

**Note:** Attempt any two questions from section I and any five questions from section II. Section I carries 20 marks and section II carries 30 marks.

**Section I**

- Q. 1) Prepare a small questionnaire to study the impact of technology on standard of living.
- Q. 2) What are rating scales? Explain various types of rating scales with suitable examples.
- Q. 3) Enumerate different methods of collecting data.

**Section II**

Q. 1) Samples of two types of electric light bulbs were tested for length of life and the following data were obtained.

	Type I	Type II
Sample number	8	8
Sample means	1,234 hrs.	1,036 hrs.
Sample standard deviation	36 hrs.	40 hrs.

Is the difference in the means sufficient to warrant that type I is superior to type II regarding length of life? Use 5 % level of significance.

Q. 2) A random sample of 400 spare parts was examined and 60 were found to be defective. A manufacturer has claimed that 10 % of the parts he produces are defective. Determine at 95 % confidence level whether the manufacturer's claim is acceptable?

Q. 3) From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment? Use 5 % level of significance.

Treatment	No. of patients		
	Favourable	Not Favourable	Total
New	140	30	170
Conventional	60	20	80
Total	200	50	250

Q. 4) In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether the two colleges are significantly different with respect to the habit of using ball pens. Use 5 % level of significance.

Q. 5) The three groups of five students each used three different methods of programmed learning to study statistics. We want to determine whether there is a significant difference in the results of the three methods. A standard test is administered to the three groups and is graded on eight point scale. The following results are obtained:

Method I	Method II	Method III
1	3	5
2	5	5
5	5	6
5	6	7
7	6	7

Use 5 % level of significance.

Q. 6) How computers are used as a tool in research?

**Table values:**

$Z_{0.05} = \pm 1.96$  (two tailed)

$Z_{0.05} = + 1.645$  or  $- 1.645$  (one tailed)

$t_{0.05}$  for 18 d.f. = 1.734 (one tailed)

$t_{0.05}$  for 17 d.f. = 1.740 (one tailed)

$\chi^2_{0.05}$  for 4 d.f. = 9.488

$\chi^2_{0.05}$  for 1 d.f. = 3.841

$f_{0.05}$  for  $v_1 = 2$ ,  $v_2 = 12$  is 3.8853

$f_{0.05}$  for  $v_1 = 2$ ,  $v_2 = 13$  is 3.8056

$t_{0.05}$  for 14 d.f. = 2.145 (two tailed)

$t_{0.05}$  for 14 d.f. = 1.761 (one tailed)

$t_{0.05}$  for 15 d.f. = 1.753 (one tailed)

$t_{0.05}$  for 15 d.f. = 2.131 (two tailed)

$$1. z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$2. z = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$3. z = \frac{p - P}{\sqrt{PQ/n}}$$

$$4. z = \frac{p_1 - p_2}{\sqrt{\hat{p}\hat{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$5. \hat{P} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$$

$$6. t = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}} \text{ where } S = \sqrt{\frac{n s^2}{n-1}}$$

$$7. t = \frac{(\bar{x}_1 - \bar{x}_2)}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \text{ where } S = \sqrt{\frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2 - 2}}$$

$$8. \chi^2 = \sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}$$

$$9. F = \frac{MSB}{MSW}$$