UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End Semester Examination, December/January 2021

Course: Program: MBA CORE **Semester: I**
Subject/Course: QUANTITATIVE METHODS **Marks: 100**
Course Code: DSQT 7001 **Duration: 3 Hours**

Instructions : Candidates are allowed to use scientific calculators.

Use of statistical tables (Normal tables or z tables) is to be provided

Q.No	SECTION A - 10Q x 2M = 20 Marks	Marks	CO
Q1	The area under normal curve within 3σ limits from the mean μ is a)0.6827 b)0.9545 c)0.9973 d)1.0	2	CO5
Q2	For constructing a frequency distribution, the first step is to a)arrange data into an array b) decide the type and number of classes c)decide number of class intervals d) all of these	2	CO3
Q3	The _____ term in Statistics measures the extent to which values that are very different from the mean affect the shape of the distribution of a set of data	2	CO3
Q4	Let p + 3q/2 = 27 be an equation involving two variables p(price) and q(quantity). Indicate the meaningful domain and range of this function when price is considered an independent variable	2	CO1
Q5	For a binomial distribution, $p(x) = {}^{10}C_x\,(0.5)^x\,(0.5)^{10-x}$, where x=0,1,2, …, 10, the standard deviation is a) 2.5 b) $\sqrt{2.5}$ c) 10 d) $\sqrt{2}$	2	CO5
Q6	If $f(x) = 1 - x^2 + x^4$, then we have a) $f(-x) = f(x)$ b) $f(-x) = -f(x)$ c) $f(-x) + f(x) = 0$ d)none of these	2	CO1
Q7	The Arithmetic mean of two numbers is 15 and the square of their Geometric Mean is 216. The numbers are _____ and _____	2	CO3
Q8	The value of correlation coefficient a)depends on the origin b) depends on the unit of scale c)depends on both origin & unit of scale d) independent of origin and unit of scale	2	CO6
Q9	The strength of a linear relationship between two variables X and Y is measured by _____	2	CO6
Q10	A firm produces an item whose production cost function is C = 80 + 4x, where x is the number of items produced. If entire stock is sold at the rate of Rs. 8 then determine the revenue function. Also obtain the 'break-even' point.	2	CO1
	SECTION B - 4Q x 5M = 20 Marks		
Q11	A student is taking a multiple-choice exam in which each question has four choices. Assume that the student has no knowledge of the correct answers to any of the questions. She has decided on a strategy in which she will place four balls (marked A, B, C, and D) into a box. She randomly selects one ball for each question and replaces the ball in the box. The marking on the ball will determine her answer to the question. There are five multiple-choice questions on the exam. What is the probability that she will get a) at least four questions correct? b) no questions correct?	5	CO5
Q12	How many terms are there in the progression 2, 4, 8, . . ., 128. Also, compute the sum of this series which ends with 128.	5	CO1

Q13	Find the derivative of function, $f(x) = (1+x)/(1-x)$. Also compute inverse $f^{-1}(x)$	**5**	**CO1**
Q14	Illustrate the two methods of classifying data in class intervals with examples.	**5**	**CO2**
SECTION C - 3Q x 10M = 30 Marks			
Q15	a) Under what circumstances would it be appropriate to use mean, median or mode? Explain b) Skewness and kurtosis measures can be used in describing frequency distribution. Explain	**10**	**CO3**
Q16	For each of the following variables, determine whether the variable is categorical or numerical. If the variable is numerical, determine whether the variable is discrete or continuous. In addition, determine the measurement scale for each variable. **a.** Name of Internet service provider **b.** Time, in hours, spent surfing the Internet per week **c.** Where the individual uses a mobile phone to connect to the Internet **d.** Number of online purchases made in a month **e.** Where the individual uses social networks to find sought after information	**5+5**	**CO2**
Q17	a) The probability that a person has a certain disease is 0.03. Medical diagnostic tests are available to determine whether the person actually has the disease. If the disease is actually present, the probability that the medical diagnostic test will give a positive result (indicating that the disease is present) is 0.90. If the disease is not actually present, the probability of a positive test result (indicating that the disease is present) is 0.02. Suppose that the medical diagnostic test has given a positive result (indicating that the disease is present). **What is the probability that the disease is actually present? What is the probability of a positive test result?** b) A piece of equipment will function only when all the 3 components A, B and C are working. The probability of A failing during one year is 0.15, that of B failing is 0.05 and that of C failing is 0.10. **What is the probability that the equipment will fail before the end of the year?**	**6+4**	**CO4**
	OR		
Q17	**a) For each of the following, state whether the events created are mutually exclusive and collectively exhaustive.** 1. Undergraduate students were asked whether they were from a business school or engineering school. 2. Each customer was classified by the brand and type of credit card used to pay the bill: Visa, MasterCard, American Express, Gold, Platinum, or none. 3. A resident in Singapore is classified as a citizen or non-citizen. 4. Each respondent was asked for his or her highest level of education: Bachelor's degree, master's degree, or doctorate degree **b)** From a city population, the probability of selecting (1) a male or a smoker is 7/10 (2) a male smoker is 2/5, and (3) a male, if a smoker is already selected is 2/3. **Find the probability of selecting:** 1. a non-smoker 2. a male 3. a smoker, if a male is first selected	**4+6**	**CO4**

<table>
<tr><td colspan="4">SECTION D - 2Q x 15M = 30 Marks</td></tr>
<tr><td>Q18 a)</td><td><u>Case Study 1 – Telecommunication Company ABC Pvt. Ltd.</u>
The long-distance calls made by the employees of a telecom company ABC Pvt. Ltd. are normally distributed with a mean of 6.3 minutes and a standard deviation of 2.2 minutes.
Find the probability that a call
a. lasts between 5 and 10 minutes.
b. lasts more than 7 minutes.
c. lasts less than 4 minutes.
d. How long do the longest 10% of calls last?</td><td>8</td><td>CO5</td></tr>
<tr><td>Q18 b)</td><td><u>Case Study 2 – Publishing Company</u>
A statistics instructor has observed that the number of typographical errors in new editions of textbooks varies considerably from book to book. After some analysis, he concludes that the number of errors is Poisson distributed with a mean of 2 per 100 pages (e = 2.718)
a) The instructor randomly selects 100 pages of a new book. What is the probability that there are no typographical errors?
b) Suppose that the instructor has just received a copy of a new statistics book. He notices that there are 400 pages. What is the probability that there are two or fewer typographical errors?</td><td>3+4</td><td>CO5</td></tr>
<tr><td>Q19</td><td>Sunflowers Apparel is a chain of upscale fashion stores for women. As the new director of planning, you have already consulted with marketing data firms that specialize in using business analytics to identify and classify groups of consumers. The business objective is to forecast annual sales for all new stores, based on the number of profiled customers who live no more than 30 minutes from a Sunflowers store. To examine the relationship between the number of profiled customers (in millions) who live within a fixed radius from a Sunflowers store and its annual sales ($millions), data were collected, which is shown in the table below:
<table>
<tr><th>Store</th><th>Profiled Customers (millions)</th><th>Annual Sales ($ millions)</th></tr>
<tr><td>1</td><td>3.7</td><td>5.7</td></tr>
<tr><td>2</td><td>3.6</td><td>5.9</td></tr>
<tr><td>3</td><td>2.8</td><td>6.7</td></tr>
<tr><td>4</td><td>5.6</td><td>9.5</td></tr>
<tr><td>5</td><td>3.3</td><td>5.4</td></tr>
<tr><td>6</td><td>2.2</td><td>3.5</td></tr>
<tr><td>7</td><td>3.3</td><td>6.2</td></tr>
<tr><td>8</td><td>3.1</td><td>4.7</td></tr>
<tr><td>9</td><td>3.2</td><td>6.1</td></tr>
<tr><td>10</td><td>3.5</td><td>4.9</td></tr>
<tr><td>11</td><td>5.2</td><td>10.7</td></tr>
<tr><td>12</td><td>4.6</td><td>7.6</td></tr>
<tr><td>13</td><td>5.8</td><td>11.8</td></tr>
<tr><td>14</td><td>3.0</td><td>4.1</td></tr>
</table>
a) Find the regression line of Annual Sales on Profiled Customers
b) Compute regression coefficient, the average of profiled customers and average Sales
c) Use regression line to predict annual sales for a store with 4 million profiled customers
d) Interpret the meaning of the slope of the regression line in this problem
e) Calculate the standard error of estimate of Annual Sales on Profiled Customers</td><td>6+3+2+2+2</td><td>CO6</td></tr>
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