

Total No. of Questions : 8]

SEAT No. :

**P3979**

[Total No. of Pages : 2

**[5462] - 706**

**M.E. (Production - Manufacturing & Automation)**

**RESEARCH METHODOLOGY**

**(2017 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**Q1) a)** Differentiate between descriptive and experimental research. **[5]**

**b)** Explain the significance of the hypothesis in research. **[5]**

**Q2)** How do you evolve research design for exploratory research? Briefly analyze. Briefly explain Independent dependent and extraneous variables in a research design. **[10]**

**Q3) a)** Differentiate between 'Census survey' and 'Sample Survey'. Analyze multi-stage and sequential sampling. **[5]**

**b)** The design matrix showing the effect of temperature and pressure on strength of a glue bond is shown in Table below. Plot the Pareto chart and investigate the interaction effect. **[5]**

Experiment No.	Temperature (°C)	Pressure (MPa)	Strength of glue bond (N)
1	100	0.35	95
2	100	0.70	190
3	200	0.35	230
4	200	0.70	255

**P.T.O.**

**Q4)** Write short notes on: [10]

- a) Methods of collecting primary data
- b) Criteria of good research.

**Q5) a)** List down various measures of central tendency and explain difference between them? [4]

**b)** Use multiple linear regression to fit. [6]

$x_1$	12	14	22	31	16
$x_2$	0	5	10	14	7
Y	117	235	302	224	297

Where,  $x_1$  and  $x_2$  are input variables and Y is output variable.

**Q6) a)** Determine the sample size to ensure the percent defective within 3% of the true value with 92% confidence level. (Assume standard variate for 92% confidence level as 1.75 and sample proportion 0.02). [4]

**b)** For a minimization problem, using simulated annealing, the function value of 120 is updated to new value of 142 at temperature 200°C. What is the probability of accepting the new solution? [6]

**Q7) a)** How the research proposal is presented, reviewed and evaluated? [4]

**b)** What are various funding agencies to whom the research proposal can be submitted? What are criteria required to be fulfilled while submitting research proposal to these agencies? [6]

**Q8)** Write short note on: [10]

- a) Mechanics of writing research report.
- b) Multi-objective optimization methods.

