

# CS/M.Tech(TT)/SEM-1/MTT-107/2009-10 2009 

## APPLIED STATISTICS \& DESIGN OF EXPERIMENT

## Time Allotted : 3 Hours

Full Marks : 70
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any seven questions. $\quad 7 \times 10=70$

1. Show that if $\bar{x}$ be the A.M. of the values $x_{i}$ weighted by $f_{i}(i=1,2, \ldots n)$ then $\sum_{i=1}^{n} f_{i}\left(x_{i}-\bar{x}\right)=0$. Explain the relationship between A.M., G.M. and H.M. $5+5$
2. Find the missing frequencies in the following frequency distribution, when it is known that A.M. $=11.09$

| Class limits | $9 \cdot 3-$ | $9 \cdot 8-$ | $10 \cdot 3-$ | $10 \cdot 8-$ | $11 \cdot 3-$ | $11 \cdot 8-$ |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $10 \cdot 2$ | $10 \cdot 7$ | $11 \cdot 2$ | $11 \cdot 7$ | $12 \cdot 3-$ | $12 \cdot 8-$ | Total |  |  |  |
| $12 \cdot 7$ | $13 \cdot 2$ |  |  |  |  |  |  |  |  |
| Frequency | 2 | 5 | $f_{3}$ | $f_{4}$ | 14 | 6 | 3 | 1 | 60 |

3. Explain the advantages and disadvantages of different measures of dispersion and explain why S.D. is regarded as superior to other measure of dispersion. What is its main defect?

Find the mean and S.D. of first ' $n$ ' natural numbers. $6+4$

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4. Show that if $\bar{x}$ is the A.M. of the quantities $x_{1}$


Distinguish between statistic and parameter. Explain the difference between standard error and standard deviation.

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5+5
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5. The mean and S.D. of 20 items are found to be 10 and 2 respectively. At the time of checking it was found that one item 8 was incorrect. Calculate mean and S.D. if (i) wrong item is omitted (ii) it is replaced by 12 .

What are the special areas of coefficient of variation ? $6+4$
6. Define p.m.f. and p.d.f. Explain the importance of normal distribution in statistics theory.

Assuming that the height distribution of a group of men is normal. Find the mean and S.D. if $84 \%$ of men have height less than $65 \cdot 2$ inches and $68 \%$ have height lying between $65 \cdot 2$ and $62 \cdot 8$ inches. $5+5$
7. The overall percentage of failure in a certain examination is 40. What is the probability that out of a group of 6 candidates at least 4 passed the examination?

In an industrial establishment, the coefficient of variation of wages of male and female workers were $55 \%$ and $70 \%$ respectively. The S.D. were Rs. 22 and Rs. $15 \cdot 40$ respectively. Calculate the combined average wages for all the workers, if $80 \%$ of the workers were males. $4+6$

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8. In a bolt factory, the machines $M_{1}, M_{2}$ and $M_{3}$ manufacture respectively $25 \%, 35 \%$ and $40 \%$ of the total product. Of their outputs $5 \%, 4 \%$ and $2 \%$ respectively are defective bolts. One bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine $M_{3} ? 10$
9. Suppose that a manufactured product has 2 defects per unit of product inspected. Using Poisson distribution, calculate the probability of finding a product without any defect, 3 defects and 4 defects (Given $e^{-2}=0 \cdot 135$ )

How do you calculate the mean of a grouped frequency distribution? $6+4$

