ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE

PG DEPARTMENT OF COMMERCE

QUESTION BANK (Revised LOCF - 2021)

FIRST YEAR- FIRST SEMESTER (2021 Batch)

QP Code: 83131

COURSE TITLE (PAPER TITLE): STATISTICS FOR BUSINESS DECISIONS

UNIT	Sl. No	QUESTIONS	MARKS
1	1.	Define independent and mutually exclusive events with examples.	5
1	2.	Define probability and explain briefly the importance of this concept in managerial decision making.	5
1	3.	What is binomial distribution and what are its main characteristics?	5
1	4.	Write a note on binomial distribution.	5
1	5.	Discuss the salient features of binomial distribution.	5
1	6.	What is poisson distribution? Give the condition under which poisson distribution is applicable.	5
1	7.	Write a note on poisson distribution.	5
1	8.	What are the characteristics of poisson distribution?	5
1	9.	What is poisson distribution? State the assumptions of poisson distribution.	5
1	10.	State the importance of poisson distribution.	5
1	11.	Define normal distribution. What are its main characteristics?	5
1	12.	State the important properties of normal probability distribution.	5
1	13.	Briefly explain the concept of probability distribution. State the characteristics of normal distribution.	5
1	14.	Write a short note on sampling distribution of mean.	5
1	15.	Briefly explain the concept of standard error.	5
1	16.	State the qualities of a good sample.	5
1	17.	Write a note on probability and non-probability sampling.	5
1	18.	Write a note on stratified sampling.	5
1	19.	Write a note on cluster sampling.	5
1	20.	Write a short note on convenience sampling.	5
1	21.	A bag contains 4 white, 5 red and 6 green balls. 3 balls are drawn at random. What is the probability that a white, a red and the green ball aredrawn?	5
1	22.	A bag contains 5 red and 6 black balls. 5 balls are drawn at random. What is the probability that drawn balls comprise 3 red and 2 black balls?	5
1	23.	A bag contains 8 red balls and 5 white balls. Two successive draws are made	5

		without replacement. Find the probability that the first drawing will give 3 white and the 2^{nd} 3 red balls.	
1	24.	A bag contains 10 Rupee coin, 7 fifty paise coin and 4 twenty paise coin. Find the probability of drawing (a) a rupee coin, (b) Three-rupeecoin (c) Three coins one of each type.	5
1	25.	Four coins are tossed at a time. What is the probability of getting (i) 2 heads and 2 tails (ii) Atleast two heads?	5
1	26.	Out of 2000 families with four children each, how many would you expect to have (a) at least one boy (b) at least 2 boys.	5
1	27.	It is known from the past experience that in a certain factory 3% products are defective. A sample of 100 items is taken at a random. Find the probability that exactly 5 products are defective (Given $e^{-3} = 0.4979$).	5
1	28.	A box contains 100 transistors, 20 of which are defective, 10 are selected at random for inspection. What is the probability that (i) all are defective (ii) at least one is defective?	5
1	29.	If 5% of the electric bulbs manufactured by a company are defective. Find the probability of defective in a sample of 100 bulbs (i) None is defective (ii) 5 bulbs are defective (Given $e^{-5} = .007$)	5
1	30.	If 20% of the bolts produced by a machine are defective; determine the probability that of 4 bolts chosen at random (a) one is defective (b) at the most 2 bolts are defective.	5
1	31.	A production engineer finds that an engineer mechanic working in a machine shop completes a certain task are approximately distributed with a mean 15 minutes, standard deviation of 3 minutes. Find the probability that the task is completed (a) in less than 8 minutes (b) between 10 and 12 minutes.	5
1	32.	Suppose in the admission test conducted by a management institute, the scores obtained by the applicants are normally distributed with mean 200 and standard deviation is 45. If a sample of 150 scores is taken, what is the probability that the sample mean will be lying between 190 and 208.	5
1	33.	Suppose the distribution of monthly salary of bank employees is skewed negatively. This distribution has a mean of Rs. 19,000 per month and a standard deviation of Rs. 2,000. If we draw a random sample of 30 employees what is the probability that their salary will average more than Rs. 19,750 per month?	5
1	34.	The strength of the wire produced by company X has a mean of 4,500 kg and a standard deviation of 200 kg. Company Y has a mean of 4,000 kg and a	5

<table>
<tr><td></td><td></td><td>standard deviation of 300 kg. If 50 wires of company X and 100 wires of company Y are selected at random and tested for strength, what is the probability that the sample mean strength of X will be at least 600 kg more than that of Y?</td><td></td></tr>
<tr><td>1</td><td>35.</td><td>In a particular area of a metropolitan city, 3 percent of the population is suffering from T.B. If a random sample of 500 residents of this area is taken, what is the probability that the proportion of T.B. patients is between 2 percent to 3.5 percent?</td><td>5</td></tr>
<tr><td>1</td><td>36.</td><td>It is believed that 30% of the population in Mysore is illiterate and 40% of the population of old Mysore is illiterate. A random sample of 500 is taken from the Mysore and 120 of them are found to be illiterate whereas a sample of 700 is taken from old Mysore and 308 are found to be illiterate. Find the probability of drawing two samples with a difference in the two sample proportions greater than what is observed.</td><td>5</td></tr>
<tr><td>1</td><td>37.</td><td>A company manufactures gold chains. The mean weight of all the chains is found to be 80 grams and the standard deviation is 25 grams. Find the standard error of the sampling distribution of mean if a sample of 9 chains is taken and compare it when the sample size is increased to 70 chains.</td><td>5</td></tr>
<tr><td>1</td><td>38.</td><td>Salary distribution of workers in North and South India is given in the following table:
<table>
<tr><th></th><th>Number of workers</th><th>Daily mean wage</th><th>Population standard deviation</th></tr>
<tr><td>North India</td><td>1000</td><td>Rs. 47</td><td>Rs. 28</td></tr>
<tr><td>South India</td><td>1500</td><td>Rs. 49</td><td>Rs. 40</td></tr>
</table>
It is presumed that there is no difference between the mean wage of all workers in North India and South India.
(a) Convert the above information into a standardized normal variable
(b) Find the probability that the daily mean wages of workers in North India is less than Rs. 47.</td><td>5</td></tr>
<tr><td>2</td><td>39.</td><td>What are the main components of time series? Briefly explain.</td><td>5</td></tr>
<tr><td>2</td><td>40.</td><td>Distinguish between secular trend, seasonal variations and cyclical fluctuations.</td><td>5</td></tr>
<tr><td>2</td><td>41.</td><td>What is a time series? What are its main components? Discuss the various methods of studying variations in a time series.</td><td>5</td></tr>
<tr><td>2</td><td>42.</td><td>What do you understand by a time series? Explain its various components and give uses of time series analysis.</td><td>5</td></tr>
</table>

2	43.	Explain seasonal variations in a time series. Mentions the various methods of determining it.	5
3	44.	Write a note on parametric tests.	5
3	45.	State the uses of parametric tests.	5
3	46.	Distinguish between parametric and non-parametric tests.	5
3	47.	Write a note on multiple correlation.	5
3	48.	What is multiple correlation and state its assumptions.	5
3	49.	Write a short note on partial correlation.	5
3	50.	State the limitations of partial correlation.	5
3	51.	State the objectives of multiple regression analysis.	5
3	52.	On the basis of the following information compute: (i) $r_{23.1}$ (ii) $r_{13.2}$ (iii) $r_{12.3}$ $r_{12} = 0.50$, $r_{13} = 0.4$, $r_{23} = 0.1$	5
3	53.	Calculate coefficient of multiple correlations $R_{1.23}$, $R_{2.13}$ and $R_{3.12}$ from the following data: $r_{12}=0.8$, $r_{13}=0.4$ and $r_{23}=0.5$.	5
3	54.	Calculate coefficient of multiple correlations $R_{1.23}$, $R_{2.13}$ and $R_{3.12}$ from the following data: $r_{12}=.98$, $r_{13}=.44$ and $r_{23}=.54$.	5
3	55.	Calculate coefficient of multiple correlations $R_{1.23}$, $R_{2.13}$ and $R_{3.12}$ from the following data: $r_{12}=.9$, $r_{13}=.65$ and $r_{23}=.6$. Given $r_{12}=.9$, $r_{13}=.4$ and $r_{23}=.6$ find multiple correlation coefficient $R_{1.32}$	5
4	56.	Distinguish between one-way and two-way analysis of variance.	5
4	57.	Write a short note on non-parametric tests.	
4	58.	State the uses of non-parametric tests.	
4	59.	Write a note on Wilcoxon's signed-rank test.	
4	60.	Briefly explain Mann-Whitney U – Test.	
4	61.	Write a short note on Kruskal Wallis H – Test.	
4	62.	Write a short note on degree of freedom.	
4	63.	State the properties of x^2 distribution.	
4	64.	Describe the uses of $x^{2\ test}$.	
4	65.	Describe the null and alternative hypotheses.	5
4	66.	Distinguish between one tailed test and two tailed tests.	5
4	67.	What do you mean by Type I and Type II errors in the testing of hypotheses?	5
4	68.	How will you decide whether to use Z-test or t-test while testing a hypothesis	5

		about population mean?	
1	69.	Explain the salient features of binomial distribution. State the conditions under which the distribution is used	10
1	70.	A committee of 4 members has to be formed from among 3 economist, 4 engineers, 2 statisticians and a doctor. (a) What is the probability that each of the 4 profession is represented in the committee? (b) What is the probability that the committee consists of a doctor and at least one economist?	10
1	71.	A bag contains 8 red and 5 white balls. Two successive drawings of 3 balls are made such that (i) balls are replaced before the second trial, (ii) the balls are not replaced before the second trial. Find the probability that the first drawing will give 3 white and the second 3 red balls.	10
1	72.	Four cards are drawn from a full pack of cards. Find the probability that (a) There is one card of each suit (b) Two cards are spades and two are hearts (c) All the four are kings (d) All the four are spades and one of them is king.	10
1	73.	A committee of 4 persons is to be appointed from 3 officers of the production department, 4 officers of purchase department, 2 officers of the sales department and a chartered accountant. Find the probability of forming the committee in the following manner: (a) There must be one from each category (b) It should at least have one from the purchase department (c) The chartered accountant must be in the committee.	10
1	74.	Two balls are drawn from a bag containing 8 red and 7 white balls. Find the probability that (i) they are both red (ii) they are both white (iii) one is red and other is white.	10
1	75.	A box contains 2 red, 3 black and 5 white balls. If 3 balls are drawn at random without replacement find the probabilities that (a) all 3 are black (b) all 3 are white (c) two are red and one black (d) one of each color	10
1	76.	It is believed that 50% students use Internet for academic purposes. In a sample of 4 students, calculate the probability: (a) None of the students use Internet (b) Only one student uses Internet (c) Two students use Internet (d) Three students use Internet (e) All the four students use Internet	10
1	77.	It is believed that 20% of the employees in an office are usually late. If 10	10

		employees report for duty on a given day, what is the probability that: (a) Exactly 3 employees are late (b) At most 3 employees are late (c) At least 3 employees are late.	
1	78.	After the privatization of power sector in Delhi, consumers often complain that new meters installed by the private power companies are defective and run faster. On rigorous testing of meters, it was found that 10% is defective. In a group housing society, a test check was conducted on 6 meters, what is the probability that (i) one meter is defective (ii) at least one meter is defective?	10
1	79.	The probability that a student will graduate is 0.4. Determine the probability that out of 5 students: (a) none (b) 1 (c) At least 1 and (d) All will graduate.	10
1	80.	It is believed that 20% of the employees I an office are usually late. If 10 employees report on duty on a given date what is the probability that: (a) Exactly 3 employees are late (b) At most 3 employees are late (c) At least 3 employees are late.	10
1	81.	As a result of a certain experiment, the data obtained was: **X** 0 1 2 3 4 **f** 8 32 34 24 5 Fit a binomial distribution to the above data.	10
1	82.	Four coins were tossed 200 times. The number of toss showing 0,1,2,3 and 4 heads were as under. Fit a binomial distribution. **No. of heads** 0 1 2 3 4 **Total** **No. of tosses** 15 35 90 40 20 200	10
1	83.	Fit a binomial distribution to the following data: **X** 0 1 2 3 4 **f** 18 18 34 35 10	
1	84.	4 unbiased coins are tossed 256 times. Find the frequencies of the distribution of heads and tabulate the result. Calculate mean and standard deviation of number of heads.	
1	85.	A coin is tossed 5 times. What is the probability of? (a) obtaining exactly 3 heads (b) at least 2 heads (c) less than two heads?	
1	86.	Bird menace in the vicinity of airports in India has assumed alarming proportions for the safety of aero planes. The Airport Authority of India has taken a number of steps to check this problem and this has shown satisfactory results. However, still an average of 2 bird hits occurs a year. Assuming that bird hits follow a poisson distribution, calculate the probability	

		i. No aeroplane was hit by birds ii. One bird hit iii. Two bird hits iv. 3 aeroplanes were hit by birds v. 4 aeroplanes were hit by birds (Given $e^{-2} = 0.1353$)	
1	87.	A manufacturer who produced medicine bottles, finds that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution find out how many boxes will contain (i) no defectives (ii) at least 2 defectives (Given $e^{-0.5} = 0.6065$)	
1	88.	Assuming that the typing mistakes per page committed by a typist follows a poisson distribution, find the expected frequencies for the following distribution of typing mistakes: **No. of mistakes per page**: 0 | 1 | 2 | 3 | 4 | 5 **No. of pages**: 40 | 30 | 20 | 15 | 10 | 5 (Value of $e^{-1.5} = 0.2231$	10
1	89.	Fit a poisson distribution to the following data: **No. of mistakes per page**: 0 | 1 | 2 | 3 | 4 **No. of pages**: 109 | 65 | 22 | 3 | 1 (Value of $e^{-0.61} = 0.543$)	10
1	90.	Fit a poisson distribution to the following: **Death**: 0 | 1 | 2 | 3 | 4 **Frequency**: 122 | 60 | 15 | 2 | 1 ($e^{-5} = .6065$)	10
1	91.	The distribution of number of road accidents per day follows a poisson with mean 4. Find the number of days out of 100 when there will be: (a) no accidents (b) at least two accidents (c) at the most three accidents and (d) between two and five accidents.	10
1	92.	The distribution of typing mistakes in a book is given below. Fit the poisson distribution: **No. of mistakes per page**: 0 | 1 | 2 | 3 | 4 | 5 **No. of pages**: 142 | 156 | 69 | 27 | 5 | 1 (Value of $e^{-1} = .36788$)	10
1	93.	Below are given the number of vacancies arising in a department during 96 years **No. of vacancies**: 0 | 1 | 2 | 3 | **Total** **Years**: 59 | 27 | 9 | 1 | 96 (Value of $e^{-1} = .36788$)	10

1	94.	One hundred car stereos are inspected and the number of defects is noted below. Fit a poisson distribution: **No. of defects** 0 1 2 3 4 **No. of sets** 79 18 2 1 0	10
1	95.	In a book of 325 pages following mistakes per page were noted below. Fit a poisson distribution and apply test of goodness of it. **Mistakes** 0 1 2 3 4 **Total** **Pages** 211 90 19 5 0 325	10
1	96.	The scores in an under-graduate class of first were found to be normally distributed with mean 60 and standard deviation 10. If a student from this class is selected at random, find the probability that: (a) The student scored between 60 and 80 marks (b) The student got between 50 and 60 marks (c) The student got between 40 and 70 marks (d) The student got above 85 marks	
1	97.	Delhi's traffic police claims that whenever any rally is organized in the city, traffic in the city is seriously disrupted. On the day of rally, city's traffic is disrupted for about 3 hours (180 minutes) on an average with a standard deviation of 45 minutes. It is believed that the disruption of traffic is normally distributed. If on a certain day, a rally is organized in the city what is the probability that: (a) Traffic was disrupted up to 2 hours (b) Traffic was disrupted up to 5 hours (c) Traffic remained disrupted between 1 to 4 hours	10
1	98.	A hospital specialized in heart surgery and other allied treatments. During the previous year, 1800 patients were admitted for treatment and the average payment made by a patient was Rs. 1,20,000 with a standard deviation of Rs. 25,000. Find: (a) The number of patients who paid between Rs. 1,00,000 to Rs. 1,50,000 (b) The probability that a patient's bill exceeds Rs. 1,75,000.	10
1	99.	Southern Bank Limited is reviewing its service charges and interest paying policies on saving accounts. The average daily balance on savings accounts is Rs. 10,000 with a standard deviation of Rs. 2,500. In addition, the average daily balances are normally distributed. (i) What percentage of savings account customers carry daily balance in excess of Rs 15,000? (ii) What percentage carry average daily balance below Rs. 3,000? (iii) What percentage carry average daily balances between Rs. 4,000 to Rs. 14,000?	10
1	100.	The marks obtained in certain examination follow normal distribution with mean 45 and standard deviation 10. If 1000 students appeared at the examination, calculate the number of students scoring (i) less than 40 marks and (ii) more than 60 marks.	10
1	101.	The mean and standard deviation of wages of 6,000 workers engaged in a factory are Rs. 1,200 and Rs. 400 respectively. Assuming the distribution to be normal, estimate:	10

<table>
<tr><td></td><td></td><td>(i) Percentage of workers getting wages above Rs. 1,600
(ii) Number of workers getting wages between Rs. 1,200 and Rs. 900
(iii) Number of workers getting wages between Rs. 1,200 and Rs. 1,400</td><td></td></tr>
<tr><td>1</td><td>102.</td><td>The weekly wages of 2000 workers are normally distributed. Its mean and standard deviation are Rs. 140 and Rs. 10 respectively. Estimate the number of workers whose weekly wages will be
(i) between Rs. 120 and Rs. 130
(ii) more than Rs. 170
(iii) less than Rs. 165.</td><td>10</td></tr>
<tr><td>1</td><td>103.</td><td>The customer accounts at a certain departmental store have an average balance of Rs. 480 and a standard deviation of Rs. 160. Assuming that the account balances are normally distributed
(i) What proportion of the accounts is over Rs. 600?
(ii) What proportion of the accounts is between Rs. 400 and Rs. 600?
(iii) What proportion of the accounts is between Rs. 240 and Rs. 360?</td><td>10</td></tr>
<tr><td>1</td><td>104.</td><td>The mean and standard deviation of marks in the language paper in B.A. (programme) 1st year were 35 and 10 respectively in a particular college. If a random sample of 49 students is drawn to construct a sampling distribution of mean
(i) what will be mean and standard error of the sampling distribution?
(ii) What proportion of sample means is between 32 and 39 marks?
(iii) What is the probability that the mean of a single sample is greater than 39?
(iv) less than 32?</td><td>10</td></tr>
<tr><td>1</td><td>105.</td><td>The strength of the wire produced by company X has a mean of 4,500 kg and a standard deviation of 200 kg. Company Y has a mean of 4,000 kg and a standard deviation of 300 kg. If 50 wires of company X and 100 wires of company Y are selected at random and tested for strength, what is the probability that the sample mean strength of X will be at least 600 kg more than that of Y?</td><td>10</td></tr>
<tr><td>1</td><td>106.</td><td>In a particular area of a metropolitan city, 3 percent of the population is suffering from T.B. If a random sample of 500 residents of this area is taken, what is the probability that the proportion of T.B. patients is between 2 percent to 3.5 percent?</td><td>10</td></tr>
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<tr><td>1</td><td>108.</td><td>Explain the concept of Central Limit theorem.</td><td>10</td></tr>
<tr><td>2</td><td>109.</td><td>Fit a trend line to the following data by free-hand graphic method:
<table>
<tr><td>Year</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td></tr>
<tr><td>Exports (in Rs. Crores)</td><td>30</td><td>32</td><td>38</td><td>35</td><td>39</td><td>38</td><td>42</td></tr>
</table>
</td><td>10</td></tr>
</table>

2	110.	Fit a trend line to the following data by free-hand graphic method: **Years** 1972 1973 1974 1975 1976 **Sales** 64 82 97 71 78	10
2	111.	Fit a trend line by the method of semi averages to the following data: **Year** 2004 2005 2006 2007 2008 2009 2010 2011 **Outputs (in units)** 70 65 82 85 93 90 96 100	10
2	112.	Fit a trend line by the method of semi averages to the following data: **Year** 1991 1992 1993 1994 1995 1996 1997 1998 **Outputs (in units)** 102 105 104 110 93 156 90 100	10
2	113.	Calculate trend by using three-yearly moving average from the following time series **Years** 2002 2003 2004 2005 2006 2007 2008 2009 2010 **Output (Rs.)** 50 53 57 54 51 60 65 73 70	10
2	114.	Find the trend values from the following data using four yearly moving averages: **Years** 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 **Output (Rs.)** 18 21 22 27 25 30 38 35 37 40	10
2	115.	Find the trend values from the following data using four yearly moving averages: **Years** 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 **Output (Rs.)** 28 31 32 47 55 40 48 36 33 50	10
2	116.	Given below is the time series data on production (in thousand units) of a certain firm: **Years** 2003 2004 2005 2006 2007 2008 2009 **Production** 42 49 62 75 92 122 158 Fit a straight-line trend by least square method.	10
2	117.	Fit a straight-line trend to the following data by least square method: **Years** 2003 2004 2005 2006 2007 2008 2010 2011 **Production** 18 21 23 27 16 21 23 19 Estimate the trend for the year 2009 and 2012.	10
2	118.	Fit a parabolic trend to the data given below and show the trend line by a graph also: **Years** 2006 2007 2008 2009 2010 **Production (in thousand Rs.)** 8 12 15 7 8	10
2	119.	Compute a non-linear trend for the data showing the production of what in 000 tonnes during the year 2003-2011. **Years** 2003 2004 2005 2006 2007 2008 2009 2010 2011 **Production of wheat** 9 10 12 15 13 10 8 16 15	10

		(000 tonnes)	
2	120.	Compute a non-linear trend for the data showing the production of what in 000 tonnes during the year 2002-2010.	10

Years	2002	2003	2004	2005	2006	2007	2008	2009	2010
Production of wheat (000 tonnes)	19	20	32	25	23	12	8	15	14

2	121.	Compute the season index numbers applying this simple average method for the following data:	10

Year	**Summer**	**Monsoon**	**Autumn**	**Winter**
2006	112	110	120	115
2007	80	145	105	90
2008	95	100	140	80
2009	110	90	130	110
2010	85	110	110	90
2011	94	120	100	85

2	122.	Compute the season index numbers applying this simple average method for the following data:	10

Year	**Summer**	**Monsoon**	**Autumn**	**Winter**
2007	100	120	130	105
2008	180	135	115	80
2009	85	110	130	70
2010	120	70	120	80
2011	95	120	120	70
2012	84	110	100	95

2	123.	Calculate the quarterly seasonal indices in respect of the following data by using simple average method.	10

	Quarters			
Year	**I**	**II**	**III**	**IV**
2006	71	68	79	71
2007	76	69	82	74
2008	74	66	84	80
2009	76	73	84	78
2020	78	74	86	82

<table>
<tr><td>2</td><td>124.</td><td>Find out seasonal indices from the following data by using the Ratio-to-moving average method.
<table>
<tr><th rowspan="2">Years</th><th colspan="4">Quarters</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>2006</td><td>19</td><td>22</td><td>24</td><td>19</td></tr>
<tr><td>2007</td><td>19</td><td>23</td><td>25</td><td>20</td></tr>
<tr><td>2008</td><td>18</td><td>22</td><td>21</td><td>18</td></tr>
<tr><td>2009</td><td>18</td><td>20</td><td>23</td><td>20</td></tr>
<tr><td>2010</td><td>21</td><td>24</td><td>23</td><td>20</td></tr>
</table></td><td>10</td></tr>
<tr><td>2</td><td>125.</td><td>Calculate seasonal indices by Ratio to Trend method from the following data:
<table>
<tr><th rowspan="2">Year</th><th colspan="4">Quarterly Sales</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>2006</td><td>42</td><td>38</td><td>39</td><td>33</td></tr>
<tr><td>2007</td><td>49</td><td>44</td><td>46</td><td>49</td></tr>
<tr><td>2008</td><td>72</td><td>62</td><td>63</td><td>67</td></tr>
<tr><td>2009</td><td>80</td><td>73</td><td>72</td><td>75</td></tr>
<tr><td>2010</td><td>100</td><td>76</td><td>74</td><td>86</td></tr>
</table></td><td>10</td></tr>
<tr><td>2</td><td>126.</td><td>Calculate seasonal indices by Ratio to Trend method from the following data:
<table>
<tr><th rowspan="2">Year</th><th colspan="4">Quarterly Sales</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th></tr>
<tr><td>2007</td><td>40</td><td>37</td><td>56</td><td>45</td></tr>
<tr><td>2008</td><td>45</td><td>58</td><td>63</td><td>39</td></tr>
<tr><td>2009</td><td>63</td><td>62</td><td>78</td><td>65</td></tr>
<tr><td>2010</td><td>87</td><td>78</td><td>79</td><td>62</td></tr>
<tr><td>2011</td><td>110</td><td>66</td><td>66</td><td>85</td></tr>
</table></td><td>10</td></tr>
<tr><td>3</td><td>127.</td><td>Define multiple regression analysis and multiple correlations analysis. Distinguish between them giving suitable examples.</td><td>10</td></tr>
<tr><td>3</td><td>128.</td><td>Distinguish between simple, partial and multiple correlation.</td><td>10</td></tr>
<tr><td>3</td><td>129.</td><td>On the basis of the following information compute $r_{12.3}$, $r_{23.1}$ and $r_{13.2}$. Given $r_{12} = .86$, $r_{13} = .65$ and $r_{23} = .72$.</td><td>10</td></tr>
<tr><td>3</td><td>130.</td><td>On the basis of the following information compute $r_{12.3}$, $r_{23.1}$ and $r_{13.2}$. Given $r_{12} = .59$, $r_{13} = .46$ and $r_{23} = .77$.</td><td>10</td></tr>
<tr><td>3</td><td>131.</td><td>The simple coefficient of correlation between temperature (X_1), corn yield (X_2) and rainfall (X_3) are $r_{12} = 0.59$, $r_{13} = 0.46$ and $r_{23} = 0.77$. Calculate partial correlation coefficients $r_{12.3}$, $r_{13.2}$ and $r_{23.1}$ and multiple correlation coefficients $R_{1.23}$, $R_{2.13}$ and $R_{3.12}$.</td><td>10</td></tr>
</table>

3	132.	In a large organization in Bengaluru the Chief Medical Officer of the in-house dispensary is disturbed because of the alarming rise in the cases of high blood pressure among young female employees. A study of high BP women employees revealed that two main factors cause high BP-work related stress and family related stress. The chief medical officer collected data for a period of five weeks that is written below. From these data calculate multiple regression equation of X_1 on X_2 and X_3	10

No. of female employees suffering from high BP- X_1	60	52	56	64	68
No. of female employees suffering from work related stress - X_2	47	41	50	42	40
No. of female employees suffering from family related stress - X_3	22	26	18	13	21

3	133.	From the following data calculate multiple regression line:					10

Day:	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**
No. of cars serviced per day- X_1	3	5	7	4	6
No. of workers - X_2	6	6	5	6	7
Power supply per day (in hours) - X_3	5	8	8	4	5

3	134.	From the following data, calculate the multiple regression equation of X_1 on X_2 and X_3:							

X_1	8	12	19	24	25	31	38	43
X_2	5	10	13	14	19	25	24	26
X_3	9	17	22	27	36	41	58	62

Also estimate the value of X_1 for X_2 =30 and X_3 70.

3	135.	Find the multiple regression of X_1 on X_2 and X_3 from the data relating to three variables given below:					10

X_1:	10	38	25	29	16	14
X_2:	12	39	20	31	16	23
X_3:	10	23	16	13	11	6

3	136.	Find the multiple regression equation of X_1 on X_2 and X_3 from the data relating to three variables given below:			10

X_1	**X_2**	**X_3**
4	15	30
6	12	24
7	8	20
9	6	14
13	4	10
15	3	4

Also predict the value of X_1 when X_2 = 10 and X_3 = 22.

	137.	Find the multiple regression equation of X_1 on X_2 and X 3 from the data relating of three variables given below X_1 | X_2 | X_3 3 | 14 | 31 5 | 11 | 25 6 | 7 | 21 8 | 5 | 15 12 | 3 | 11 14 | 3 | 5	
4	138.	What is difference between parametric and non-parametric tests? Describe the various non-parametric test methods.	10
4	139.	Discuss the main advantages and disadvantages of non-parametric tests compared to non-parametric tests.	10
4	140.	What do you mean by the term statistical hypothesis? Explain the procedure of hypothesis testing.	10
4	141.	300 digits were chosen at random from a set of tables. The frequencies are given below. Using x^2 test, test the hypothesis that digits were distributed in equal numbers in table. Given $x^2 0.05$ for $V_9 = 16.92$. **Digits** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 **Frequency** | 28 | 29 | 33 | 31 | 26 | 35 | 32 | 30 | 31 | 25	10
4	142.	200 digits were chosen at random from a set of tables. The frequencies are given below. Using x^2 test, test the hypothesis that digits were distributed in equal numbers in table. Given $x^2 0.05$ for $V_9 = 16.92$. **Digits** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 **Frequency** | 20 | 19 | 23 | 41 | 16 | 45 | 37 | 20 | 11 | 35	10
4	143.	100 digits were chosen at random from a set of tables. The frequencies are given below. Using x^2 test, test the hypothesis that digits were distributed in equal numbers in table. Given $x^2 0.05$ for $V_9 = 16.92$. **Digits** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 **Frequency** | 25 | 30 | 45 | 21 | 28 | 33 | 38 | 50 | 45 | 25	10
4	144.	400 digits were chosen at random from a set of tables. The frequencies are given below. Using x^2 test, test the hypothesis that digits were distributed in equal numbers in table. Given $x^2 0.05$ for $V_9 = 16.92$. **Digits** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 **Frequency** | 34 | 56 | 34 | 48 | 55 | 39 | 56 | 45 | 34 | 24	10
4	145.	A mobile phone service provider found that its customers pay bills by three modes: cheques, credit card and internet. It collected samples of the number of days three types of customers take in making the payment after the receipt of billing SMS/bill. The company believes that the three samples below have been obtained from normal population with equal variances. Test the hypothesis at 5% level that the mean time is equal for the three modes.	15

		x_1 | x_2 | x_3 8 | 7 | 12 10 | 5 | 9 7 | 10 | 13 14 | 9 | 12 11 | 9 | 14	
4	146.	There are three main brands of a certain powder. A set of 120 customers are examined and found to be allocated among 4 groups (A, B, C and D) and brands (I, II and III) as shown hereunder: **Brands** | **Groups** (A | B | C | D) **I** | 0 | 4 | 8 | 15 **II** | 5 | 8 | 13 | 6 **III** | 18 | 19 | 11 | 13	15
4	147.	Four groups of four cows each were fed individually four different brands of feeds for a given period of time to test that the mean weight gain for each of the feeds is the same or not. Use 5% level of significance. Data of weight gain is mentioned below: x_1 | x_2 | x_3 | x_4 168 | 213 | 200 | 204 182 | 212 | 184 | 193 202 | 185 | 197 | 188 184 | 190 | 199 | 203	15
4	148.	A company wants to test the life of four types of tyres – A, B, C, and D. The data on the number of kilometers of each tyre used by 6 similar cars is given ahead. With 5% level of significance, determine whether there is any difference in the life of the four types of tyres: **A** | 33 | 38 | 36 | 40 | 31 | 35 **B** | 32 | 40 | 42 | 38 | 30 | 34 **C** | 31 | 37 | 35 | 33 | 34 | 30 **D** | 29 | 34 | 32 | 30 | 33 | 31	15
4	149.	A firm used three different strategies of sales promotion during the similar festival season and noted the following sales: **S 1** | 12 | 14 | 14 | 12 | 20 **S 2** | 21 | 15 | 17 | 17 | 13 **S 3** | 18 | 14 | 18 | 20 | 19 Test whether the strategies influenced sales? Use significance level at 0.05	15
4	150.	Three training methods were compared to see if they led to greater productivity after training. The productivity measures for individuals trained by each method are as below:	15

			Method 1	36	26	31	20	34	25
			Method 2	40	29	38	32	39	34
			Method 3	32	18	23	21	33	27
		At the 0.05 level of significance, do the three training methods lead to different levels of productivity?							
4	151.	The following data represent the number of units of production per day turned out by five different workmen using different types of machines.							15

Workmen	**Machine types**			
	A	**B**	**C**	**D**
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	33	38	46	33
5	38	42	49	39

(a) test whether the mean productivity is the same for the 4 different machine types

(b) test whether 5 men differ with respect to mean productivity. (use significance level = 0.05)

4	152.	Four experiments determine the moisture content of samples of a powder, each man taking a sample from each of six consignments. Their assessments are given below:							15

	Consignments					
	1	**2**	**3**	**4**	**5**	**6**
1	9	10	9	10	11	11
2	12	11	9	11	10	10
3	11	10	10	12	11	10
4	12	13	11	14	12	10

Analyse the data and discuss whether there are any significant difference consignments or between observers.

4	153.	A farmer applies three types of fertilizers on 4 separate plots. The figures on yield per acre are tabulated below:							15

Fertilizers/Plots	**Yield**				
	A	**B**	**C**	**D**	**Total**
Nitrogen	6	4	8	6	24
Potash	7	6	6	9	28
Phosphates	8	5	10	9	32
Total	21	15	24	24	84

Find out if the plots are materially different in fertility, as also, if the three fertilizers make any material difference in yields. (use significance level = 0.05)

4	154.	You are given the following data indicating the number of units produced per day by five different workers using four different types of machine. **Workers** / **Machine Type** **A** **B** **C** **D** **1** 44 36 48 38 **2** 48 40 50 44 **3** 37 38 40 36 **4** 45 34 45 32 **5** 40 44 50 40 Test (i) Whether the mean productivity is the same for four different machine types. (ii) Whether the 5 workers differ with respect to mean productivity.	15
4	155.	The following data represents the number of units of production per day turned out by 4 workers using 4 different types of machines: **Workers** / **Machine Type** **A** **B** **C** **D** **1** 6 7 9 7 **2** 5 6 8 5 **3** 5 8 5 5 **4** 5 7 6 6 Test whether there is a significant change: (i) between the units produced by the workers. (ii) between the units produced by the machines.	15
4	156.	To study the performance of three washing powders under three different temperatures was recorded with specially designed washing machines **Workmen** / **Machine** **A** **B** **C** **D** Cold 57 55 67 179 Warm 49 52 68 169 Hot 54 46 58 158 **Total** 160 153 193 506	15
4	157.	The following are the defective pieces produced by four operators working on 4 different machines. Perform analysis of variance and state (a) whether operators differ in mean productivity (b) whether machines are different in mean productivity. **Operators** **B 1** **B 2** **B 3** **B 4** **Machine** A 1 34 28 33 29 A 2 31 24 35 22 A3 27 20 43 32 A 4 28 28 29 26	15

Note: The attached question paper is to be taken as a model question paper and all the M. Com I semester Question papers will have the similar pattern.

Q.P Code:53005

St. Philomena's College (Autonomous) Mysore

I Semester M.Com Final Examination December 2019

Subject: COMMERCE

Title: STATISTICS FOR BUSINESS DECISIONS (SC)

Time: 3 Hours **Max Marks: 70**

PART – A

Answer any Five of the following questions. Each question carries 5 Marks **5×5=25**

1 State the features and limitations of Binomial and Poisson distributions.

2 If 2% of the electric bulbs manufactured by a company are defective.
Find the probability that in a sample of 200 bulbs
(a) at least one defective (b) at most 3 defectives and (c) exactly 4 defectives.

3 What is sampling? Describe its advantages and disadvantages.

4 Fit a straight line trend for the following series. Estimate the value for 2020.

Year	2012	2013	2014	2015	2016	2017	2018
Production	60	72	74	65	82	85	95

5 What do you mean by time series? Explain its usefulness in business.

6 Distinguish between secular trend, seasonal variations and cyclical fluctuations.

7 What is multiple regression analysis? What are its objectives?

8 Given: $R_{12} = 0.69$, $R_{13} = 0.55$ and $R_{23} = 0.68$ find multiple correlation co-efficient

$R_{3,1,2}$ and $R_{1,2,3}$

PART – B

Answer any Three questions. Each question carries 10 Marks **3×10=30**

9 What is probability? Explain the different approaches available for the study of probability.

10 Suppose that a doorway being constructed is to be used by a class of people whose heights are normally distributed with mean 70 inches and standard deviation 3 inches. How much high the door way should be, without causing more than 25% of the people to bump their heads? If the height of the door may be fixed at 76 inches, how many persons out of 5,000 are expected to bump their heads?

PTO

11 Explain the probability sampling methods, their advantages and limitations.

12 Obtain the seasonal indices from the following data: 8

Production (in thousand units)

Year	I Quarter	II Quarter	III Quarter	VI Quarter
2014	25	30	21	32
2015	27	28	25	34
2016	22	27	21	30
2017	24	25	20	33

13 Given the following data, find the regression equation of X_1 on X_2 and X_3.

Variable X_1: 11 17 26 28

Variable X_2: 2 4 8 18

Variable X_3: 2 3 4 5

PART – C

Case Study (Compulsory) **1×15**

14 The following figures represent the number of units of production per day turned out by four different workers using four different types of machines.

Workers	Machine Type			
	A	B	C	D
1	4	5	3	7
2	6	8	6	5
3	7	6	7	8
4	3	5	4	8

On the basis of this information, can it be concluded that

a) The mean productivity is the same for different machines? and

b) The workers do not differ with regard to their productivity?

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