Sem - IV (CBSGS) Mathematics & Statistics

02-12-15

QP Code : 21743

Duration: 3 Hrs | Maximum marks: 70

Note: All Questions are compulsory
Use of simple calculator is allowed
Figure at right indicate maximum marks

Q1. (a) Attempt any 7 [2 marks each]: [14]

(i) If Mode = 40, Median = 42.5, then the approximate value of Mean is:
(a) 43.15 (b)43.35 (c) 43.55 (d) 43.75

(ii) Which of the following average is a partition value?
(a) AM (b) Median (c) Mode (d) None

(iii) If 75% percentage of the items lies above 33.64 and 75% of the items lie below 57, then Coefficient of Quartile Deviation is:
(a) 23.36 (b) 11.68 (c) 0.2573 (d) 0.2537

(iv) If n = 10, $\sum x = 200$ SD = 10 then Coefficient of Variation is :
(a) 2% (b) 15% (c) 50% (d) 200%

(v) If Median and SD are 40 and 2.5 respectively. If each item is increased by 5 then the Median and SD will be:
(a) 40 and 7.5 (b) 45 and 2.5 (c) 45 and 7.5 (d) None of these

(vi) If mean = 3570 , SD = 683.82 , mode = 3650 , then Karl Pearson's coefficient of skewness is:
(a) 0. 1169 (b) -0.1169 (c) 10.56 (d) -10.56

(vii) In a 3 coin trial, the probability of getting at least one Head is:
(a)1/8 (b)3/8 (c) 5/8 (d)7/8

(viii) For a binomial distribution mean = 3 and variance = 2.25 then the value of parameters **n** and **p** are :
(a) 12 and 0.25 (b) 6 and 6.75 (c) 12 and 0.75 (d) None of these

(ix) The table value for a Normal distribution, $P[Z \geq 2.1] = 0.0179$ then $P[Z \leq 2.1]$ = is:
(a)0.4821 (b) 0.9821 (c) 0.0179 (d) none of this

(b) Attempt any 1: [1]

(x) If A is any event, then which of the following inequality is more accurate?
(a) $-1 \leq P(A) \leq 1$ (b) $0 \leq P(A) \leq 1$ (c) $-1 < P(A) < 1$ (d) $0 < P(A) < 1$

(xi) In a Hypothesis test the Null hypothesis is accepted if:

(a) Test value is more than Critical value (b) Test value is less than Critical value (c)Test value is equal to Critical value (d) None of these

Q2. (a) Attempt any two (4 marks each) [8]

(i) The following table gives the platelets count (in lakh/cmm) from the analysis of the blood samples of five different days in a pathology laboratory. Find the average platelets count per patient.

Days	1	2	3	4	5
Platelets count in (lakhs/ cmm)	0.55	0.67	0.1.2	1.50	2.00
No of patients	60	70	65	95	90

(ii) Find the QD and it's coefficient of weight for the following date:

Weight:	45-50	50-55	55-60	60-65	65-70
No of students:	22	27	23	18	10

(iii) Calculate 6^{th} Decile and 60^{th} Percentile from the following data:

Marks :	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No of students:	7	9	11	14	22	16	11

(b) Attempt any one (3 marks) [3]

(i) Find missing frequency for the following data if mean = 61.6 :

X	52	58	60	65	68	70	75
f	7	5	4	--	3	3	2

(ii) The average monthly production of a certain factory for the year is 2542 units. The average production for the first 9 months is 2584 units. Find the average production for the remaining months.

Q3. (a) Attempt any two (4 marks each) [8]

(i) The mean and the variance of a sample size 14 were 22.4 and 9 respectively. If one more item 20 was added to this group, find the mean and standard deviation of the new group.

(ii) The daily high blood pressure of a patient on the last 25 days are given below. Find it's Mean Deviation on Median and its coefficient:

B.P (mmHg) :	102	106	110	114	118	122
Number of days:	3	3	5	8	4	2

(iii) A group of 50 items has mean and standard deviation 61 and 8 respectively. Another group of 100 items has mean and standard deviation 70 and 9 respectively. Find the combined mean and S.D.

(b) Attempt any one (3 marks) [3]

(i) First 4 moments of a data distribution about the mean are 0, 3, 0, and 27 respectively. Comment on the nature of skewness and kurtosis.

(ii) In a series of boys, the mean blood pressure was 120 mmHg and S.D was 10. In the same series mean heights and S.D were 160cm and 5 cm respectively. Find which character shows greater variation?

Q4. (a) Attempt any two (4 marks each) [8]

(i) A certain drug is given to two patients. Probability that the patients A will recover is 4/5 and that of patient B will recover is 5/7. Find the probability that (1) both will recover (2) both will not recover (3) drug is effective.

(ii) Find the central moments and comment about the symmetry and peakedness about the curve for the set of numbers 1, 4, 8, 12 and 15.

(iii) Find Karl Pearson's coefficient of skewness for the following data:

Class:	0-2	2-4	4-6	6-8	8-10
Freq:	5	8	10	5	2

(b) Attempt any one (3 marks) [3]

(i) A random variable 'x' has the following probability distribution.

x	-2	-1	0	1	2	3
P(x)	0.1	k	0.2	2k	0.3	3k

Find k and hence find the expectation and variance.

(ii) Find Bowley's coefficient of skewness of a set of data if sum and the difference of the Quartiles are 97 & 13 and it's median is 46.5.

Q5. (a) Attempt any two (4 marks each) [8]

(i) The probability that an individual suffers a bad reaction from an injection is 1%. If 20 individual are given the injection, what is the probability that (1) Only one suffers the bad reaction (2) At least one suffers the bad reaction

(ii) It is observed that 2% of tablets made by a factory are defective. Find probability that in sample of 200 tablets (1) exactly 5 tablets (2) more than 3 tablets, are defective.

m	1	2	3	4	5	6
e^{-m}	0.3679	0.1353	0.0498	0.0183	0.00673	0.00248

(iii) The life time of a certain kind of pace maker has a mean of 300 days and a standard deviation of 35 days. Assuming that the distribution of life times is normal, find the probability of life time of pace makers (1) more than 370 days. (2) less than 265 days [Given that area between z = 0 and z = 2 is 0. 4772, Given that area between z = 0 and z = 1 is 0.3413]

(b) **Attempt any one (3 marks)** [3]

(i) Fit a straight line of the form $y = a + bx$ for the following data:

Year :	2009	2010	2011	2012	2013
Index:	210	225	245	260	275

Estimate the index for the year 2014.

(ii) Fit an exponential curve $y = a.b^x$, from the following data:

Year	: 2010	2011	2012	2013	2014
Income(in lakhs) :	6	9	14	15	18

Q6. (a) Attempt any two (4 marks each) [8]

(i) Mean weekly sales of Crocin in a medical stores is 146.3 strips per store. After an advertising campaign, the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a SD of 17.2. Was the campaign successful? [Value of t for 21 df at 5% level of significance is 1.72]

(ii) A pharmacy claimed that 95% of the medicines supplied by them confirmed all the quality specifications. An examination of a sample of 200 pieces revealed that 18 were guilty. Test the claim at 1% level of significance, against the alternative hypothesis that the percentage is less than 95. [At 1% level of significance, table value is 2.58]

(iii) Following are weekly sales records (in '000s of Rs) of 3 salesmen A,B and C of a company during 15 sales calls:

A	25	30	36	38	31
B	31	39	38	42	35
C	24	30	28	25	28

Using ANOVA technique to determine whether sales of the 3 salesmen are different. Give value of F for (2,8) df at 5% l.o.s is 4.46 and for (4,8) df at 5% l.o.s is 3.84.

(b) **Attempt any one (3 marks)** [3]

(i) A sample of size 10 has sample mean 12 and sum of squares of deviations from mean is 120. Another sample of size 12 has mean 15 and sum of squares of deviations from mean is 314. Can the two samples be regarded as coming from the same normal population?[Given $F_{0.05}(9,11) = 2.90$ and $F_{0.05}(11, 9) = 3.1$]

(ii) A certain drug was administrated to 456 males out of a total of 720 males in a certain locality to test its efficacy against typhoid. 144 of those administrated the drug were infected by typhoid and 72 males were not infected even though they were not administrated the drug. Test for the efficacy of the drug given that the value χ^2 for 1 DF at 5% los is 3.84.
