**B.Com. / B.Com (A&F) DEGREE EXAMINATION APRIL 2018**
**FOURTH SEMESTER**

COURSE    :    ALLIED – CORE
PAPER     :    STATISTICAL TECHNIQUES FOR BUSINESS
TIME      :    3 HOURS                                              MAX. MARKS: 100

**SECTION – A**

**I.  ANSWER ALL THE QUESTIONS**                                    **(10 X 2 = 20)**

1) What is secular trend?
2) Write the two normal equations used to determine the least squares line of best fit.
   $Y_c = a + bX$.
3) What are Type I and Type II errors in tests of hypothesis?
4) In a hospital 480 female and 520 male babies were born in a week. Do these figures confirm the hypothesis that male and female babies are born in equal number?
5) State any two conditions for application of chi-square?
6) What do you understand by non-parametric test?
7) Fill in the blanks: a) The technique of analysis of variance was developed by -----------
        b) ------------ stands for mean square between samples.
8) Certain refined edible oil packed in tins holding 16kg each. The filling machine can maintain this but with a standard deviation of 0.5 k.g. Samples of 25 are taken from production line. If a sample mean is 16.35kg. Can we be 95% sure that the sample has come from a population of 16kg tins?
9) On the basis of the following information compute: $r_{13.2}$

   $r_{12} = 0.70$; $r_{13} = 0.61$; $r_{23} = 0.40$
10) What is partial correlation?

**SECTION – B**

**II. ANSWER ANY FIVE QUESTIONS**                                    **(5 X 8 = 40)**

11) Given below are the figures of sales (in 000 rupees) of a certain shop:

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------|------|------|------|------|------|------|------|
| Sales | 125 | 128 | 133 | 135 | 140 | 141 | 143 |

Fit a straight line by the method of least squares and show the trend values. What is the monthly increase in sales?

12) A fertilizer mixing machine is set to give 12kg of nitrate for every quintal bag of fertilizer. Ten 100 kg bags are examined and percentage of nitrate is as follows:
    11, 14, 13, 12, 13, 12, 13, 14, 11, 12.
    Is there a reason to believe that the machine is defective?

13) The sales manager of a large company conducted a sample survey in states A and B taking 400 samples in each case. The results were:

|                    | State A | State B |
|--------------------|---------|---------|
| Average Sales      | Rs.2500 | Rs.2200 |
| Standard Deviation | Rs.400  | Rs.550  |

Test whether the average sales is the same in the 2 states at 1% level.

14) To test the effectiveness of Inoculation against cholera the following table were obtained:

| No of persons | Attacked | Not Attacked |
|---------------|----------|--------------|
| Inoculated    | 30       | 160          |
| Not inoculated | 140     | 460          |

Does inoculation prevent attack from cholera?

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15) In a sample of 8 observations, the sum of the squared deviations of items from the mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference in the variances is significant at 5% level.

16) The following table gives the yields of 15 samples of plot under three varieties ofseed.

| A | B | C |
|---|---|---|
| 20 | 18 | 25 |
| 21 | 20 | 28 |
| 23 | 17 | 22 |
| 16 | 15 | 28 |
| 20 | 25 | 32 |

Test by using analysis of variance whether there is a significant difference in the average yield of seeds.

17) Given the following information:

$r_{12} = 0.20$; $r_{13} = 0.40$; $r_{23} = 0.50$; $r_{14} = 0.40$; $r_{24} = 0.30$; $r_{34} = 0.1$

Find $r_{41.23}$.

## SECTION – C

### III. ANSWER ANY TWO QUESTIONS                    (2 X 20 = 40)

18) Find seasonal variation by the ratio to trend method from the data given below:

| Year | I Quarter | II Quarter | III Quarter | IV Quarter |
|------|-----------|------------|-------------|------------|
| 2012 | 30 | 40 | 36 | 34 |
| 2013 | 34 | 52 | 50 | 44 |
| 2014 | 40 | 58 | 54 | 48 |
| 2015 | 54 | 76 | 68 | 62 |
| 2016 | 80 | 92 | 86 | 82 |

19) A sample of 400 items is taken from a normal population whose mean as well as variance is 4. Set up a two way ANOVA table for the following per hectare yield for 4 varieties of wheat on 3 plots and interpret the results.

| | | Yield | | |
|--------------|---|---|---|---|
| Plot of Land | A | B | C | D |
| I | 3 | 4 | 6 | 6 |
| II | 6 | 4 | 5 | 3 |
| III | 6 | 6 | 4 | 7 |

20) In an industry 200 workers employed for a specific job, were classified according to their performance and training received / not received to test independence of a specific training and performance. The data is summarised as follows:

| | Performance | | Total |
|-----------|------|----------|-------|
| | Good | Not Good | |
| Trained | 100 | 50 | 150 |
| Untrained | 20 | 30 | 50 |
| Total | 120 | 80 | 200 |

Use Chi-Square test of independence at 5% level of significance and interpret the result.

21) A simple correlation coefficient between temperature $x_1$, corn yield $x_2$ and rainfall $x_3$ is $r_{12} = 0.59$, $r_{13} = 0.46$ and $r_{23} = 0.77$. Calculate partial correlation coefficients $r_{12.3}$, $r_{23.1}$ and $r_{13.2}$ also calculate $R_{1.23}$

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