D2AEC2304 **(3 Pages)** **Name.....**
Reg.No.....

SECOND SEMESTER M.A. DEGREE EXAMINATION, APRIL 2024

(Regular/Improvement/Supplementary)

ECONOMICS

FECO2C08: QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS II

Time: 3 Hours **Maximum Weightage: 30**

Part A: Multiple choice questions. Answer *all* questions. Each carries $^{1}/_{5}$ weightage.

1. $\overline{(A \cup B)}$ is …….
   ($\bar{A} \cap B$) (b) ($A \cap \bar{B}$) (c) ($\bar{A} \cap \bar{B}$) (d) ($\bar{A} \cup \bar{B}$)
2. Which of the following is an axiomatic approach to probability?
   (a) $0 \leq P(A) \leq 1$ (b) $P(S) = 1$
   (b) $P(A \cup B) = P(A) + P(B)$ where $A \cap B = \varphi$ (d) all the above
3. Two random variables x an y are said to be independent if …….
   (a) $E(x + y) = E(x) + E(y)$ (b) $E(x\ y) = E(x)\ E(y)$
   (c) $E\ (x/y) = E(x)/E(y)$ (d) None of these
4. $V(ax + b)$ is equal to:
   (a) $V(ax)$ (b) $V(ax) + b$ (c) $a^2V(x)$ (d) $aV(x)$
5. In a Binomial Distribution with parameters n and p the relationship between mean and variance is …….
   (a) Mean = Variance (b) Mean $<$ variance
   (c) Mean $>$ variance (d) None of these
6. Which of the following is an instance of Poisson Distribution which can be applied?
   (a) Number of male births in a day in a hospital.
   (b) Number of defective articles produced in a factory in a day.
   (c) Number of deaths due to road accidents in a day in a city.
   (d) All the above.
7. The difference between statistic and parameter is called …….
   (a) standard error (b) Non sampling error
   (c) Sampling error (d) Probable error
8. The area under a standard normal curve beyond the lines $Z = \pm 1.96$ is …….
   (a) 95% (b) 90% (c) 10% (d) 5%
9. The degrees of freedom for student's 't' distribution based on a random sample of size n is …….
   (a) n – 1 (b) n (c) n – 2 (d) $(n - 1)/2$
10. An estimator is a function of …….
    (a) Population observations (b) Sample observations
    (c) Mean and Variance of a population (d) None of the above

(P.T.O.)

11. In estimating parameter of a linear function, most commonly used method of estimation is …….
    (a) Maximum likelyhood method (b) Least square Method
    (c) Method of moments (d) None of these
12. A hypothesis may be classified as …….
    (a) Simple (b) Composite (c) Null (d) All the above
13. When we reject a null hypothesis the test is said to be …….
    (a) Insignificant (b) Significant (c) Intangible (d) All the above
14. Which is the more severe kind of error?
    (a) type I error (b) type II error
    (c) Both are equally severe (d) No error is severe
15. Which of the following is not generally a two sample test?
    (a) Sign test (b) Willoxan matched pair signed rank test
    (c) Warld – Wolfowitz run test (d) Kruskal– Wallis test

(15 × $^{1}/_{5}$ = 3 weightage)

Part B: Very short answer questions. Answer any five questions. Each carries 1 weightage.

16. State and prove addition theorem on probability for two events.
17. Define mathematical expectation. What are its properties?
18. Define binomial distribution. Mention its mean and variance.
19. Define lognormal distribution.
20. What do you mean by standard error? How it is related to the sample size n?
21. Explain maximum likelihood method of estimation.
22. Distinguish between parametric and non – parametric tests of hypothesis.
23. Explain Mann Whitney U test.

(5 × 1 = 5 weightage)

Part C: Short answer questions. Answer any seven questions. Each carries 2 weightage.

24. Define conditional probability. Box I contains 4 white and 5 black balls. Box II contains 5 white and 3 black balls. A ball is transferred from Box I to Box II and then a ball is taken from box II. What is the probability that it is a black ball?
25. Distinguish between discrete and continuous random variables. Give two examples for each.
26. Describe the salient features of Binomial Distribution and Poisson Distribution in usual symbols.
27. If x is normally distributed with mean 64 and variance 144. Find the probability that:
    (i) $x \geq 67$ (ii) $60 \leq x \leq 67$ (iii) $x \leq 64$.
28. Establish the interrelationship between t, χ^2 and F distributions. Define: (i) χ^2 - statistic (ii) t - statistic (iii) F – statistic.
29. Obtain 99% confidence limits for μ of the normal distribution N(μ,σ^2) with the help of a random sample of size n.
30. 150 heads and 250 tails resulted from 400 tosses of a coin. Find 95% confidence interval for the probability for a head.

31. A new sterio needle was introduced in the market claiming that it has an average life of 200 hours with a standard deviation of 21 hours. This claim came under severe criticism from dissatisfied customers. A customer group tested 49 needles and found that they have an average life of 191 hours. Is the claim of the manufacturer justified?
32. The following data give the gains in the weights of 20 rats, half of which received their protein from raw peanuts and other half from roasted peanuts. Test whether the roasting has any effect at 5% level of significance.

Raw	62	60	56	63	56	63	54	56	44	61
Roasted	57	56	49	61	55	61	57	54	62	58

33. Following figures related to production in kgs of wheat of three varieties A, B and C in 12 plots.

A	34	36	38		
B	34	33	35	42	
C	38	36	39	39	42

Use Kruskal - Wallis test to test if there is significant difference in production in the three varieties at 5% level of significance.

(7 × 2 = 14 weightage)

Part D: Essay questions. Answer any *two* questions. Each carries 4 weightage.

34. Fit a Poisson Distribution to the following data and test the goodness of fit.

No. of deaths (x)	0	1	2	3	4
Frequency (f)	122	60	15	2	1

35. In a normal distribution 58% of the items are under 75 and 4% are over 80. Find the mean and standard deviation of the distribution.
36. Explain how will you determine the $100(1-\alpha)$% confidence interval for the mean and variance of a normal population.
37. Four salesmen recorded their sales of refrigerator in three seasons as follows. Find out if there is any significant difference between in sales by salesman and by seasons.

Seasons		Sales man			Total
	A	B	C	D	
Summer	300	360	210	350	1280
Winter	280	290	310	320	1260
Monsoon	260	280	290	290	1120
Total	900	930	810	960	3660

(2 × 4 = 8 weightage)