SAMPLE QUESTION PAPER
STATISTICS
Class-XII

Time allowed :- 3 Hours 15 Minutes **Full Marks - 70**

Part- I

Answer the following Questions:- 1x10=10

1. If $x^2+y^2=a^2$, which one of the following is the value of $\frac{dy}{dx}$?

   i) $\frac{x}{y}$ ii) $\frac{-x}{y}$ iii) $\frac{y}{x}$ iv) $\frac{-y}{x}$

2. Which one in the following is the value of $\int_0^1 \frac{dx}{x^2+=1}$?

   i) $\frac{\pi}{2}$ ii) $\frac{\pi}{4}$ iii) π iv) $\frac{3\pi}{4}$

3. If $y= \log(x^2-5)$ and $\frac{dy}{dx} = \frac{kx}{x^2-5}$.
   find the value of k.

4. If A_1, A_2, A_3 are equally likely, mutually exclusive and exhaustive, then $P(A_1)$ equals : 1, 0, $^1/_2$, $^1/_3$

5. A continuous random variable x, which can assume any value in the interval (a,b) i,e, $a \le x \le b$, then $\int_a^b f(x)\,dx$ is 0, 1, –1, none of these.

6. From a population with 20 members a random sample without replacement of 2 members is taken. Which of the following is the possibe number of all such samples 400, 40, 380, 190?

7. Power of a critical region for testing H_o against H_1 is i) P [rejecting H_o when H_1 is true] ii) P[rejecting H_o when H_o is true], iii) P[Accepting H_o when H_0 is true].

8. Pick out the correct answer : If you are given that the total Fertility Rate is 2006 (per thousand) and sex ratio at birth is 1 male to 1 female, then the Gross Reproduction Rate will be i) 1.003, ii) 1003, iii) 2.006 and iv) none of these.

9. Define Age Specific Fertility Rate.

10. What is Vital Index?

Part-II

Answer all questions : 2x6=12

11. Obtain the value of $\int_0^2 |1-x|\,dx$.

12. Obtain the value of $\int_0^{2a} \sqrt{2ax-x^2}$

13. Show that $r^2=byz.\ bzy$,when the symbols have their usual meanings.

14. x follows a normal distribution whose mean is 12 and s.d is 4. Find $p(x \geq 20)$ given $\int_{-\infty}^{2} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt = 0.9772499$.

15. Distinguish between Statistic and Parameter, giving examples.

16. Define Gross Reproduction Rate (G.R.R) and Net Reproduction Rate (N.R.R).

Part-III

Answer all questions: 3x6=18

17. Find $\frac{dy}{dx}$ where $x=y \log(xy)$

18. Prove that the Product moment correlation coefficient (r) lies between - 1 and +1.

or

Two variates have the least squares regression lines $x+4y+3=0$ and $4x+9y+5=0$. Find their mean values and the correlation coefficient.

19. State and prove the addition theorem of Probability for two mutually exclusive events

or

A and B throw alternately with a pair of dice. A wins if he throws 6 before B throws 7, and B if he throws 7 before A throws 6. If A begins, show than his chance of winning is $\frac{30}{61}$

20. Find the mean and variance of the poisson distribution.

21. What is meant by a test of a null hypothesis? What are type I and type II errors?

22. Distinguish between best linear unbiased estimator (BLUE) and Minimum variance unbiased estimator (MVUE).

Part-IV

Answer all questions: 5x6=30

23. Obtain the value of $\lim_{x \to \infty} \frac{1^m+2^m+3^m+....+n^m}{n^m+1}$

or

Obtain the value of $\int_{-\infty}^{\infty} x^{2n} e^{-x^2} dx$ when $n>0$.

24. If x and y are two correlated variables with same variance and the correlation coefficient is r, find the regration coefficient of x on (x+y) and that of (x+y) on x. Hence find correlation coefficient between x and (x+y).

or

i) Derive the regression equation of y on x.
ii) If $s_y^2 = s_x^2$, Show that x+y and (x–y) are uncorrelated. 3+2.

25. Find the mode of binomial distribution with parameter n and p.

26. The contents of three vessels 1,2,3 are as follows: 1 White, 2 Red, 3 Black balls,
2 White, 3 Red, 1 Black balls,
3 White 1 Red, 2 Black balls.

A vessel is chosen at random and from it two balls are drawn at random. The two balls are one Red and one White. What is the probability that they came from the 2nd vessel?

or

i) The probalility that Ashok can solve a problem in Businens Statistics is $^4/_5$, that Amal can solve it is $^2/_3$, and that Abdul can solve it is $^3/_7$ If all of them try independently, find the Probability that the problem will be solved.
ii) The Probability that a teacher will give a Surprise test during any class meeting is $^1/_5$. If a student is absent on two days, What is the probability than he will miss at least one test? 3+2=5

27. The proportion of defectve items in a large lot of items is P. To test the hypothesis P=0.2, we take a random sample of 8 items and acept the hypothesis if the number of defectives in the sample is 6 or less. Find the probability of type I error of the test. What is the type II error if P=0.3?

28. A population consists of 5 members (2,3,6,8,11). Consider all possible samples of size two which can be drawn with replacement from this population. Calculate the S.E. of sample means.

or

i) The mean m of a certain population is equal to the S.E of mean of random sample of size 100 from that population. Find out the S.E of the mean of random sample of size 36 from the population, in terms of m (Assume that the population size is very large).
ii) If a random variable x is distributed normally around a mean 20 with a S.D 3, describe the important charac teristics of the probability distribution $y=\frac{x-20}{2}$ 3+2=5