RESEARCH METHODOLOGY AND PROJECT MANAGEMENT
(REEN 5142)

Time Allotted: 3 hrs **Full Marks: 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and Any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1=10**

(i) The subject "Research Methodology" primarily deals with
(a) tools and techniques for presentation of research data
(b) laboratory experimentation
(c) software programming
(d) assay Techniques

(ii) Type I error is synonymous with
(a) consumer's risk (b) producer's risk
(c) quality control professional's risk (d) benefit of everyone.

(iii) Personnel working in the market research group is responsible for the job of
(a) equipment selection (b) product evaluation
(c) equipment design (d) cost estimation.

(iv) The following is the correct procedure for drawing a network
(a) formation of loop
(b) arrows representing activity should cross each other
(c) there should be at least one star connection
(d) the dummy activities should be marked using dashed lines.

(v) At break-even capacity the annual manufacturing cost is
(a) greater than annual sales revenue
(b) less than annual sales revenue
(c) equal to annual sales revenue.
(d) equal to annual sales revenue minus taxable amount.

(vi) The β – distribution is
(a) a discrete distribution (b) a synonym of normal distribution
(c) a skewed distribution (d) a virtual distribution.

(vii) The 95% confidence interval means _____ % level of significance
(a) 100 (b) 5 (c) 1 (d) 95.

(viii) Book value of a property
(a) is the worth of the property in the market
(b) is the worth of the property as shown in the owner's accounting records
(c) is independent of time
(d) cannot be predicted, without experimental determination.

(ix) The Deming Cycle also means
(a) Carnot Cycle (b) PDCA Cycle
(c) Linde Cycle (d) Kaizen.

(x) The PERT network is discovered by
(a) IG FARBEN group (b) Du Pont International
(c) US Navy (d) General Electric Co.

Group - B

2. A soft drink bottler is interested in obtaining more uniform fill heights in the bottles produced by his manufacturing process. The filling machine theoretically fills reach bottle to the correct target height, but in practice, there is variation around the target, and the bottler would like to understand better the sources of this variability and eventually reduce it.

The process engineer can control three variables during the filling process. The percent carbonation (A), the operating pressure in the filter (B), and the bottles produced per minute or the line speed (C). the pressure and speed are easy to control, but the percent carbonation is more difficult to control during actual manufacturing because it varies with product temperature. However, for purposes of an experiment, the engineer can control carbonation at three levels: 10, 12, & 14 percent. He chooses two levels for pressure (25 and 30 psi) and two levels for line speed (200 and 250 bpm). He decides to run two replicates of a factorial design in these three factors, with all 24 runs taken in random order. The response variable observed is the average deviation from the target fill height observed in a production run of bottles at each set of conditions. The data that resulted from the experiment are shown below. Positive deviations are fill heights above the target, whereas negative deviations are fill heights below the target :

Operating pressure (B)					
Percent carbonation (A)	25 psi Line Speed(C)		30 psi Line Speed (C)		y_i
	200	250	200	250	
10	-3	-1	-1	1	-4
	-1	0	0	1	
12	0	2	2	6	20
	1	1	3	5	
14	5	7	7	10	59
	4	6	9	11	

Analyse the data using ANOVA and draw your conclusions.

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3. (a) Discuss the importance of Data Collection in Research. What do you mean by Primary and Secondary Data?

   (b) Tension bond strength data for the Portland cement formulation experiment are given below. Assuming the mean tension bond strength of the two mortar formulations are equal, perform 't' test to determine whether the null Hypothesis H_o needs to be rejected or not. You are to analyze within the regime 95% confidence interval.

Sl No	Modified Mortar (y_{1j})	Unmodified mortar (y_{2j})
1	16.85	17.50
2	16.40	17.63
3	17.21	18.25
4	16.35	18.00
5	16.52	17.86
6	17.04	17.75
7	16.96	18.22
8	17.15	17.90
9	16.59	17.96
10	16.57	18.15

(2 + 2) + 8 = 12

Group - C

4. (a) Discuss the role and responsibilities of a Project Manager.

   (b) Explain the different phases of a Project Life Cycle with the help of a suitable representative diagram.

6 + 6 = 12

5. State clearly the advantages of a Matrix Organization Structure .What are its disadvantages? How one can overcome these disadvantages**?**

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Group D

6. As per the pollution control norms prevalent in India, what is the category of a Solar PV manufacturing plant? State the salient chapters/sections to be furnished while preparing a DPR for an industry manufacturing LED lights.

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7. (a) A piece of equipment having a negligible salvage and scrap value is estimated to have a service life of 10 years. The original cost of the equipment was Rs.60,000/-.
   Determine the following:
   The depreciation charge for the fifth year if double declining-balance depreciation is applied.

   (b) The percent of the original investment paid off in the first-half of the service life using the double declining-balance method.

6 + 6 = 12

Group E

8. (a) What is Gantt Chart? Discuss how the concept of network analysis has been derived from milestone chart.

   (b) State the Fulkerson's rule for numbering a Network diagram.

(3 + 4) + 5 = 12

9. In a construction project, events have been identified as A, B, C, D, E, F, G, H, J, K, L and M. A is the start event. B occurs after A. C succeeds B and precedes L but restrains the occurrence of G. D occurs after B before K and retrains C. F succeeds C, precedes G and retrains E.E succeeds B but precedes J. G succeeds F and precedes H. H precedes L and constrains J. L occurs after J but before K. M succeeds K. Draw a Network diagram.

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