

**B.C.A. DEGREE (C.B.C.S.S.) EXAMINATION, NOVEMBER 2012****First Semester****Complementary Course—BASIC STATISTICS**

Time : Three Hours

Maximum Weight : 25

*Use of Scientific calculators and Statistical tables are permitted.***Part A (Objective Type)**

- I. 1. Sampling is inevitable in the situation of :
- (a) Blood test of a person. (b) When the population is infinite.  
(c) Test of life of dry battery cells. (d) All the above.
2. The most appropriate diagram to present quantitative data on a geographical basis is :
- (a) Bar diagram. (b) Pictogram.  
(c) Cartogram. (d) None of these.
3. The class interval of the continuous grouped data 10–19, 20–29, 30–39, 40–49, 50–59 is :
- (a) 14.5. (b) 9.  
(c) 4.5. (d) 10.
4. Histogram is suitable for presenting :
- (a) Continuous grouped frequency distribution.  
(b) Discrete grouped frequency distribution.  
(c) Individual series.  
(d) All the above.
- II. 5. If a constant 5 is added to each observation of a set, the mean is :
- (a) Increased by 5. (b) Decreased by 5.  
(c) 5 times the original mean. (d) Not affected.
6. If the AM of a set of two numbers is 9 and its GM is 6, then the HM of the set of observations is :
- (a) 4. (b)  $3\sqrt{6}$ .  
(c) 3. (d) 1.5.
7. If a constant 2 is added to each observation of raw data whose variance is  $\sigma^2$ , then the variance of the new set is :
- (a)  $\sigma^2$ . (b)  $4\sigma^2$ .  
(c)  $2 + \sigma^2$ . (d)  $4 + \sigma^2$ .

**Turn over**

8. The percentage of items lying between upper and lower quartile in a distribution is :
- (a) 80 per cent. (b) 40 per cent.  
(c) 50 per cent. (d) 25 per cent.
- III. 9. The number of ways of arranging 4 books on a shelf is :
- (a) 4. (b) 12.  
(c) 24. (d) 16:
10. Two mutually exclusive events A and B are :
- (a) Always independent.  
(b) Never independent.  
(c) Never independent if  $A \neq \phi, B \neq \phi$ .  
(d) None of these.
11. The probability for a randomly chosen month to have its 10<sup>th</sup> day as Sunday is :
- (a)  $\frac{1}{84}$ . (b)  $\frac{1}{12}$ .  
(c)  $\frac{10}{84}$ . (d)  $\frac{1}{7}$ .
12. If  $P(A) = \frac{1}{4}$ ,  $P(\bar{B}) = \frac{1}{2}$  and  $P(A \cup B) = \frac{5}{9}$ , then  $P(A|B)$  is \_\_\_\_\_.
- (a)  $\frac{7}{72}$ . (b)  $\frac{7}{18}$ .  
(c)  $\frac{7}{9}$ . (d)  $\frac{7}{36}$ .
- IV. 13. In a probability distribution of a random variable X, the sum of the probabilities is always :
- (a) 0. (b) 1.  
(c) Less than 1. (d) None of these.
14. The probability density function of X of a continuous random variable X with distribution function :

$$F(x) = 0, x < 0$$

$$= 1 - \frac{1}{4}e^{-x}, x \geq 0 \text{ is}$$

- (a)  $e^{-x}$ . (b)  $\frac{1}{4}e^{-x}$ .  
(c)  $\frac{1}{4}e^x$ . (d)  $e^x$ .

15. If  $X$  is a random variable with mean  $\mu$ , the expression  $E(X - \mu)^2$  represents :
- (a) Standard deviation of  $X$ .                      (b) Mean deviation of  $X$ .  
 (c) Second central moment.                      (d) None of these.
16. If  $X$  and  $Y$  are independent random variables, then  $V(X - Y)$  is :
- (a)  $V(X) - V(Y)$ .                      (b)  $V(X) + V(Y) - 2 \text{Cov}(X, Y)$ .  
 (c)  $V(X) + V(Y)$ .                      (d)  $V(X) + V(Y) + 2 \text{Cov}(X, Y)$ .

(4 × 1 = 4)

**Part B***Answer any five questions.**Weight 1 each.*

17. Point out the important functions of statistics.
18. What are the advantages and disadvantages with the primary data ?
19. A mathematics teacher tabulated the marks secured by 35 students of the 8<sup>th</sup> class. The average of their marks was 72. If the marks secured by Reema was written as 36 instead of 86, find the correct average marks up to two decimal places.
20. How will you compute median for a grouped frequency distribution ?
21. The coefficient of variation of two series are 60% and 70% and their standard deviations are 21 and 16 respectively. What are their means ?
22. The probability that a man will live for 10 more years is  $\frac{1}{4}$  and that his wife will live for 10 more years is  $\frac{1}{3}$ . What is the probability that neither will be alive in 10 years ?
23. If  $A$  and  $B$  are independent events, show that  $A$  and  $B'$  are independent.
24. State the properties of distribution functions of a random variable.

(5 × 1 = 5)

**Part C***Answer any four questions.**Weight 2 each.*

25. How will you draw histogram for a frequency distribution with (i) equal width (ii) unequal width ?
26. Calculate the average speed of a car running at the rate of 15 km.p.h. during the first 30 kms, at 20 km.p.h. during the second 30 kms and at 25 km.p.h during the third 30 kms.

**Turn over**

27. A person is known to hit the target in 3 out of 4 shots, whereas another person is known to hit the target in 2 out of 3 shots. Find the probability of targets being hit at all when they both try.
28. Examine whether the following is a probability density function :

$$\begin{aligned}
 f(x) &= \frac{x}{2}, 0 \leq x \leq 1 \\
 &= \frac{1}{2}, 1 \leq x \leq 2 \\
 &= \frac{1}{2}(3-x), 2 \leq x \leq 3 \\
 &= 0 \quad \text{elsewhere.}
 \end{aligned}$$

29. A random variable X has the following probability distribution :

$X = x_i$	:	1	2	3	4
$P(X = x_i)$	:	0.1	0.2	0.3	0.4

Find the mean and standard deviation of X.

30. Show that the moment generating function of sum of two independent random variables is the product of their moment generating functions.

(4 × 2 = 8)

#### Part D

Answer any two questions.

Weight 4 each.

31. Draw a less than cumulative frequency curve for the data and hence determine (a) the median, (b) the quartile deviation.

Marks	:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Number of Students	:	10	40	80	140	170	130	100	70	40	20

32. How will you compute standard deviation for (a) a raw data ? (b) ungrouped frequency distribution, (c) grouped frequency distribution ?
33. (a) State and prove Baye's theorem.

- (b) In a certain town 40% persons have brown hair, 25% have brown eyes and 15% have both. If a person selected at random has brown hair, find the probability that a person selected at random with brown hair is with brown eyes.

(2 × 4 = 8)