

**PROJECT ENGINEERING
(CHEN 4231)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

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

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) What is the purpose of scale-up techniques in project engineering?
 - (a) To reduce the size of the plant
 - (b) To increase the production capacity
 - (c) To decrease the capital investment
 - (d) To improve the safety of the plant
- (ii) What is the primary consideration for selecting a plant location?
 - (a) Proximity to raw material sources
 - (b) Proximity to markets
 - (c) Availability of labor
 - (d) Availability of land
- (iii) What is a Special Economic Zone (SEZ)?
 - (a) A designated area for industrial development with tax incentives
 - (b) A designated area for agricultural development with subsidies
 - (c) A designated area for service sector development with tax exemptions
 - (d) A designated area for residential development with infrastructure support
- (iv) The method of calculation of depreciation which incorporates time value of money is
 - (a) Declining Balance Method
 - (b) Sum of the Years Digit Method
 - (c) Sinking Fund Method
 - (d) Straight Line Method
- (v) 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
- (vi) The present GDP growth rate of India is around:
 - (a) 6-- 8 percent
 - (b) 20-25 percent
 - (c) 10-12 percent
 - (d) less than 2 percent

- (vii) The primary objective of optimum design in project engineering is to:
 (a) Minimize cost (b) Maximize profit
 (c) Optimize performance (d) All of the above
- (viii) Which of the following is a factor that influences the breakeven point?
 (a) Initial investment (b) Annual revenue
 (c) Annual operating costs (d) All of the above
- (ix) The β – distribution is
 (a) a discrete distribution (b) a synonym of normal distribution
 (c) a skewed distribution (d) virtual distribution
- (x) The CPM network is
 (a) A deterministic network
 (b) A probabilistic network
 (c) A virtual network
 (d) Sometimes deterministic & sometimes probabilistic

Fill in the blanks with the correct word

- (xi) Mancheswar SEZ is located in_____.
- (xii) The formula for calculating the future value of an amount is $FV = PV \times (1 + r)^n$, where PV is the _____.
- (xiii) The 5% level of significance means _____ % confidence interval.
- (xiv) Historically _____ chart precedes Network theory.
- (xv) Return on Equity (ROE) is synonymous with _____ Analysis.

Group - B

2. (a) Define the role and scope of a project manager. [[CO1](Analyse/HOCQ)]
 (b) Define present value of annuity. [[CO1](Remember/LOCQ)]
 (c) Describe the difference between annuity and annuity due. [[CO1](Apply/IOCQ)]
6 + 3 + 3 = 12
3. (a) Describe the difference between compound interest and continuous compound interest. [[CO1](Remember/LOCQ)]
 (b) Define time value of money. Describe the difference between fixed capital and working capital and manufacturing cost. [[CO1](Remember/LOCQ)]
 (c) Define net present value and its significance. [[CO2](Apply/IOCQ)]
4 + (2 + 3) + 3 = 12

Group - C

4. (a) What is Depreciation? What do you mean by Salvage Value and Asset value? [[CO2](Understand/LOCQ)]
 (b) The concept of Depreciation actually gives rise to a method of protection towards Income-tax – Discuss critically. [[CO2](Analyze/IOCQ)]
[2 + (2 × 2)] + 6 = 12

5. (a) Discuss in brief the importance of Gross Domestic Product index and National Growth. [[CO2](Analyse/IOCQ)]
- (b) A plant is producing 10,000t/y of a product. The overall yield is 70% on a mass basis (kg of product per kg raw material). The raw material costs Rs. 1,200/t, and the product sells for Rs. 4,000/t. A process modification has been devised that will increase the yield to 75%. The additional investment required is Rs. 35,00,000, and the additional operating costs are negligible. Is the modification worth-making? [[CO2](Evaluate/HOCQ)]

$$4 + 8 = 12$$

Group - D

6. (a) Derive an expression for the optimum flow rate in condenser for flow of fluid at a given volumetric flow rate. Define the notations used in the expression. [[CO3](Analyse/HOCQ)]
- (b) Write a short note on minimum cost analysis and economics in selection of material. [[CO2](Apply/IOCQ)]

$$6 + 6 = 12$$

7. A heat exchanger has been designed and insulation is being considered for the unit. The insulation can be obtained in thickness of 25mm, 50mm, 75mm and 100mm. The following data have been determined for the different insulation thickness:

Insulation Thickness (mm)	25	50	75	100
K cal/hr Saved	75000	87500	93750	95000
Cost for insulation (Rs)	60000	80000	90000	93500
Annual fixed charges	10%	10%	10%	10%

The value of heat is Rs. 60 per million K cal. An annual return of 15% on fixed capital investment is required for any capital put into this type of investment.

(i) Discuss the basis of time limit selection for this design problem.

(ii) Which thickness of insulation should be used?

[[CO3](Evaluate/HOCQ)]

$$(4 + 8) = 12$$

Group - E

8. (a) What is a Bar Chart? What are its disadvantages? [[CO4](Remember/LOCQ)]
- (b) The development of Milestone Chart has eliminated the difficulties associated with Horizontal Bar Chart – Analyze critically. [[CO4](Analyse/IOCQ)]

$$(3 + 3) + 6 = 12$$

9. (a) The formation of Loop is not allowed in Network diagram – Explain with reasons. [[CO4](Analyse/IOCQ)]
- (b) What are Earliest expected time and latest allowable occurrence time in network analysis? [[CO4](Analyse/IOCQ)]
- (c) Show the essential characteristics of PERT and CPM network with the help of a table. [[CO4](Understand/LOCQ)]

$$4 + 4 + 4 = 12$$

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	29.2	37.5	33.3