

SET B

Unique Paper Code	: 61011104
Name of the Paper	: Statistics for Business Decisions
Name of the Course	: Bachelor of Management Studies (CBCS)
Semester	: I
Duration	: 3 hours
Maximum Marks	: 75

Instructions to Candidates:

- (i) All Questions carry equal marks.*
- (ii) The Question paper contains 6 Questions.*
- (iii) Attempt any 4 Questions in all.*
- (iv) Use of Simple Calculator is allowed.*

Q 1 State and explain Chebyshev's theorem. How does it compare with the empirical rule? A survey of demand (in '000 tons) of urea during a year is given below:

Demand (in '000 tons)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of firms	25	75	60	200	85	35	14	6

Find the appropriate measure of central tendency and variation. Determine the five-point summary for the given data. Draw the Box and whisker plot to determine the nature of the distribution. For a mesokurtic distribution, the fourth central moment is 768. Obtain its standard deviation.

Q 2 Distinguish between linear and non-linear trend. The quarterly expenses (in Rs Lakhs) of a large automobile firm have been recorded for 2016–2020. Compute the seasonal indices using the method of ratio to trend:

Quarter	2016	2017	2018	2019	2020
1	30	34	32	38	42
2	48	50	46	48	52
3	50	64	66	70	64
4	68	78	72	64	82

Q 3 What are the conditions under which a binomial distribution is used? Discuss the conditions under which a binomial distribution can be approximated as a Poisson distribution.

From past records, the owner of a fast-food restaurant knows that, on average, 2.4 cars use the drive-through window between 3:00 P.M. and 3:15 P.M. Determine the probability that, between 3:00 P.M. and 3:15 P.M., (i) exactly two cars use the drive-through window and (ii) at least three cars use the drive-through window.

The heights of the 3264 female students attending a college are approximately normally distributed with a mean of 64.4 inches and standard deviation 2.4 inches. Find (i) the percentage of female students with height less than 63 inches; (ii) The number of female students with heights between 65 and 70 inches and (iii) the maximum height of the lowest 25% students.

A plant has two production lines on which it produces resistors. Line A is old and produces 30 percent of the output, while line B is new which accounts for the remaining output. The proportion of defective resistors produced by Line A is 0.01 and that of Line B is 0.004. The output of both the lines goes to same conveyor belt so that it is not possible to find which line produced a particular resistor. Before supplying the resistors to an aerospace firm, they are

tested randomly for defects. Calculate the probability that, (i) a resistor will be found to be defective; (ii) a resistor found defective was produced by Line B.

Q 4 What is meant by critical value? How is it used in testing of hypothesis? The Central Investigative Force compiles data on robbery and publishes the information on its website. A sample of 15 pickpocket offenses resulted in losses as shown in following table:

Offense	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Losses (in Rs)	447	208	627	430	883	313	844	253	397	214	217	768	106	426	587

At 5% significance level, do the data provide sufficient evidence to conclude that pickpocket offenses resulted in average losses of more than Rs. 440? Determine the confidence interval at 99% for the average losses due to pickpocket offences (population mean).

Q 5 Does correlation imply the existence of cause-and-effect relationship between two variables? Explain with help of suitable examples. Smart Tech Solutions is in the business of providing technological support and services to educational institutions. The company wants to develop a forecast model using the following data:

Sales revenue (in USD Millions)	20	30	22	25	27	30	32	38	42
Marketing expenditure (in USD Millions)	4	4.2	4.5	4.7	5	5.2	5.8	5.9	6

Use the given information to determine the two regression equations. Find the Sales revenue (in USD Millions) that can be suitably associated with the Marketing expenditure equal to USD Millions. Determine Spearman's rank correlation using the above data.

Q 6 Explain in brief the problems that are faced in the construction of index numbers. Construct the CPI using the data given below:

Category	Index	Weight
Food and Beverages	?	45
Clothing and Footwear	120	15
Housing	110	8
Fuel and Light	200	4
Lifestyle and Electronics	125	10
Miscellaneous	150	18

Determine the index for the category food and beverages with the following data using the Fisher's method:

Item	Current year		Base year	
	Price (in ₹)	Quantity	Price (in ₹)	Quantity
Cereals	60	1200	40	1,000
Pulses	95	400	85	360

Fruits and Vegetables	300	550	250	600
Dairy products	80	480	90	450
Packed Juices	150	160	115	140

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
one-tail	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
two-tails											
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
Z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										