M.TECH/RE/1ST SEM/REEN 5142/2016

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
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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) experimental procedure
          (c) algorithms
          (d) none of the above.

   (ii)   Linear programming problem was discovered by
          (a) Chowmasky   (b) Dantzig
          (c) Peter drukker   (d) P C Mahalanobis.

   (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)   Which one of 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 degree of freedom means
          (a) the total number of variables
          (b) the number of constant parameter but not the variables
          (c) the number of independent variables
          (d) none of the above.

   (x)   The PERT network is
          (a) a deterministic network
          (b) a probabilistic network
          (c) a virtual network
          (d) sometimes deterministic & sometimes probabilistic.

Group – B

2.   A textile company is used to weave a fabric on a large number of looms. The looms are likely to be homogeneous in order to obtain a fabric of uniform strength. The process engineering personnel suspect that, in addition to the usual variation in strength within samples of fabric from the same loom, there may also be significant variations in the strength between looms. To investigate this one selects four looms at random and makes four observations on the strength of the fabric on each loom. The randomly obtained data from the experiment are shown in the following table

	Observation				
Looms	1	2	3	4	y_i
1	98	97	99	96	390
2	91	90	93	92	366
3	96	95	97	95	383
4	95	96	99	98	388
				Total	1527

Compute analysis of variance (ANOVA) and comment on the results.

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3. (a) If $\mu_x = E(x) = \int_{-\infty}^{+\infty} xf(x)dx$ where x is continuous and $\sum xP(x)$ where x is discrete, prove that $\mu_{np} = E(r) = np$, and

(b) $\sigma_{np} = E(r^2) = \sqrt{\{np(1-p)\}}$

6 + 6 = 12

Group – C

4. (a) Discuss the characteristics of Project Management explaining the details of the following stages:
Initiation, Planning and Design, Execution and Construction, Monitoring and Control, Completion and Finish Point.

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

8 + 4 = 12

5. Write Technical notes on:
(i) Prince2
(ii) Critical Chain Project Management.

(6 + 6) = 12

Group – D

6. (a) Enumerate the salient features/points need to be furnished while preparing a DPR.

(b) Show that the capitalized cost of an asset can be expressed as

$K_v = C_v + \dfrac{C_R}{e^{in} - 1}$

if the interest is compounded continuously, Where, K_v = capitalized cost, C_V = original cost, C_R = replacement cost, i = annual interest rate, n = service life in year.

5 + 7 = 12

7. A plant produces Heating Mantles at the rate of P units per day. The variable costs per unit have been established to be Rs $(47.73+0.1.P^{1.2})$. The total daily fixed charges are Rs.1750, and all other expenses are assumed to be Rs.7325 per day. If the selling price per Heating Mantle is Rs.173, determine:
(i) the daily profit at a production schedule giving the minimum cost per mantle.

(ii) the daily profit at a production schedule giving the maximum daily profit.
(iii) the production schedule at the breakeven point.

4 + 4 + 4 = 12

Group – E

8. The following activities for a symposium with their duration in days are given below:
Fixing the dates (2); Formulate the theme (2); collect the contact details for sending brochure (4); get the brochure printed (6); finalize selection of two guest speakers (1); send invitation to the two guest speakers (1); mail brochure to all (3); collect all submitted papers (45); Review and finalize papers (10); inform the authors of the acceptance (7); arrange accommodation and refreshment (6); arrange transportation (2); arrange lecture halls, PA systems etc. (2); prepare introductory speech (1); assign duties to volunteers (2). The value in the parenthesis indicates number of day.
With these pre-arrangements, let us assume the symposium can begin. (i) Determine the minimum number of days required for preparatory work before the D-day of the symposium, and (ii) Determine the critical path for the network.

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9. The following table gives data on normal time-cost and crash time-cost for a project

Activity	Normal		Crash	
	Time (days)	Cost (Rs.)	Time (days)	Cost (Rs.)
10—20	6	600	4	1000
10—30	4	600	2	2000
20—40	5	500	3	1500
20—50	3	450	1	650
30—40	6	900	4	2000
40—60	8	800	4	3000
50—60	4	400	2	1000
60—70	3	450	2	800

The indirect cost per day is Rs.100. Drawing the Network, crash the relevant activities systematically, and determine the optimum project completion time and cost.

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