64f64c93b_files/image004.png. | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 13 | Determine the distribution function for the following probability density function. https://kp.christuniversity.in/KnowledgePro/Files/EWordConverter/cae0a8e3f99241e57636cb6339a4bd8a/a15ff4fc13b6845aa8a545eb1169a853_files/image001.png | 6.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | |  | **U1-T4-S1--10 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 14 | The joint probability density function of a two dimensional random variable is given by, (*f*(*x*, *y*) = 2, for 0<*x*<1, 0<*y*<*x*,  *f*(*x*, *y*) = 0 *Otherwise*  (i) Obtain marginal density function of X and Y. (ii) Evaluate the conditional density function of X given Y and Y given X.  (iii) Check for the independence of X and Y. (iv) Also obtain P(X<1, Y<3) | 10.0 | Complex(Evaluating/Creating) | Application |  |  | | 15 | If X and Y are two random variables having joint density function: *f*(*x*,*y*)= 18(6−*x*−*y*), 0≤*x*<2, 2≤*y*<4, *f*(*x*,*y*)=0 *Otherwise*.  Find (i) the marginal distributions of X and Y (ii) P(X<1, Y<3).  (iii) conditional distributions of X/Y and Y/X. (iv) P(X<1/Y<3). | 10.0 | Simple (Remembering/Understanding) | Problem oriented |  |  | | 16 | Let X and Y be two random variables each taking values -1, 0 and 1 with given the joint probability distribution.   |  |  |  |  | | --- | --- | --- | --- | | X  Y | -1 | 0 | 0 | | -1 | 0 | k | k | | 0 | 2k | 2k | 2k | | 1 | 0 | k | k |   (i) Compare the expectations of X and Y. (ii) Prove that x and Y are uncorrelated (iii) Find Var(X), Var(Y) and V(Y/X=-1)  (iv)Identify the conditional probability distribution of X given Y=0. | 10.0 | Medium (Applying/Analysing) | Problem oriented |  |  | | 17 | For a bivariate distribution with the following pmf evaluate k, calculate marginal pmf, conditional distribution of X/Y and correlation coefficient.   |  |  |  |  | | --- | --- | --- | --- | | X  Y | 1 | 3 | 9 | | 2 | 1/8 | 1/12 | k | | 4 | 1/4 | 1/4 | 0 | | 6 | 1/8 | 1/24 | 1/12 | | 10.0 | Medium (Applying/Analysing) | Application |  |  | | |  | **U1-T5-S1--10 marks 2** | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 18 | Find the missing probability in the following distribution and then compute E(X) and V(X). Also find E(3X), V(6X), E(7X+6) and V(5X)   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 0 | 1 | 2 | 3 | 4 | | P(X) | 3/8 | 1/4 | ? | 3/16 | 1/16 | | 10.0 | Simple (Remembering/Understanding) | Application |  |  | | 19 | (a) Identify the value of k given the following probability distribution and then obtain its mean and variance.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 2 | 4 | 6 | 8 | 10 | | P(x) | 1/12 | k | 1/3 | 1/4 | 1/6 |   (b) A man wins if he gets 5 on a single throw of a die, he loses if he gets 2 or 4, If he wins he gets Rs. 50/-, if he losses he gets Rs. 10/- and otherwise he has to pay Rs.15/-. Obtain his expected gain and standard deviation. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | 20 | (a) For the following probability distribution evaluate the following:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | | P(x) | 0.001 | 0.01 | 0.1 | ? | 0.1 | 0-01 | 0.001 |   (i) the missing probability (ii) mean and variance (iii) E(X2 + 3)  (b) An urn contains 7 white balls and 3 red balls. Two balls are drawn together at random, from this urn. Compute the probability that neither of them is white. Also compute the expected number of white balls drawn. | 10.0 | Complex(Evaluating/Creating) | Application |  |  | | 21 | (a) Identify the value of k given the following probability distribution and then obtain its mean and variance.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 2 | 4 | 6 | 8 | 10 | | P(X) | 1/12 | k | 1/3 | 1/4 | 1/6 |   (b) There 100 tickets in lottery. There is one first prize worth Rs.25 and two second prizes worth Rs.10 each.  (i) Obtain the expected prize amount that a particular lottery ticket will fetch. (ii) A lottery ticket is bought for Rs.1.Obtain the expected loss? | 10.0 | Medium (Applying/Analysing) | Application |  |  | | | **U2--Discrete Distributions** | | |  | **U2-T1-S1--Point (or degenerate), binomial, Poisson** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 22 | The mean and variance of a binomial distribution are 4 and 4/3 respectively. Identify the pmf. Identify mode. | 3.0 | Medium (Applying/Analysing) | Problem oriented |  |  | | 23 | Write the experimental conditions under which binomial distribution is used. | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 24 | Explain the underlined conditions for binomial distribution to tend to Poisson distribution. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 25 | Identify the distribution for which (i) mean is greater than variance (ii) mean is equal to variance and (iii) mean is less than variance. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | |  | **U2-T2-S1--Hypergeometric distributions with applications.** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 26 | Identify the situation where the following distributions can be applied. (i) geometric (ii) hyper geometric (iii) negative binomial. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 27 | Identify the situation where the following distributions can be applied (i) binomial, (ii) Poisson, (iii) Geometric | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 28 | Choose the correct distribution and state reasons( Do not solve)  (i) Bob is a high school basketball player. He is a 70% free throw shooter. That means his probability of making a free throw is 0.70. During the season, determine the probability that Bob makes his third free throw on his fifth shot.  (ii) A representative from the National Football League's Marketing Division randomly selects people on a random street in Kansas City, Kansas until he finds a person who attended the last home football game. Let *p*, the probability that he succeeds in finding such a person, equal 0.20. And, let *X* denote the number of people he selects until he finds his first success. Evaluate the probability that the marketing representative must select 4 people before he finds one who attended the last home football game. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 29 | Suppose that a researcher goes to a small college with 200 faculty, 12 of which have blood type O-negative. She obtains a simple random sample of of the faculty and finds that 3 of the faculty have blood type O-negative. Is this experiment a hypergeometric probability experiment? List the possible values of the random variable X, the number of faculty that have blood type O-negative. | 3.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | |  | **U2-T3-S1--Geometric, negative binomial** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 30 | Write the p m f of a hyper geometric distribution, explaining each term. State its mean and variance. | 3.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | 31 | Draw 6 cards from a deck without replacement. Evaluate the probability of getting two hearts Identify the distribution is this. | 3.0 | Medium (Applying/Analysing) | Problem oriented |  |  | | 32 | Choose three examples where hyper-geometric distribution can be applied. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 33 | Identify the parameter and hence find the mode of a Poisson distribution if P(X=5) = 8 P(X=4). | 3.0 | Medium (Applying/Analysing) | Analytical |  |  | | |  | **U2-T4-S1--6 marks 1** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 34 | Derive the mgf of a Poisson distribution and hence obtain its mean and variance. | 6.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 35 | Derive the mgf of a binomial distribution and hence obtain its mean and variance. | 6.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 36 | (i) Comment on the following: The mean of a binomial distribution is 6 and variance is 4  (ii) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Identify the pmf.  (iii) The mean and variance of a binomial distribution are 4 and 3 respectively. Obtain the values of the parameters.  (iv) For a B(17, ¼) obtain mode. | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 37 | (i) Comment on the following: The mean of a binomial distribution is 3 and variance is 4  (ii) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Write the pmf.  (iii) The mean and variance of a binomial distribution are 4 and 4/3 respectively. Obtain the values of the parameters.  (iv) For a B(16, ¼) find mode. | 6.0 | Simple (Remembering/Understanding) | Application |  |  | | |  | **U2-T5-S1--6 marks 2** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 38 | An expert sharpshooter misses a target 10 percent of the time.  Identify the probability that she misses the target for the 22nd time in her 10th shot.  Identify the probability that her 22nd miss comes no later than her 1010th shot. | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 39 | Solve the following:  (i) A representative from the National Football League's Marketing Division randomly selects people on a random street in Kansas City, Kansas until he finds a person who attended the last home football game. Let *p*, the probability that he succeeds in finding such a person, equal 0.20. And, let *X* denote the number of people he selects until he finds his first success. Obtain the probability that the marketing representative must select 4 people before he finds one who attended the last home football game.  (ii) A small voting district has 101 female voters and 95 male voters. A random sample of 10 voters is drawn. Obtain the probability exactly 7 of the voters will be female. | 6.0 | Medium (Applying/Analysing) | Problem oriented |  |  | | 40 | Solve the following and mention the distribution used. Justify your answer.  (i) A deck of cards contains 20 cards: 6 red cards and 14 black cards. 5 cards are drawn randomly without replacement. Determine the probability that exactly 4 red cards are drawn?  (ii) An oil company conducts a geological study that indicates that an exploratory oil well should have a 20% chance of striking oil. Obtain the probability that the first strike comes on the third well drilled? | 6.0 | Complex(Evaluating/Creating) | Problem oriented |  |  | | 41 | Solve the following:  (i) An oil company conducts a geological study that indicates that an exploratory oil well should have a 20% chance of striking oil. What is the probability that the first strike comes on the third well drilled?  (ii) A small voting district has 101 female voters and 95 male voters. A random sample of 10 voters is drawn. What is the probability exactly 7 of the voters will be female? | 6.0 | Simple (Remembering/Understanding) | Problem oriented |  |  | | |  | **U2-T6-S1--10 marks 1** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 42 | Derive the mode of Poisson distribution. On the average, two tornadoes hit major U.S. metropolitan areas every year. What is the probability that more than five tornadoes occur in major U.S. metropolitan areas next year? | 10.0 | Simple (Remembering/Understanding) | Application |  |  | | 43 | Explain binomial distribution. Derive the recurrence relation for the moments of Binomial distribution and obtain the coefficients of skewness and kurtosis. Give the criterion for which Binomial distribution is symmetric. | 10.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 44 | Define Poisson distribution. Derive the recurrence relation for the moments of Poisson distribution and obtain the coefficients of skewness and kurtosis. | 10.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | 45 | A pharmaceutical lab states that a drug causes negative side effects in 3 of every 100 patients. To confirm this affirmation, another laboratory chooses 5 people at random who have consumed the drug. Give the distribution and derive the recurrence relation for the moments of this distribution and obtain the coefficients of skewness and kurtosis. | 10.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 46 | Derive the mode of Binomial distribution. Identical computer components are shipped in boxes of 5. About 15% of components have defects. Boxes are tested in a random order. Identify the probability that a randomly selected box has only non-defective components? | 10.0 | Medium (Applying/Analysing) | Application |  |  | | |  | **U2-T7-S1--10 marks 2** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 47 | (a) Derive the mgf of two parameter gamma distribution and hence obtain the mean and variance. Develop the relationship between the mean and variance.  (b) State and prove the additive property of gamma distribution. | 10.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 48 | (a) Derive the mgf of two parameter gamma distribution and hence obtain the mean and variance. Inspect the relation between mean and variance.  (b) The daily consumption of milk in a city, in excess of 20,000 litres, is approximately distributed as a gamma variate with parameters a= 1/10000 and λ = 2. The city has a daily stock of 30,000 litres. Identify the probability that the stock is insufficient on a particular day. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | 49 | (a) Derive the mgf of two parameter gamma distribution and hence obtain the mean and variance. Show the relationship between the mean and variance.  (b) The number of miles that a particular car can run before its battery wears out is exponentially distributed with an average of 10,000 miles. The owner of the car needs to take a 5000-mile trip. What is the probability that he will be able to complete the trip without having to replace the car battery | 10.0 | Simple (Remembering/Understanding) | Application |  |  | | 50 | (a) In a town the duration of shower is exponentially distributed with mean 5 minutes. Identify the probability that  (i) a shower will last between 3 to 8 minutes (ii) a shower will last for 3 more minutes if it has already lasted for 4 minutes.  (b) The daily consumption of milk in a city, in excess of 20,000 litres, is approximately distributed as a gamma variate with parameters a= 1/10000 and λ = 2. The city has a daily stock of 30,000 litres. Identify is the probability that the stock is insufficient on a particular day. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | | **U3--Continuous Distributions** | | |  | **U3-T1-S1--Normal** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 51 | Explain the relationship among QD, SD and MD in a normal distribution. If the standard deviation of a normal distribution is 7 evaluate approximately its mean deviation and quartile deviation. | 3.0 | Complex(Evaluating/Creating) | Descriptive |  |  | | 52 | Identify the relationship among QD, SD and MD in a normal distribution. If the standard deviation of a normal distribution is 10, evaluate approximately its mean deviation and quartile deviation. | 3.0 | Medium (Applying/Analysing) | Problem oriented |  |  | | 53 | Define a standard normal variate and write its p d f and m g f. | 3.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | 54 | Examine any three properties of Normal distribution. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | |  | **U3-T2-S1--Exponential, Beta and Gama distributions with applications.** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 55 | Differentiate Beta first and Second type distribution conditions. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 56 | Define an exponential distribution. Derive its mgf. | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 57 | Explain Gamma distribution of two parameter. | 3.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 58 | Explain beta distribution of first and second kind. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | |  | **U3-T3-S1--6 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 59 | Find the mean deviation of a normal variate. | 6.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | 60 | Derive the mode of a normal variate. | 6.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 61 | Derive the mean deviation of a normal distribution. | 6.0 | Medium (Applying/Analysing) | Conceptual |  |  | | 62 | Give the expression of moment generating function of a normal variate and hence obtain mean. Evaluate the mgf of standard normal variate using that of normal variate. | 6.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | |  | **U3-T4-S1--10 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63 | Explain the steps to find probability in a normal distribution.A large group of students took a test in Physics and the final grades have a mean of 70 and a standard deviation of 10. If we can approximate the distribution of these grades by a normal distribution, determine the percent of the students a) scored higher than 80. b) should pass the test (grades≥60). c) should fail the test (grades<60).  d) Above what grade the middle 90% of the students fall? | 10.0 | Complex(Evaluating/Creating) | Application |  |  | | 64 | What are the steps to find probability in a normal distribution?The speed in which the home page of a website is downloaded is an important quality characteristic of that website. Suppose that the mean time to download the home page for the Internal Revenue Service is 1.2 seconds. Suppose that the download time is normally distributed, with a standard deviation of 0.2 second. What is the probability that a download time is  (i) less than 2 seconds?  (ii) between 1.5 and 2.5 seconds?  (iii) above 1.8 seconds?  (iv) 99% of the download times are slower (higher) than how many seconds? | 10.0 | Simple (Remembering/Understanding) | Application |  |  | | 65 | Give the steps to find probability in a normal distribution. The speed in which the home page of a website is downloaded is an important quality characteristic of that website. Suppose that the mean time to download the home page for the Internal Revenue Service is 1.2 seconds. Suppose that the download time is normally distributed, with a standard deviation of 0.2 second. Identify the probability that a download time is  (i) less than 2 seconds?  (ii) between 1.5 and 2.5 seconds?  (iii) above 1.8 seconds?  (iv) 99% of the download times are slower (higher) than how many seconds? | 10.0 | Medium (Applying/Analysing) | Application |  |  | | 66 | Develop the steps to find probability in a normal distribution. A health club lets members use, on each visit, their facilities for as long as they wish. The club’s records suggest that the length of a visit can be modeled by a normal distribution with mean 90 minutes. Only 20% of the members stay for more than 125 minutes.  (i) Evaluate the standard deviation of the distribution.  (ii) Determine the probability that a visit lasts less than 25 minutes.  (iii) Identify the probability that a visit lasts for more than 100 minutes. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | | **U4--Limit Theorems** | | |  | **U4-T1-S1--Statement and application of Chebychev's inequality** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 67 | State and explain in brief the central limit theorem. | 3.0 | Simple (Remembering/Understanding) | Conceptual |  |  | | 68 | Explain the importance of Chebychev’s inequality. | 3.0 | Complex(Evaluating/Creating) | Conceptual |  |  | | 69 | Expamine the use of Chebychev’s inequality. | 3.0 | Medium (Applying/Analysing) | Application |  |  | | 70 | A quality control inspector wants to estimate the mean width of automobile door latches that are used in the assembly of door for new automobiles. If the inspector uses a random sample of 100 door latches and the standard deviation is 2 mm, identifythe probability that his error will be less than 0.25mm if he uses central limit theorem. | 3.0 | Medium (Applying/Analysing) | Application |  |  | | |  | **U4-T2-S1--WLLN and SLLN, Central limit theorem (CLT) for i.i.d. variates, and its applications. De Moivere's Laplace Theorem.** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 71 | The supervisor of a waste disposal truck that collects waste in a residential neighbourhood wants to estimate the mean number of cubic feet of waste collected. Suppose that the supervisor uses a sample of 30 waste pickups and knows from the experience that the standard deviation is 3 cubic feet for that data based on central limit theorem, what probability can the supervisor assert that the error will be less than 1 cubic feet. | 3.0 | Simple (Remembering/Understanding) | Interpretative |  |  | | 72 | The supervisor of a waste disposal truck that collects waste in a residential neighbourhood wants to estimate the mean number of cubic feet of waste collected. Suppose that the supervisor uses a sample of 30 waste pickups and knows from the experience that the standard deviation is 3 cubic feet for that data based on central limit theorem, identify the probability the supervisor assert that the error will be less than 0.5 cubic feet. | 3.0 | Medium (Applying/Analysing) | Interpretative |  |  | | 73 | If X is a randon variable such that E(X)=3 and E(X2)=13, use Chebychev’s inequality to determine a lower bound for P(-2<X<8). | 3.0 | Complex(Evaluating/Creating) | Problem oriented |  |  | | 74 | The supervisor of a waste disposal truck that collects waste in a residential neighbourhood wants to estimate the mean number of cubic feet of waste collected. Suppose that the supervisor uses a sample of 30 waste pickups and knows from the experience that the standard deviation is 3 cubic feet for that data based on central limit theorem, what probability can the supervisor assert that the error will be less than 0.5 cubic feet. | 3.0 | Medium (Applying/Analysing) | Application |  |  | | |  | **U4-T3-S1--6 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 75 | A study of the nutritional value of a certain kind of bread shows that on the average one slice contains .260 milligram of thiamine (Vitamin B1) with a standard deviation of 0.005 milligram. According to Chebychev’s theorem, identify the values between which the thiamine content be of a) at least 35/36 of all slices of this bread b) At least 80/81 of all slices of this bread. | 6.0 | Medium (Applying/Analysing) | Interpretative |  |  | | 76 | State and prove Weak Law of Large Numbers. | 6.0 | Complex(Evaluating/Creating) | Interpretative |  |  | | 77 | A quality control inspector wants to estimate the mean width of automobile door latches that are used in the assembly of door for new automobiles. If the inspector uses a random sample of 100 door latches and the standard deviation is 2 mm, what can he assert about the probability that his error will be less than 0.25mm if he uses central limit theorem. | 6.0 | Simple (Remembering/Understanding) | Interpretative |  |  | | 78 | An airline records show that its flight between two cities arrive on the average 5.4 minutes late with a standard deviation of 1.4 minutes. At least what percentage of its flight between the two cities arrive anywhere between a) 2.6 minutes late and 8.2 minutes late? b) 1.6 minutes early and 12.4 minutes late? | 6.0 | Medium (Applying/Analysing) | Interpretative |  |  | | | **U5--Statistical Data Analysis using SPSS** | | |  | **U5-T1-S1--Introduction to SPSS: Variables and their characteristics, importing and exporting, merging files, selecting cases, recoding, sorting, defining new variables and split files** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 79 | Explain the function of “SORT” and “SPLIT FILE” in SPSS. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | 80 | What are the various scales of measurement in SPSS? Give one example for each. | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 81 | Identify different methods of filtering (selecting cases) in SPSS. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | 82 | Formulte the procedure to define new variables and filtering (selecting cases) using SPSS. | 3.0 | Complex(Evaluating/Creating) | Descriptive |  |  | | |  | **U5-T2-S1--Analysis tools, frequencies, descriptive statistics, cross tabs, graphical representation** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 83 | Identify the steps involved importing data from other data files to SPSS. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | 84 | Develop the steps for recoding variables in SPSS. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | 85 | Explain types of variables and their measurements in SPSS. | 3.0 | Complex(Evaluating/Creating) | Descriptive |  |  | | 86 | Expand SPSS. Give some applications of SPSS in statistical data analysis. | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | |  | **U5-T3-S1--correlation and regression, curve fitting, output editing and usage of syntax.** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 87 | Formlate the steps to find regression coefficients in SPSS. | 3.0 | Complex(Evaluating/Creating) | Descriptive |  |  | | 88 | How do find you find regression coefficients in SPSS? | 3.0 | Simple (Remembering/Understanding) | Descriptive |  |  | | 89 | Develop the procedure to find the correlation coefficient. | 3.0 | Medium (Applying/Analysing) | Descriptive |  |  | | 90 | Identify and give the steps to obtain this output? | 3.0 | Medium (Applying/Analysing) | Application |  |  | | |  | **U5-T4-S1--6 marks** | |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 91 | (a) Explain the procedure to find the regression coefficients.  (b) The following is an output from SPSS. Develop the equation of regression line.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Coefficientsa** | | | | | | | | Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | | B | Std. Error | Beta | | 1 | (Constant) | 5.705 | 1.381 |  | 4.130 | .000 | | PerCapitaGDP\_dollars | -.001 | .001 | -.355 | -2.082 | .046 | | a. Dependent Variable: Polpulation\_percentage | | | | | | | | 6.0 | Complex(Evaluating/Creating) | Application |  |  | | 92 | (a) Develop the procedure to find the correlation coefficient.  (b) The following is the output obtained from SPSS. Identify the correlation coefficient and interpret the result.   |  |  |  |  | | --- | --- | --- | --- | | **Correlations** | | | | |  | | Household income in thousands | Age in years | | Household income in thousands | Pearson Correlation | 1 | .494\*\* | | Sig. (1-tailed) |  | .000 | | N | 1500 | 1500 | | Age in years | Pearson Correlation | .494\*\* | 1 | | Sig. (1-tailed) | .000 |  | | N | 1500 | 1500 | | \*\*. Correlation is significant at the 0.01 level (1-tailed). | | | | | 6.0 | Medium (Applying/Analysing) | Application |  |  | | 93 | (a) Explain the procedure of constructing various graphs using SPSS.  (b) The following is an output obtained from SPSS. Name the diagram, and write the procedure. | 6.0 | Simple (Remembering/Understanding) | Interpretative |  |  | | 94 | (a) Develop the procedure to find the regression coefficients.  (b) The following is an output from SPSS. Examine the result and give the equation of regression line.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Coefficientsa** | | | | | | | | Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | | B | Std. Error | Beta | | 1 | (Constant) | 5.705 | 1.381 |  | 4.130 | .000 | | PerCapitaGDP\_dollars | -.001 | .001 | -.355 | -2.082 | .046 | | a. Dependent Variable: Polpulation\_percentage | | | | | | | | 6.0 | Medium (Applying/Analysing) | Interpretative |  |  | | |  | **U5-T5-S1--10 marks** | |  | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 95 | State some features of SPSS software. Give the steps to find the pmf of a binomial random variable using SPSS. Explain the construction of the following table using SPSS. | 10.0 | Simple (Remembering/Understanding) | Interpretative |  |  | | 96 | State any four features of SPSS software.Give the steps to get the distribution function of Binomial random variable using SPSS. List the steps to construct the following using SPSS. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | 97 | State some features of SPSS software. Develop the steps to get the pmf of Poisson random variable using SPSS. Identify construction of the given table using SPSS. | 10.0 | Medium (Applying/Analysing) | Application |  |  | | 98 | Explain the features of SPSS software. Elaborate the steps in finding normal probability using SPSS. Explain the steps involved in constructing the given table in SPSS. | 10.0 | Complex(Evaluating/Creating) | Application |  |  | | |  | | https://kp.christuniversity.in/KnowledgePro/images/04.gif |  | https://kp.christuniversity.in/KnowledgePro/images/06.gif | |

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