

**PROJECT ENGINEERING
(CHEN 4231)**

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) What is a cash flow table in project management?
 - (a) A table portraying inflow of cash in a project
 - (b) A table portraying outgoing expenses of a project
 - (c) It is the tool that is used to study such cash flows by breaking inflows and outflows down, usually on a monthly basis
 - (d) A table portraying debts taken for a project.
 - (ii) The project manager meets with the project team to review lessons learned from previous projects. In what activity is the team involved?
 - (a) Performance management
 - (b) Scope identification
 - (c) Risk identification
 - (d) Project team status meeting.
 - (iii) Which one of the following is captured in the Work Breakdown Structure (WBS)?
 - (a) The life cycle phases
 - (b) The logical order of tasks
 - (c) The scope of the project
 - (d) Project costs.
 - (iv) The location of a pharmaceutical industry should be
 - (a) near raw-material source
 - (b) anywhere in the country
 - (c) at dry yet temperate city
 - (d) near a port.
 - (v) The method of calculation of depreciation which incurs maximum financial protection for the organization is
 - (a) declining Balance method
 - (b) sum of the years digit method
 - (c) sinking fund method
 - (d) straight line method.
 - (vi) Pinch Analysis is
 - (a) synonymous with ABC Analysis
 - (b) optimizes feasible energy targets
 - (c) a gravimetric method
 - (d) not related with Project Engineering.

- (vii) 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.
- (viii) The CPM network is
(a) a deterministic network
(b) a probabilistic network
(c) a virtual network
(d) sometimes deterministic & sometimes probabilistic.
- (ix) Identify the standard related to Safety and Health Aspects of a project
(a) ISO 9000 (b) SA 8000
(c) OHSAS 18000 (d) ISO 14000.
- (x) PERT Network requires _____ time estimates.
(a) one (b) two
(c) three (d) four

Group - B

2. (a) Enumerate the Six major factors / Characteristics for Plant Location / site selection of Chemical Industries. *[[CO1](Remember/LOCQ)]*
(b) The incorporation of SEZ concept revolutionized the earlier concept of Plant Location and Site selection -- Discuss critically. *[[CO1](Analyze/IOCQ)]*
6 + 6 = 12
3. (a) Describe the roles and responsibilities of a Project Engineer. *[[CO1](Understand/LOQC)]*
(b) What is an ideal location? State the various strategies for the location analysis. *[[CO1,CO3](Understand/LOCQ)]*
(c) Describe the difference between fixed capital, working capital and manufacturing cost. *[[CO1,CO2](Remember/HOCQ)]*
4 + (2 + 3) + 3 = 12

Group - C

4. A piece of equipment having a salvage value Rs. 30,000 is estimated to have a service life of 10 years. The original cost of the equipment was 3,00,000. Determine the following:
(i) The depreciation charge for the fifth year if text book declining-balance depreciation is used.
(ii) The depreciation charge for the fifth year if sum-of-the-years-depreciation is used. *[[CO2](Evaluate/HOCQ)]*
(6 + 6) = 12
5. A plant is producing 10,000 t/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. 1,000 /t, and the

product sells for Rs. 3,500 /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)]

12

Group - D

6. (a) Starting from the total mechanical energy balance equation and considering that turbulent flow in the pipe exists for which $f = Re^{0.16}$. Determine the economic pipe diameter. [[CO3](Evaluate/HOCQ)]
 (b) State all the assumptions you make in your calculation. [[CO3](Evaluate/HOCQ)]
8 + 4 = 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. $(47.73 + 0.1P^{1.2})$. The total daily fixed charges are Rs. 1750, and all other expenses are constant at 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 production schedule at the breakeven point. [[CO3](Evaluate/HOCQ)]
(6 + 6) = 12

Group - E

8. What is Gantt Chart? How does it differ from a milestone chart? Discuss the evolution of Network Planning methodologies from Milestone chart. [[CO3](Understand/LOCQ)]
(2 + 4 + 6) = 12
9. (a) State and Explain Fulkerson's Rule for numbering a Network. [[CO4](Remember/LOCQ)]
 (b) Listed in the table are the activities and sequencing necessary for a maintenance job on the heat exchangers in a refinery.

Activity	Description	Predecessor Activity
A	Dismantle pipe connections	---
B	Dismantle heater, closure and floating front	A
C	Remove tube bundle	B
D	Clean bolts	B
E	Clean heater and floating head front	B
F	Clean tube bundle	C
G	Clean shell	C
H	Replace tube bundle	F,G
I	Prepare shell pressure test	D, E, H
J	Prepare tube pressure test and reassemble	I

Draw a Network diagram of activities for the project.

[[CO1](Analyze/IOCQ)]

4 + 8 = 12

<i>Cognition Level</i>	<i>LOCQ</i>	<i>IOCQ</i>	<i>HOCQ</i>
<i>Percentage distribution</i>	<i>32.29</i>	<i>14.58</i>	<i>53.13</i>

Course Outcome (CO):

After completion of the subject the students will be able to:

1. Understand the basics of project engineering and apply that to organize the activities of project engineering for economic analysis of the project.
2. Apply cost and profitability analysis for the project under considerations and study the preliminary feasibility of the project.
3. Implement innovative ideas to optimization of the plant design components in regard to requirement of energy, time and ultimately cost.
4. Perform network analysis of the project and critically examine the schedule for the completion and cost impacts for the project.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*