**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, April 2023**

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|  | **3BT6107** | Roll No. | Total Printed Pages: 2 |
| **3BT6107** |  |
| B. Tech. III Year VI- Semester (Main/Back) End Semester Examination, April 2023  **(DS)** | |
| **BDS06108 / BDS06103 :** **Inferential Statistics** | | | |

# Max. Time: **3**Hours. Max. Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / part. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.** [F, t and z Distribution](http://socr.ucla.edu/htmls/dist/Fisher_Distribution.html) Tables **2.-----------------------------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Discuss the importance of fundamental concepts of null hypothesis and Alternative hypothesis with applications. | **(6)** | Evaluating |
|  |  |  |  |  |
|  | **(b)** | Explain the importance of error and its type with level of significance and confidence level. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.2** | **(a)** | Describe the statistical hypothesis with types of hypotheses with suitable examples. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Explain the application and importance of Neyman Pearson Lemma. | **(6)** | Evaluating |
|  |  |  |  |  |
|  |  | **UNIT-II (CO2)** |  |  |
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| **Q.3** | **(a)** | A company wants to test the claim that their batteries last more than 40 hours. Using a simple random sample of 15 batteries yielded a mean of 44.9 hours, with a standard deviation of 8.9 hours. Test this claim using a significance level of 0.05. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | A coaching institute claims that the students’ mean scores in their institute are greater than the 82 marks with a standard deviation of 20. A sample of 81 students is selected, and the mean score is 90 marks. At 95% confidence level, is there enough evidence to support the claim? | **(6)** | Evaluating |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.4** |  | A forester wants to compare two different mist blowers for consistent application. She wants to use the mist blower with the smaller variance, which means more consistent application. She wants to test that the variance of Type A (0.087 gal.2) is significantly greater than the variance of Type B (0.073 gal.2) using α = 0.05.   |  |  | | --- | --- | | Type A | Type B | | S12= 0.087 | S22= 0.073 | | n1= 16 | n2 = 21 | | **(12)** | Analyzing |
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|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | A researcher wants to test whether a new medication for treating migraine headaches is effective. She recruits 20 patients and measures their pain levels before and after taking the medication. The researcher wants to know if there is a significant difference between the pre- and post-medication pain levels. | **(6)** | Analyzing |
|  |  |  |  |  |
|  | **(b)** | A company wants to know if there is a significant difference in the average salary between two different departments. They sample 12 employees from each department and calculate their salaries. | **(6)** | Evaluating |
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|  |  | **OR** |  |  |
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| **Q.6** |  | A company wants to know if there is a difference in the productivity of three different departments. They have a sample of 40 employees in each department and want to use the Friedman test to determine if there is a difference in the median productivity of the three departments. | **(12)** | Evaluating |
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|  |  | **UNIT-IV (CO4)** |  |  |
| **Q.7** | **(a)** | Describe the central limit theorem and its application | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Explain the types of estimation, properties of good estimator, unbiasedness, consistency, efficiency and sufficiency. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.8** | **(a)** | Explain the Method of estimation and properties of method of maximum likelihood estimator with suitable example. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Discuss the assumptions of ordinary least square method and properties of the OLS method. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **UNITV (CO5)** |  |  |
|  |  |  |  |  |
| **Q.9** | **(a)** | Explain the Bayes inference and Bayesian Procedures | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Describe the Bayesian sequential procedures and important terms related to Bayesian statistical inference. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.10** | **(a)** | Explain the modern Bayesian statistical inference and estimations. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Let X and Y be jointly normal and X∼N(0,1), Y∼N(1,4), and ρ(X,Y)=. Find a 95% credible interval for X, given Y=2 is observed. | **(6)** | Applying |