

# Question Paper

Exam Date & Time: 23-Jan-2021 (10:00 AM - 01:00 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST SEMESTER M.O.T./ M.Sc. M.L.T./ M. Opt./ M.Sc. R.T./ M.Sc. ECOCARDIOGRAPHY/M.Sc. CC&IT /M.Sc. M.I.T./M.P.T./M.Sc. E.S.S./ M.Sc. N.M.T./ M.Sc. M.R.P./ M.Sc. RRT&DT/M.Sc. PFT/M.Sc. AUDIOLOGY/M.Sc. (S.L.P.)  
DEGREE EXAMINATION - JANUARY 2021

SUBJECT: RES 601 - BIOSTATISTICS & RESEARCH METHODOLOGY/RESEARCH METHODOLOGY & BIOSTATISTICS/ADVANCED BIOSTATISTICS & RESEARCH METHODOLOGY/RESEARCH METHODS, EPIDEMIOLOGY & STATISTICS  
(2018 SCHEME)

Marks: 100

Duration: 180 mins.

Answer all the questions.

- 1) Erythrocyte Sedimentation Rate (ESR) readings (in mm) of 12 tuberculosis patients are given (8)  
below:  
12 8 11 9 8 14 8 12 8 9 11 10  
Calculate coefficient of variation.

2. Differentiate between the following:

- 2A) Ordinal variables and nominal variables. (4)  
2B) Sampling and non-sampling errors. (4)  
2C) P value and level of significance. (4)  
2D) Parameter and statistic. (4)

3. Explain the following with an example:

- 3A) The model used in logistic regression and interpretation of its coefficients. (4)  
3B) Use of predictive values in validation of a diagnostic test. (4)

- 4) Clearly stating the assumptions and hypothesis, describe paired t test and its non-parametric analogue test. (8)  
5) Illustrate the procedure of selecting a sample using simple random sampling. Enumerate its uses and limitations. (6)  
6) Describe the importance of review of literature in the development of a research protocol. (5)  
7) With the help of a schematic diagram explain prospective cohort study design and its analysis. (10)  
8) Differentiate between simple and stratified randomization methods with suitable examples. (6)

9. A random sample of 61 individuals from a population contained 20 smokers.

- 9A) What is the standard error of proportion of smokers? (1)

- 9B) Construct a 95% confidence interval for the population prevalence. (3)
- 9C) Give the margin of error. (1)
- 10) A hospital administrator wishes to estimate the mean weight of babies born in the hospital. How large a sample of birth records should be taken if the administrator wants a 95% confidence interval with margin of error of 1.2 kg? Assume that a reasonable estimate of the population standard deviation is 5 kg. (4)
- 11) An epidemiologist compared in a pilot study, a sample of 100 adults suffering from a certain neurologic disease to a sample of 100 comparable controls who were free of the disease. 50 of the adults with the disease and 25 of the controls were involved in industries using a specific chemical. Assuming that the proportion employed in these industries in the entire population is similar to that observed in the pilot study, how many subjects should be studied in each of the two groups to have 80% power of detecting the true difference between the groups if the hypothesis is tested at 5% level? (4)
- 12) Define correlation and give two examples of each of positive and negative correlation. State the range of Pearson's correlation coefficient. (6)
- 13A) Given the mean and standard deviation of weight of new born babies are 2.8 kg and 0.5 kg respectively. Assuming normality, construct the reference range. (2)
- 13B) Draw the normal distribution curve and list its properties. (4)
- 14) Nine laboratory animals were infected with a certain bacterium and then immune-suppressed. The mean number of organisms later recovered from tissue specimens was 6.5 with a standard deviation of 0.6. Can one conclude from these data that the population mean is different from 6? What assumptions are necessary? (8)  
[ $\alpha = 0.05$ ,  $t_{1 - \alpha/2} (8) = 2.31$ ]

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