

[This question paper contains 10 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 8367
Unique Paper Code : 61011104
Name of the Paper : Statistics for Business Decisions
Name of the Course : Bachelor of Management Studies
(BMS), 2017 (CBCS)
Semester : I
Duration : 3 Hours
Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any Five questions.
3. All questions carry equal marks.
4. Use of simple calculator is allowed.

1. (a) Listed below is frequency distribution for returns in percentage terms for a sample of 100 equity mutual funds for the year 2016-17.

Returns (%)	Number of mutual funds (f)
0-5	8
5-10	26
10-15	40
15-20	16
20-25	10

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Compare the cut-off point returns for the top 25% and the bottom 25% of the distribution. What are the average returns? (6)

(b) In a survey it was found that out of the total number of mobile phone owners, 35% are below the age group of 25 years and the remaining 65% above. Further, from another survey it was found that out of total number of mobile owners below 25 years of age, 40% are Airtel service subscribers. On the other hand 30% of above 25 years mobile owners have an Airtel connection. Given that a mobile phone owner is an Airtel subscriber what is the likelihood that he/she is below 25 years of age? (5)

(c) Calculate the Fisher's Index for the Year 2016 using the following data (with 2015 as the Base Year):

Commodity	2015 Price	2015 Expenditure	2016 Price	2016 Expenditure
A	8	200	65	1950
B	20	1400	30	1650
C	5	80	20	900
D	10	360	15	300
E	27	2160	10	600

(4)

2. (a) A survey was conducted among college students to enquire how much they spent on eating out in the last one month. The following data was obtained:

Expenditure (₹)	Number of students
0-50	20
50-100	10
100-150	25
150-200	20
200-250	10
250-500	15

What is the average monthly expenditure? Find the Karl Pearson's coefficient of skewness. (6)

(b) After an analysis of incoming faxes the manager of an accounting firm determined the probability distribution of the number of pages (X) per facsimile as follows:

X	1	2	3	4	5	6	7
p(x)	.05	.12	.20	.30	.15	.10	.08

Compute the mean and variance of the number of pages per fax. Further analysis by the manager revealed that the cost of processing each page of a fax is \$\$.25. Determine the mean and variance of the cost per fax. (5)

(c) Distinguish between Correlation and Regression analysis. (4)

3. (a) The table given below provides a summary of total expenditure by the Government of India for Health and Sanitation from 2010-11 to 2016-17:

Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Expenditure (in Rs Crore)	177.2	185.0	224.9	254.0	304.9	359.9	438.8

Fit an exponential trend ($Y = ab^x$) to the given data and estimate the expenditure for the year 2017-18. (6)

- (b) Given below are the approximate average returns obtained from Gold and real estate over the last 5 years :

Year	Gold (%)	Real Estate (%)
2012-13	10	8
2013-14	10	7
2014-15	6	5
2015-16	4	5
2016-17	9	3

Which of the two offers the more consistent returns? (5)

- (c) A manufacturing company regularly conducts quality control checks at specified periods on the products it manufactures. Historically, the failure rate for LED light bulbs that the company manufactures is 5%. Suppose a

random sample of 10 LED bulbs is selected. Let X represent's number of defective LED light bulbs.

- (i) What is the probability that two or fewer of the LED light bulbs are defective?

- (ii) What is the mean and variance of X. (4)

4. (a) The following data relates to scores obtained by nine Salesmen of a company in an Intelligence test and their Weekly Sales (in ₹ '000):

Salesman	1	2	3	4	5	6	7	8	9
Test Score	50	60	50	60	80	50	80	40	70
Weekly Sales (in ₹ '000)	30	60	40	50	60	30	70	50	60

Obtain the two regression equations; Weekly Sales on Intelligence test score of the Salesman and Intelligence test score of the Salesman on Weekly Sales. If the Intelligence test score of a Salesman is 65, what would be his expected Weekly Sales? (6)

- (b) ABC Trucking Company determined that the distance travelled per truck per year is normally distributed, with a mean of 50 thousand miles and a standard deviation of 12 thousand miles.

- (i) What proportion of trucks can be expected to travel between 34 and 50 thousand miles in a year?

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(ii) How many miles will be travelled by at least 80% of the trucks? (5)

(c) Distinguish between Type I and Type II errors. (4)

5. (a) In 1993, the Financial Accounting Standard Board (FASB) was considering a proposal to require companies to report the potential effect of employees' stock options on earnings per share (EPS). A random sample of 41 high-technology firms revealed that the new proposal would reduce EPS by an average of 13.8 percent, with a standard deviation of 18.9 percent. A random sample of 35 producers of consumer goods showed that the proposal would reduce EPS by 9.1 percent on average, with a standard deviation of 8.7 percent. On the basis of these samples, is it reasonable to conclude at 5% level of significance that the FASB proposal will cause a greater reduction in EPS for high-technology firms than for producers of consumer goods? (6)

(b) An economist wanted to find out whether there is any relationship between the unemployment rate in a country and its inflation rate. Data from 7 countries for the year 2016 is given below:

Country	A	B	C	D	E	F	G
Unemployment rate (per cent)	11	9	13	7	13	8	8
Inflation rate (per cent)	4	5	7	8	6	3	5

Use Spearman's Rank Correlation to find the strength of association between unemployment rate in a country and its inflation rate. (5)

(c) A.B. Power and Associates calculates and publishes various statistics concerning car quality. The initial quality score measures the number of problems per new car sold. For 2017 model cars, an automobile company KPS had 1.02 problems per car. Let the random variable X be equal to the number of problems with a newly purchased 2017 KPS car.

- (i) What assumptions must be made in order for X to be distributed as a Poisson random variable? Are these assumptions reasonable?
- (ii) Making the assumptions as in (i), if you purchased a 2017 KPS car, what is the probability that the new car will have two or fewer problems? (4)

6. (a) Prices of shares (in ₹) of a company on the different days in a month were found to be: 66, 65, 69, 70, 69, 71, 70, 63, 64 and 68. Assuming the prices of shares follow normal distribution and its standard distribution is unknown, test at 5 percent level of significance that the sample average price of the shares in that month is same as 65. (6)

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(b) Given that the mean sales of 30 FMCG companies in the year 2016-17 was ₹ 300 crore and the mean sales of 70 IT companies was ₹ 2000 crore. The standard deviation for FMCG companies was ₹ 50 crores and for IT companies ₹ 1000 crores. Find the combined mean and standard deviation for the two groups taken together.

(5)

(c) Given below are two series of Price index of Steel. Splice them with the base 2014 = 100.

Year	Series A Base 2005 = 100	Series B Base 2014 = 100
2010	141.5	
2011	163.7	
2012	158.2	
2013	156.8	
2014	157.1	100
2015		102.3

What is the percentage change in the price of Steel between 2010 and 2015? (4)

IV. BINOMIAL COEFFICIENTS

n	(n 0)	(n 1)	(n 2)	(n 3)	(n 4)	(n 5)	(n 6)	(n 7)	(n 8)	(n 9)	(n 10)
0	1										
1	1	1									
2	1	2	1								
3	1	3	3	1							
4	1	4	6	4	1						
5	1	5	10	10	5	1					
6	1	6	15	20	15	6	1				
7	1	7	21	35	35	21	7	1			
8	1	8	28	56	70	56	28	8	1		
9	1	9	36	84	126	126	84	36	9	1	
10	1	10	45	120	210	252	210	120	45	10	1
11	1	11	55	165	330	462	462	330	165	55	11
12	1	12	66	220	495	792	924	792	495	220	66
13	1	13	78	286	715	1287	1716	1716	1287	715	286
14	1	14	91	364	1001	2002	3003	3432	3503	2002	1001
15	1	15	105	455	1365	3003	5005	6435	6435	3003	1365
16	1	16	120	560	1420	4368	8008	11440	12870	11440	8008
17	1	17	136	680	1716	3597	6868	11628	15472	15472	6868
18	1	18	153	816	2187	4618	9696	18480	27132	27132	9696
19	1	19	171	969	2709	5952	11628	21132	35271	35271	11628
20	1	20	190	1140	3432	4845	6845	9270	12570	12570	4845

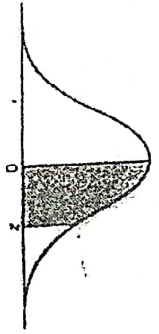
V. VALUES OF e^{-m} (For Computing Poisson Probabilities) (0 < m < 1)

m	0	1	2	3	4	5	6	7	8	9
0.0	1.0000	.9900	.9802	.9704	.9608	.9512	.9418	.9324	.9231	.9139
0.1	0.9048	.8938	.8830	.8724	.8621	.8521	.8422	.8324	.8228	.8133
0.2	0.8187	.8106	.8025	.7945	.7866	.7788	.7711	.7634	.7558	.7483
0.3	0.7468	.7394	.7321	.7249	.7178	.7107	.7037	.6967	.6897	.6827
0.4	0.6703	.6636	.6570	.6505	.6440	.6376	.6313	.6250	.6188	.6125
0.5	0.6005	.5945	.5886	.5827	.5770	.5712	.5655	.5599	.5543	.5486
0.6	0.5488	.5434	.5379	.5326	.5272	.5220	.5169	.5117	.5066	.5014
0.7	0.4960	.4916	.4868	.4819	.4771	.4724	.4677	.4630	.4584	.4538
0.8	0.4493	.4449	.4404	.4360	.4317	.4274	.4232	.4190	.4148	.4107
0.9	0.4086	.4045	.4005	.3966	.3927	.3887	.3849	.3811	.3773	.3735

m	1	2	3	4	5	6	7	8	9	10
e ^{-m}	.36788	.13534	.04979	.01832	.006738	.002479	.000912	.000338	.000133	.000048

Notes: To obtain values of e^{-m} for other values of m, use the laws of exponents.
 Example. e^{-2.35} = (e^{-2.00}) (e^{-0.35}) = (.13534) (.7047) = .095374

VII. AREA UNDER STANDARD NORMAL CURVE



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0039	.0079	.0118	.0157	.0195	.0234	.0273	.0312	.0351	.0390
0.2	.0078	.0117	.0156	.0194	.0232	.0270	.0308	.0346	.0384	.0421
0.3	.0117	.0155	.0193	.0230	.0267	.0304	.0341	.0377	.0413	.0449
0.4	.0155	.0192	.0229	.0265	.0301	.0337	.0372	.0407	.0442	.0477
0.5	.0193	.0229	.0264	.0299	.0334	.0368	.0402	.0436	.0470	.0504
0.6	.0229	.0263	.0297	.0330	.0363	.0395	.0427	.0459	.0491	.0522
0.7	.0264	.0297	.0329	.0360	.0391	.0421	.0451	.0480	.0509	.0537
0.8	.0297	.0328	.0358	.0388	.0417	.0445	.0473	.0500	.0527	.0554
0.9	.0328	.0357	.0385	.0413	.0440	.0467	.0493	.0519	.0545	.0570
1.0	.0357	.0384	.0410	.0436	.0461	.0486	.0511	.0535	.0559	.0582
1.1	.0384	.0409	.0434	.0458	.0481	.0504	.0527	.0549	.0571	.0592
1.2	.0409	.0432	.0455	.0477	.0498	.0519	.0539	.0559	.0578	.0596
1.3	.0432	.0453	.0474	.0494	.0513	.0531	.0549	.0567	.0584	.0601
1.4	.0453	.0473	.0492	.0511	.0529	.0546	.0563	.0579	.0595	.0611
1.5	.0473	.0492	.0510	.0527	.0544	.0560	.0576	.0591	.0606	.0621
1.6	.0492	.0509	.0525	.0541	.0557	.0572	.0587	.0601	.0615	.0629
1.7	.0509	.0525	.0540	.0555	.0570	.0584	.0598	.0611	.0625	.0638
1.8	.0525	.0540	.0554	.0568	.0581	.0594	.0607	.0619	.0631	.0643
1.9	.0540	.0554	.0567	.0580	.0592	.0604	.0615	.0626	.0637	.0647
2.0	.0554	.0567	.0579	.0591	.0602	.0613	.0623	.0633	.0643	.0652
2.1	.0567	.0579	.0590	.0601	.0611	.0621	.0630	.0639	.0648	.0656
2.2	.0579	.0590	.0601	.0610	.0619	.0628	.0636	.0644	.0652	.0659
2.3	.0590	.0601	.0610	.0618	.0626	.0634	.0641	.0648	.0655	.0662
2.4	.0601	.0609	.0617	.0625	.0632	.0639	.0646	.0652	.0659	.0665
2.5	.0609	.0617	.0625	.0632	.0639	.0645	.0651	.0657	.0663	.0668
2.6	.0617	.0625	.0632	.0638	.0644	.0650	.0655	.0660	.0665	.0670
2.7	.0625	.0632	.0638	.0644	.0649	.0654	.0659	.0663	.0668	.0672
2.8	.0632	.0638	.0644	.0649	.0653	.0657	.0661	.0665	.0669	.0673
2.9	.0638	.0644	.0649	.0653	.0657	.0661	.0664	.0668	.0671	.0675
3.0	.0644	.0648	.0652	.0655	.0658	.0661	.0664	.0667	.0670	.0673

(500)