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Section-A

[Answer *all* Questions. Each question carries *one* mark]

1. Which of the following is not casualty insurance?

   a)Automobile   b) Home   c) Health   d) Life insurance.

2. The set of all possible pay-offs displayed in a table is called

   a) Zero matrix   b) Pay-off matrix   c) Unit matrix   d) None

3. Aggregate claims amounts may be modeled using ………… distribution.

   a)Discrete   b) Compound   c)Conditional   d) Continuous

4. If security loading, $\theta=0.4$. The premium income per annum is 40% …………..the expected rate of claims outgo.

   a) Less than   b) Greater than   c) Equal to   d) None of these

5. Obtain the variance of the claim random variable X, where q=0.04 and the claim amount is fixed at 50.

   a) 0.12   b) 96   c).25   d) 0.2

6. Saddle point is also called

   (a) Critical point   (b) Turning point   (c) equalitarian point   (d) None of these

Fill in the blanks

7. The actual premium that the direct writer gets to keep after making any payments for reinsurance is called ……..

8. The original amounts without adjustment for reinsurance are referred to as ………….

9. The number of claims that will occur over a certain period is called …….

10. …………… is the percentage by which the rate of premium income exceeds the rate of claim outgo.

11. Under Negative binomial distribution $E[N]$ is …………… $Var[N]$.

12. …………… is the maximal excess of aggregate claims over premiums received.

                                          (12 x 1=12 Marks)

Section-B
[**Answer any seven questions. Each question carries *two* marks**]

13. Define Minimax criterion

14. Let S denote the total amount of rain that falls at a weather station in a given month. How would you model S as a random sum?

15. Define individual risk model.

16. What you meant by maximal aggregate loss?

17. Obtain the mean and variance of the claim random variable X. where q=0.06 and the claim amount is fixed at B.

18. Suppose $X \sim exp(\mu)$ and $N \sim Geo(p)$. Find $M_S(t)$.

19. What do you mean by Convolution?

20. What you meant by probability of ruin?

21. State the two main types of Proportional reinsurance arrangements. How do they differ from each other?

(**7x2=14 Marks**)

Section-C
[**Answer *any six* Questions. Each question carries *five* marks**]

22. Explain inverse Gaussian distribution.

23. What do you mean by "Statistical games"? Explain how statistical games differ from the game theory.

24. The probability of a claim arising on any given policy in a portfolio of 1,000 one year term assurance policies is 0.004. Claim amounts have a *Gamma* (5, 0.002) distribution. Find the mean and variance of the aggregate claim amount.

25. The number of claims arising from a particular group of policies has a negative binomial distribution wit parameters k=4 and p= 0.8. Individual claim amounts have the following distribution P(X=500)=0.5. P(X=1000)=0.25 and P(X=2000)=0.25. The aggregate claim is denoted by S. calculate P(S≤20000) using normal approximations.

26. Suppose that N takes the values 0. 1. 2 with probabilities 0.5. 0.3. 0.2. respectively. and X takes the values 1. 2. 3 with probabilities 0.4. 0.2. 0.4. respectively. Find the distribution of S.

27. A compound distribution $S = X_1 + X_2 + \ldots + X_N$ has claim number distribution:

$P(N = n) = 9(n+1)4^{-n-2}$, $n = 0,1,2,\ldots$

If the individual claim size distribution X is exponential with a mean of 2, what are the values of $E(S)$ and var(S) ?

28. Describe the model for individual claim random variable.

29. If the claims distribution with P(1)=P(2)=1/2, then determine θ if it is given that R=log3.

(6x5=30 Marks)

Section-D
[Answer *any three* Questions. Each question carries eight marks]

30. Explain various reinsurance arrangements.

31. Define adjustment coefficient. Derive an expression for adjustment coefficient in the special case where Wi's common distribution is $N(N(\mu, \sigma^2))$.

32. a) Show that sums of independent compound Poisson random variables is itself a Compound Poisson random variable.

b) If N has a Poisson distribution with mean λ, show that

$M_S(t) = \exp(\lambda (M_X(t) - 1))$.

33. Derive the formula for the expectation and variance of aggregate claims, S.

34. (i) Explain collective risk models.

(ii) Let X denote the amount of claim takes values 1,2 and 3 with respective probabilities 0.3, 0.4 and 0.3 and N denote the frequency of claims with possible values 0, 1 and 2 with probabilities 0.4,0.5 and 0.1 respectively. Find the probability distribution of total claims over the period.

(3x8=24 marks)

1B4M19221   (Pages : 3)   Reg. No:...........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester BSc Mathematics Degree Examination, March /April 2019

BSTA4C04 – Applied Statistics

(2017 Admission onwards)

Time: 3 hours   Max. Marks : 80

Part A
(Answer all questions)

1. Random sampling is also referred as...........
2. A sample containing all the relevant characteristics of the population is called .... sample.
3. Sampling errors can be reduced by .... the size of the sample.
4. The assumptions in analysis of variance are.........,............. and................
5. The analysis of variance technique is appropriate for testing equality of several population...................
6. Forces of rhythmic nature cause...........
7. An additive model of time series with the components T, S, C and I is.........
8. The normal equations to find 'a' and 'b' in straight line trend given by Y= a+bX are .... and............
9. The formula for simple price index number by aggregate expenditure method is........
10. Time reversal test is satisfied when.........
11. Basic types of variations in mass-production item are...........and............
12. The two ways in which statistical quality control is done are......... and............

(12×1=12 marks)

Part B
(Answer any seven questions)

13. What is census method?
14. What is non sampling error?
15. What do you mean by random sampling?
16. What is meant by the term 'treatment' in ANOVA ?
17. What is meant by trend?
18. Define cyclical variation.
19. What are simple index numbers?
20. Why Fisher's index number is called ideal?
21. When is a process said to be under statistical control?

(7×2=14 marks)

Part C
(Answer any six questions)

22. Explain why a sample survey is usually preferred to a census survey.
23. What are the qualities of a good questionnaire?
24. Explain clearly the technique of ANOVA for data with one–way classification.
25. Explain seasonal variations in a time series. Mention the various methods of determining it.
26. What are the uses of time series analysis?
27. Describe the procedure followed in the construction of index numbers.
28. What are p and np charts?
29. The following are the number of defects noted in the final inspection of 30 bales of woollen cloth: **0,3,1,4,2,2,1,3,5,0,2,0,0,1,2,4,3,0,0,1,2,4,3,0,0,1,2,4,5,9.**
    Draw a control chart of C. plot the given data and comment on the state of control

(6×5=30 marks)

Part D
(Answer any three questions)

30. Define sampling. Explain different methods of sampling.
31. Four experiments determine the moisture content of soil samples, each observer taking a sample from each of four fields. Their observations are:

Observers	Fields			
	I	II	III	IV
1	19	17	19	20
2	22	21	19	21
3	21	26	24	22
4	22	20	23	24

Perform an analysis of variance of these data and discuss whether there is significant difference between fields or between observers.

32. Find the seasonal variation index for each quarter for the following data on value added (in Rs. millions) of a firm.

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1967	8	11	9	34
1968	34	52	50	44
1969	40	58	54	48
1970	54	76	68	62

33. Calculate Fisher's index number for the following data

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	6	50	9	55
B	2	100	3	125
C	4	60	6	65
D	10	30	14	2

34. From a factory producing metal sheets, a sample of 5 sheets is taken every hour and the data obtained are as follows.

Sample number	Mean thickness of sheets	Sample range
1	0.025	0.025
2	0.032	0.048
3	0.042	0.012
4	0.022	0.019
5	0.028	0.019
6	0.010	0.010
7	0.025	0.006
8	0.040	0.046
9	0.026	0.010
10	0.029	0.032

Draw a control chart for mean and range and examine whether the process is under control or not.

(3×8=24 marks)

B4M19220   (Pages : 2)   Reg. No:...........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester BSc Statistics Degree Examination, March /April 2019

BSTA4B04 – Testing of Hypotheses

(2017 Admission onwards)

Time: 3 hours   Max. Marks : 80

Part A
Answer All Questions.
Each question carries 1 mark

1. Which of the following is a simple hypothesis about Binomial distribution?

   a)H: $n = 6$, $p \leq 0.4$ b) H: $n = 6$, $p \geq 0.4$ c) H: $n = 6$, $p = 0.4$ d) H: $n=6$, $p \neq 0.4$

2. Acceptance of a wrong null hypothesis is known as

   a)Type I error   b) Type II error   c) size of the test   d) power of the test

3. Large sample tests are application of ....

   a)Central Limit Theorem   b) Chebechev"s Inequality

   c) Law of Large Numbers   d)none of these

4. The sampling distribution of sample proportion is ?

   a)Normal   b) Uniform   c) Poisson   d) Binomial

5. Test used for equality of several population means is.....?

6. For testing independence of two attributes using r x s contingency table, the degrees of freedom of test statistic is maximum........?

7. The joint probability function of sample is called ......?

8. ....test is used for testing significance of observed correlation coefficient?

9. If a test statistic has p-value 0.25, then the null hypothesis is .... At 5% level of significance.

10. ......test account both sign and magnitude of differences of observations from hypothesised value?

11. Sampling distribution of number of runs is ...?

12. The Non parametric test used for testing goodness of fit is ....?

(12 x 1 = 12 Marks)

Part B
Answer Any Seven Questions.
Each question carries 2 marks

13. Define level of significance and power of test

14. Give one example for one sided and two sided hypothesis.

15. Define Critical Region.

16. Define p – value

17. Define UMP test.

18. State the test statistic used for testing independence using 2x2 contingency table

19. State merits and demerits of Non Parametric tests.

20. State the statistic used for testing equality of two population variances.

21. Define run

$(7 \times 2 = 14$ Marks$)$

Part C
Answer Any Six Questions.
Each question carries 5 marks

22. Let X be a single observation taken from Poisson population for testing $H_0: \lambda = 2$ against $H_1: \lambda = 4$, H_0 is rejected when $X \geq 3$. Find size and power of the test.

23. A die is rolled 180 times and the frequencies of the faces were observed as 27, 32, 31, 25, 29, 36 respectively. Test whether the die is fair?

24. Briefly explain large sample test for equality of two population means

25. A machine was producing 30 defective items out of 400 and after overhauling the machine, a random sample of 100 items gave 5 defectives. Does the efficiency of machine improved?

26. Briefly explain Wilcoxon Signed Rank test

27. The following data gives score of students before and after an coaching programme

Student	1	2	3	4	5	6	7	8	9
Before	47	64	51	72	60	56	49	58	67
After	53	65	57	73	61	55	51	56	64

Test whether training was effective?

28. A random sample of 15 observations from a normal population gave mean of 48 and standard deviation of 2.6. Test whether 1) population mean is 50, 2) population variance is 7.

29. Briefly explain Median test.

$(6 \times 5 = 30$ Marks$)$

Part D
Answer Any Three Questions.
Each question carries 8 marks

30. State and prove Neymman Pearson Lemma.

31. The following is observations of random samples taken from two independent normal populations

Sample 1 : 26, 29, 32, 34, 30, 28

Sample 2 : 27, 30, 32, 31, 29

Test for the significant difference of population mean and variance.

32. Fit a Poisson distribution and test goodness of fit

Value (x)	0	1	2	3	4	5	6
Frequency	52	95	104	75	47	21	6

33. Briefly explain 1) Mann – Whitney test 2) Kruskal Wallis Test

34. Explain chi square test for independence of attributes.

$(3 \times 8 = 24$ Marks$)$

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester   BSc Psychology Degree Examination, March /April 2019
BSTAT(PSY4)C02 – Psychological Statistics
(2017 Admission onwards)

Time: 3 hours   Max. Marks : 80

Section-A
[Answer all Questions. Each question carries one mark]

1. If there are 6 possible classes under considerations for goodness of fit, the number of degrees of freedom will be

   (a) 6   (b) 5   (c) 4   (d) None of these

2. The ----------- test is calculated by taking the difference between two sets of scores and ranking them from highest to lowest

   (a) Independent t test   (b) Wilcoxon Test (c) Kruskall Wallis Test (d) None of the above

3. ANOVA is used when

   (a) There are more than two groups   (b) There is only two groups to be compared

   (c) Significant difference between two means is to be found   (d) None of these

4. Which one of the following is the most powerful scale

   (a) Ordinal   (b) Nominal   (c) Interval   (d) Ratio

5. In a Wilcoxon Rank sum test

   (a) Ties never affect the decision   (b) Ties always affect the decision

   (c) Ties within one sample may affect the decision

   (d) Ties between the two samples may affect the decision

6. When testing for randomness, we can use

   (a) Sign test   (b) Mann- Whitney U test   (c) Run test   (d) None of these

7. Reliability of measurement is concerned with

   (a) Systematic error   (b) Relevance   (c) Consistency   (d) Proven value

8. The null hypothesis for the chi square test of independence should specify

   (a) That the two numerical variables are independent

   (b) That the two numerical variables are dependent

   © That the two categorical variables are dependent

   (d) That the two categorical variables are independent

9. Parametric statistical test are applied when the data is collected in

(a) Nominal scale only   (b) Interval scale only (c) Ratio scale only (d) Interval or Ratio

10. Chi square test statistic to test $H_0 : \sigma^2 = \sigma_0^2$ based on a sample of size n has degrees of freedom equal to

(a) $n-1$ (b) n (c) $n+1$ (d) None of these

Fill in the blanks

11. In an ANOVA table, if total sum of squares is 258 with d.f 19 and sum of squares between sample is 50 with d.f 3, the mean error sum of squares is--------

12. The degrees of freedom for the chi square test statistic when testing for independence in a contingency table with 5 rows and 3 columns would be...............

(12x1=12 Marks)

Section-B
[Answer any seven questions. Each question carries *two* marks]

13. What are the characteristics of ANOVA

14. Define degrees of freedom

15. What are the advantages of non parametric test

16. What is meant by ordinal scale

17. Write down the test statistic under test of homogeneity of proportions and define each term

18. What is meant by test validity

19. A random sample of size 10 from a normal population gave the following values. 65, 72, 68, 74, 77, 61, 63, 69, 73, 71. Test the hypothesis that the population variance is 32 at 5% level of significance.

20. What are contingency tables

21. Define logistic regression

(7x2=14 Marks)

Section-C
[Answer *any six* Questions. Each question carries *five* marks]

22. Discuss the χ^2 test of goodness of fit of a theoretical distribution to an observed frequency distribution

23. Outline the various steps for ANOVA testing in one way classification

24. Explain how the sign test is used to compare two populations

25. What are the chief features of a good questionnaire? What precautions to be taken while drafting a questionnaire

Briefly explain Fisher's exact test

A random sample of 10 women is selected and their weights (lbs), before and after they are put on a new diet, are recorded as given below

Weights before diet	180	178	165	200	160	145	170	210	185	155
Weights after diet	174	181	157	198	152	150	160	205	178	160

Use the Wilcoxon signed rank test at 5% level of significance to test the claim that the new diet is effective in reducing weight.

8. The observed frequency of cells such as (1,1),(1,2), (1,3), (2,1), (2,2), and (2,3) are respectively 40,35,55,30,65 and 75. Obtain the value of χ^2 statistic

9. Describe the Kruskal- Walli's test for testing if k independent samples have been drawn from populations with the same distribution **(6x5=30 Marks)**

Section-D

[Answer *any three* Questions. Each question carries eight marks]

0. A farmer uses 3 types of fertilizers as four varieties of crops A, B, C, D and the yields are given in the table. Check for the significance of varieties and fertilizers at 5% level of significance

		Varieties			
		A	B	C	D
Fertilizers	F_1	6	7	8	7
	F_2	9	6	7	8
	F_3	4	6	5	5

31. (a) Describe how χ^2 test is used to test the association between attributes

(b) The following table gives the classification of 100 workers according to sex, and the nature of work. Test whether nature of work is independent of the sex of the works at 5 level of significance

Work Sex	Skilled	unskilled	Total
Male	40	20	60
Female	10	30	40
Total	50	50	100

32. Discuss the term test reliability and explain the different methods of estimating reliabili

33. A typist in a company commits the following numbers of mistakes per page in typing 4 pages.

No. of mistakes per page	0	1	2	3	4	5	Total
No. of pages	223	142	48	15	4	0	432

Does this information verify that the mistakes are distributed according to the Poisson la

34. The following are the marks obtained (out of 100) by the students taking coaching in thr different public schools

School I	32, 15, 87, 32, 22, 63, 56, 57, 44
School II	33, 38, 39, 48, 58, 70, 61, 41, 45, 49
School III	55, 68, 27, 88, 46, 52, 76

Using Kruskal Walli's test is it possible to say that the students studying in three differ public schools have identical distribution of marks (use $\alpha = 5\%$)

(3x8=24 mar