Year	Cash flow in lakhs of Rs.)	
	P_1	P_2
0	20	20
1	6	8
2	6	8
3	8	4
4	4	6
5	4	2

(b) Furnish a synopsis about technical evaluation of project.

7 + 5 = 12

Group - E

8. (a) Following table depicts details of activities for a project.

Activity	Start Node	End Node	Completion Time (weeks)
1	1	2	4
2	1	3	6
3	1	4	4
4	2	7	6
5	3	5	14
6	4	6	10
7	7	8	8
8	6	8	18
9	8	9	6

It is told that activity 7 cannot start until activity 5 has been completed.
(i) Draw the network diagram.
(ii) Determine the critical path.
(iii) Find project completion time.

(b) Highlight the differences between PERT and CPM.

9 + 3 = 12

9. Write short notes on any three of the following :
(i) LOB
(ii) Snowball sampling
(iii) Gantt Chart
(iv) Fulkerson's Rule
(v) Dummy activity

3 × 4 = 12

RESEARCH METHODOLOGY & PROJECT MANAGEMENT
(HMTS 6101)

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)

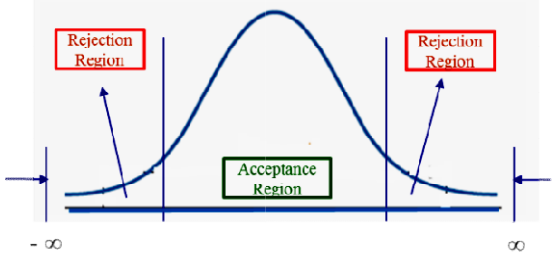
1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Type of research designed to solve practical problems is
(a) basic research (b) quantitative research
(c) applied research (d) historical research.

(ii) Measurement scale suitable to find customer preference for a product is
(a) nominal scale (b) ordinal scale
(c) interval scale (d) ratio scale.

(iii) . . . . . sampling is one of the probability samplings.
(a) Quota (b) Judgement
(c) Snowball (d) Cluster

(iv) The null and alternative hypothesis for the following case will be



(a) $H_0 : \mu \geq \mu_0$ and $H_1 : \mu < \mu_0$ (b) $H_0 : \mu \leq \mu_0$ and $H_1 : \mu > \mu_0$
(c) $H_0 : \mu = \mu_0$ and $H_1 : \mu \neq \mu_0$ (d) $H_0 : \mu \geq \mu_0$ and $H_1 : \mu = \mu_0$.

(v) How many t-tests are required to be done to compare mean of six population distributions?
(a) 15 (b) 12 (c) 10 (d) none.

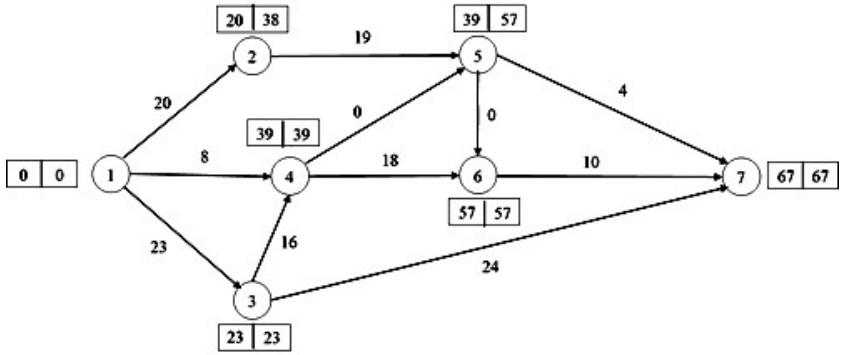
(vi) For lower significance level, sample size required will be
(a) lower (b) higher (c) below 20 (d) none of these.

(vii) In the SMART criteria used in determining the objective of a project 'S' stands for
(a) Simple (b) Systematic (c) Scientific (d) Specific.

(viii) 'Painting by Numbers' is . . . . . project
(a) intricate (b) routine (c) investigative (d) none of these.

(ix) While conducting financial evaluation of projects . . . . . method considers time value of money.
(a) rate of return (b) payback period
(c) discounted cash flow (d) both (a) and (c).

(x) Burst events in the shown network are



(a) 1,2,3 and 4 (b) 1,3,4 and 5
(c) 1,3 and 6 (d) none of these.

Group - B

2. (a) A pipe manufacturing company produces pipes of average length of at least 3.5 mts with a standard deviation of 0.3 mts. Longer pipes are acceptable to the customers but the shorter ones are rejected. A random sample of 16 pipes were checked and their average length was found to be 3.4 mts. At a significance level of 5%, the company wants to verify if they need to modify the production process to ensure that their products are not rejected.

(b) A research worker wants to determine the average time it takes a mechanic to repair a domestic appliance, and she wants to be able to assert with 95% confidence that the mean of her sample is off by at most 0.50 minute. If she can presume from her past experience that variance is 1.96 min^2, how large a sample should she take?

7 + 5 = 12

3. (a) Marks of the 1st year engineering students in the mid-semester and end semester examinations are presented in the table below -

Exam	Marks obtained				
Mid Sem	77	50	71	96	81
End Sem	82	66	78	99	47

Write the normal equation using the method of least squares and hence estimate a regression line.

(b) Experimental finding of the mean defects of seven days production at four different production centers of an assembly shop is given in the following table Analysis of Variance for the mean defects

Source of variation	Sum of squares
Between Plants (SS_A)	2300
Error - within plants (SS_E)	2950
Total (SS_T)	5250

Conducting test of hypothesis at a significance level of 2.5% , can we infer that the mean defects at different production centers are same?

8 + 4 = 12

Group - C

4. (a) Briefly discuss the roles and responsibilities of a "Project Manager".

(b) Explain briefly the concept of different phases of project life cycle with suitable example for each of these phases.

6 + 6 = 12

5. (a) Explain the characteristics of balanced and unbalanced projects. Give a brief analysis of their impact on the business.

(b) Narrate features of different types of project organisations.

6 + 6 = 12

Group - D

6. (a) Enlist the different methods used for financial evaluation of projects. Explain the methods which do not consider time value of money.

(b) Illustrate significance of managerial appraisal with suitable examples, in the context of project management.

6 + 6 = 12

7. (a) If you are assigned to undertake two projects P_1 and P_2 whose cash flow is tabulated below. Given that the useful life, of both projects, is 5 years, which project will you choose?