TOTAL PAGES: 2

20SSP11

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2022
(Second Semester)

Branch – **SOFTWARE SYSTEMS**
(Five Year Integrated)

PROBABILITY AND STATISTCS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. If the events of a random experiment are mutually exclusive events then $P(A \cap B)$ is
   (a) 0 (b) 1
   (c) -1 (d) 2
2. If X is a random variable then V(aX) is
   (a) aE(X) (b) $a^2E(X)$
   (b) (c) aV(X) (d) $a^2V(X)$
3. The probability of type I error is called
   (a) Level of significance (b) power
   (c) error (d) critical region
4. The test used for the ratio to variances is
   (a) t-test (b) z-test
   (c) F-test (d) c-test
5. The distribution free test is called
   (a) parametric test (b) non-parametric test
   (c) t-test (d) z-test

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Write a note on sample space and events in probability theory?
OR
b Discuss classical and axiomatic approach to probability.

7 a Define joint probability distribution and marginal probability distribution.
OR
b In Binomial distribution with parameters n=5,p=0.3, find the probabilities of getting atleast 3 successes and exactly 3 failures.

8 a What are null and alternative hypothesis?
OR
b A random sample of 10 boys has the following IQ's : 70,120,110,101,88,83,95,98,107,100. Do these data support the assumption of a population mean IQ of 100?

9 a Write the test procedure for paired t-test.
OR
b What is goodness of fit test and when do you apply?

10 a Explain the test procedure for one way ANOVA.
OR
b What is one sample sign test?

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a State and prove the addition theorem on probability.

OR

b State and prove Baye's theorem.

12 a The joint probability distribution of X and Y are $f(x,y)= 4xy \exp(-\{x^2 + y2\})$, $x,y \geq 0$. Test if I and Y are independent. Also find the conditional density of X given Y=y.

OR

b Discuss the various characteristics of Normal distribution.

13 a Random samples of 400 men and 600 women were asked whether they would like to have a fly-over near their residence. 200 men and 325 women were favour of it. Test the equality of proportion of men and women in this study.

OR

b Elucidate the test procedure for testing of hypothesis.

14 a The heights of 6 randomly selected sailors are 63,65,68,69,71 and 72 inches and those of 10 randomly chosen soldiers are 61,62,65,66,69,69,70,71,72 and 73 inches . Test whether this data suggest that the sailors are on average taller than soldiers or not.

OR

b The result of a survey shows that out of 50 ordinary shops 35 are managed by men of which 17 are in cities, 12 shops in villages are run by women using chi-square test. Can it be inferred that shops run by women are relatively more in villages than in cities.

15 a The following figures relate to production in kgs of three varieties A,B,C of wheat sown on 12 plots

A	14	16	18		
B	14	13	15	22	
C	18	16	19	19	20

Is there any significant difference in the production of these varieties?

OR

b Consider a clinical investigation to assess the effectiveness of a new drug designed to reduce repetitive behaviors in children affected with autism. When the drug is effective, children will exhibit fewer repetitive behaviors on treatment as compared with untreated. A total of 8 children with autism were enroled in the study and the data are given below. Test whether the treatment is effective or not using two sample sign test.

Child	Before Treatment	After 1 Week of Treatment
1	85	75
2	70	50
3	40	50
4	65	40
5	80	20
6	75	65
7	55	40
8	20	25

Z-Z-Z

END