# BIO-STATISTICS – I ( SEMESTER - 2 )

## CS/HM/SEM-2/BHM-202/09

1. ..... *Signature of Invigilator*

2. ..... *Signature of the Officer-in-Charge*

***Reg. No.*** | | | | | | | | | | | | | | |

***Roll No. of the Candidate*** | | | | | | | | | | | | | | |

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## CS/HM/SEM-2/BHM-202/09

## ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

## BIO-STATISTICS – I ( SEMESTER - 2 )

Time : 3 Hours ] [ Full Marks : 70

***INSTRUCTIONS TO THE CANDIDATES :***

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **40 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question.**
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

**No additional sheets are to be used and no loose paper will be provided**

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**FOR OFFICE USE / EVALUATION ONLY**

Marks Obtained

| | Group – A | | | | | | | | | | Group – B | | | Group – C | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Question Number*** | | | | | | | | | | | | | | | | | ***Total Marks*** | ***Examiner's Signature*** |
| ***Marks Obtained*** | | | | | | | | | | | | | | | | | | |

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**Head-Examiner/Co-Ordinator/Scrutineer**

**2252 (05/06)**

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**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009**

# BIO-STATISTICS – I

**SEMESTER – 2**

Time : 3 Hours ] [ Full Marks : 70

*Graph sheets are provided at the end of the booklet.*

## GROUP – A

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) If the algebraic sum of the deviation of 10 observations measured from 20 is 30, the A.M. of the observations is

a) 23 b) 21

c) 20 d) 19. ☐

ii) If the A.M. of 3, 5, $x$, 12 and 17 be 9, then the value of $x$ is

a) 4 b) 8

c) 7 d) 6. ☐

iii) If for a symmetrical distribution $Q_1 = 24$, $Q_3 = 32$, the median is

a) 27 b) 17

c) 28 d) 23. ☐

iv) The range of the daily wages of 6 persons given by 18, 25, 15, 20, 28, 22 is

a) 10 b) 12

c) 9 d) 13. ☐

v) If for a distribution, $Q_1 = 10$, $Q_2 = 22$ and $Q_3 = 33$, the Quartile deviation is

a) 11·5 b) 12·5

c) 13 d) 12. ☐

vi) If the absolute deviations of 7 observations from mean be 31, 35, 29, 63, 55, 72 and 37, the mean deviation about mean is

a) 43 b) 46

c) 41 d) 40.

vii) If for a frequency distribution mean = 48, S.D. = 18·72, the value of the coefficient of variation is

a) 32 b) 31

c) 39 d) 33.

viii) The A.M. of two observations is 20 and their G.M. is 15. Their H.M. is

a) 9 b) 7

c) 8 d) 10.

ix) The root-mean-square-deviation from mean is known as

a) mean deviation b) standard deviation

c) quartile deviation d) none of these.

x) Area under standard normal curve between $Z = +1$ and $Z = -1$ is

a) 95·45% b) 68·27%

c) 99·75% d) none of these.

xi) Standard deviation is independent of

a) change of origin only b) change of scale only

c) both (a) & (b) d) none of these.

xii) The normal distribution is a

a) continuous probability distribution

b) discrete probability distribution

c) both (a) & (b) depending on the situation

d) neither (a) nor (b).

xiii) Which of the following is a measure of relative dispersion ?

a) S.D. b) Mean deviation

c) Coefficient of variation d) Range.

xiv) To find the average speed of two speeds what type of mean is preferred ?

a) A.M. b) G.M.

c) H.M. d) None of these.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following questions. $3 \times 5 = 15$

2. Ages of 42 employees of a company are given as below :

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 65 | 65 | 67 | 55 | 50 | 65 | 77 | 73 | 30 | 62 | 54 | 48 | 65 |
| 79 | 60 | 63 | 45 | 51 | 68 | 79 | 83 | 33 | 41 | 49 | 28 | 55 | 61 |
| 65 | 75 | 55 | 75 | 39 | 87 | 45 | 50 | 66 | 65 | 59 | 25 | 35 | 53 |

Arrange the data in the form of frequency distribution table in 7 classes of equal width.

3. Following table has some frequencies missing. Given the total frequency = 90 and the median = 57·5, find the missing frequencies :

| Value | 20 - 29 | 30 - 39 | 40 - 49 | 50 - 59 | 60 - 69 | 70 - 79 | 80 - 89 | 90 - 99 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 2 | 12 | 15 | ? | 18 | ? | 9 | 4 | 90 |

4. In a certain examination, the average grade of all students in Class *A* is 68·4 and all students in Class *B* is 71·2. If the average of both classes combined is 70, what is the ratio of the number of students in Class *A* to the number in Class *B* ?

5. The mean weight of 500 students at a certain college is 150 lbs and standard deviation is 15 lbs. Assuming that the weights are normally distributed, find how many students weigh

i) between 120 lbs and 155 lbs

ii) more than 155 lbs

[ Given $\Phi$ ( 2 ) = 0·9772, $\Phi$ ( 0·33 ) = 0·6293 ]

6. Two samples of sizes 40 and 50 respectively have the same mean 53, but different standard deviation 19 and 8 respectively. Find the standard deviation of the combined sample of size 90.

7. Present the following data by a multiple bar chart :

Number of students appeared and passed in BHM examination of WBUT :

| College | Appeared | Passed |
|---|---|---|
| DSMS | 700 | 490 |
| NSHM | 612 | 402 |
| MID | 507 | 390 |
| B. C. Roy | 310 | 250 |

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following questions. 3 × 15 = 45

8. The weight ( in kgs ) of 50 persons are given below :

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 72 | 66 | 55 | 64 | 76 | 57 | 46 | 63 | 52 | 54 | 44 | 73 |
| 53 | 67 | 55 | 47 | 66 | 65 | 56 | 53 | 58 | 61 | 69 | 43 |
| 61 | 72 | 59 | 48 | 74 | 64 | 67 | 58 | 64 | 71 | 63 | 43 |
| 42 | 62 | 52 | 42 | 78 | 64 | 77 | 67 | 59 | 48 | 75 | 65 |
| 55 | 46 | | | | | | | | | | |

a) Arrange the data in a frequency distribution table with class-intervals of 5 kg.

b) Obtain the percentage frequency in each class-interval.

c) Draw histogram and frequency polygon from the table. 5 + 5 + 5

9. a) Two samples of 6 and 5 items respectively gave the following data :

Mean of the first sample = 40

S.D. of the first sample = 8

Mean of the second sample = 50

S.D. of the second sample = 10

Is the difference between the mean at 5% level significant ? ( The value of $t$ for 9 d.f. at 5% level is 2·26 ) 5

b) Define vital statistics. Calculate the

i) crude death rate

ii) specific death rate for each age group, for Town-1 and Town-2 separately.

| **Age-group** | **Town-1** | | **Town-2** | |
|---|---|---|---|---|
| ( Years ) | Population | No. of Deaths | Population | No. of Deaths |
| 0 - 9 | 15,000 | 45 | 6,000 | 150 |
| 10 - 24 | 3,000 | 15 | 5,000 | 20 |
| 25 - 44 | 5,000 | 30 | 6,000 | 30 |
| 45 and over | 500 | 12 | 3,000 | 54 |
| Total | 23,500 | 102 | 20,000 | 254 |

10

10. a) The number of runs scored by cricketers of *A* & *B* during the test for each of 10 innings is shown below :

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Cricketer *A* | 34 | 36 | 45 | 75 | 12 | 61 | 40 | 58 | 82 | 11 |
| Cricketer *B* | 47 | 38 | 52 | 42 | 36 | 54 | 48 | 34 | 50 | 54 |

Make a comparative study of their batting performance. 10

b) The mode of the following distribution is Rs. 66. Find the missing frequency. 5

| Daily wages ( Rs. ) | 30 - 40 | 40 - 50 | 50 - 60 | 60 - 70 | 70 - 80 | 80 - 90 |
|---|---|---|---|---|---|---|
| No. of workers | 8 | 16 | 22 | 28 | ? | 12 |

11. a) Draw ogive or calculate frequency curve from the following frequency distribution :

| Wages ( Rs. ) | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 | 60 - 70 | 70 - 80 |
|---|---|---|---|---|---|---|---|
| No. of workers | 5 | 10 | 12 | 36 | 8 | 5 | 4 |

Also calculate the median ogive. 10

b) The A.M. of 25 observations is 44. Later on, it was found that two of the observations 34 and 46 were wrongly copied as 28 & 42. Find the correct A.M. 5

12. Ages of 42 employees of a company are given as below :

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | 65 | 65 | 67 | 55 | 50 | 65 | 77 | 73 | 30 | 62 | 54 | 48 | 65 |
| 80 | 60 | 63 | 45 | 51 | 68 | 79 | 83 | 33 | 41 | 49 | 28 | 55 | 61 |
| 66 | 75 | 55 | 75 | 39 | 87 | 45 | 50 | 66 | 65 | 59 | 25 | 35 | 53 |

a) Arrange the data in the form of a frequency distribution table in 6 classes of equal width.

b) Find the class boundaries and cumulative frequencies ( less than type ) from the given data.

c) Draw an ogive for the above data and hence obtain the median value graphically. Check it against the calculated value.

d) From the above data, calculate the percentage of the employees who have age

i) less than 35

ii) between 35 and 60 and

iii) above 60. 15

13. a) The percentage of literacy in West Bengal is shown below separately for males and females for 4 years :

| Years | 1941 | 1951 | 1961 | 1971 |
|---|---|---|---|---|
| Males | 27·4 | 34·1 | 40·1 | 44·8 |
| Females | 3·9 | 12·3 | 17·0 | 22·1 |

Represent the above data by a suitable diagram. 7

b) Represent the following data of the distribution of expenditure by a suitable diagram :

| Particulars | Expenditure ( Rs. lakhs ) |
|---|---|
| Raw materials | 1689 |
| Taxes | 582 |
| Manufacturing expenses | 543 |
| Employees | 470 |
| Other expenses | 286 |
| Depreciation | 94 |
| Dividends | 75 |
| Retained income | 51 |
| Total expenditure | 3790 |

8

14. a) Calculate the standardized death rates for Town I and Town II from the following data : 10

| Age group | Specific death rate ( per thousand ) | | Standard Population |
|---|---|---|---|
| | Town I | Town II | |
| 0 - 9 | 30 | 25 | 2,200 |
| 10 - 24 | 5 | 6 | 3,000 |
| 25 - 44 | 6 | 5 | 2,700 |
| 45 & over | 24 | 28 | 2,100 |
| Total | | | 10,000 |

b) In 1981, a city had a total 507 thousand live births, while its total population was 27,512 thousand and total female population in the age group 15-49 was 7,576 thousand. Obtain the crude birth rate and the general fertility rate. 5

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