

**INDUSTRIAL ENGINEERING
(MECH 3224)**

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) Space needed for placing machine in case of product layout as compared to process layout is
 - (a) less
 - (b) more
 - (c) equal
 - (d) has no relation.
 - (ii) An assembly type of production in a factory, adopts
 - (a) product layout
 - (b) process layout
 - (c) combined layout
 - (d) fixed position layout.
 - (iii) “Value” for value engineering and value analysis purposes is defined as
 - (a) purchase value
 - (b) saleable value
 - (c) depreciated value
 - (d) function / cost.
 - (iv) The unit cost in case of batch production as compared to jobbing production is
 - (a) same
 - (b) low
 - (c) high
 - (d) depends on quantity to be produced.
 - (v) In ship manufacturing, the type of layout preferred is
 - (a) product layout
 - (b) process layout
 - (c) fixed position layout
 - (d) combination layout.

- (vi) Which of the following functions of Production Planning and Control is related to the time table of activities?
- (a) Scheduling
 - (b) Dispatching
 - (c) Expediting
 - (d) Routing.
- (vii) “Buffer Stock” is the level of stock
- (a) half of the actual stock
 - (b) at which the ordering process should start
 - (c) minimum stock level below which actual stock should not fall
 - (d) maximum stock in inventory.
- (viii) The following classes of costs are usually involved in inventory decisions except
- (a) cost of ordering
 - (b) carrying cost
 - (c) cost of shortages
 - (d) machining cost.
- (ix) Product Development refers to
- (a) enhancement of the quality of the existing product
 - (b) all of the stages involved in bringing a product from concept or idea through market release and beyond
 - (c) actual product was not designed as it should have been
 - (d) manufacturing a product with competitive advantage.
- (x) Productivity increases when
- (a) inputs increase while output remain the same
 - (b) inputs decrease while output remain the same
 - (c) outputs decrease while input remain the same
 - (d) inputs and outputs increase proportionately.

Group- B

2. (a) How do you define the term “Industrial Engineering (IE)”? Briefly mention the main function of Industrial Engineering. *[(CO1) (Remember)/LOCQ]*
- (b) A company is engaged in manufacturing specialised sensors for automobiles. It has a capacity of producing 24,000 sensors in a year. Fixed costs amount to Rs. 5 lakhs per annum. Variable costs are Rs. 50 per unit and the selling price of sensor is Rs. 100 per unit. Find out the breakeven point (in terms of percentage of capacity). *[(CO1)(Understand)/HOCQ]*
- (2 + 4) + 6 = 12**
3. (a) A company employs 10 people to produce 100 units a month. The standard time allowed for producing a unit is 15 hours. If the permissible delays are 120 man-hours in a month.
- Calculate the productivity and the wastivity of the company. (Assume that a worker works 8 hours/day and number of days worked are 25 days).
- [(CO2) (Evaluate)/IOCQ]*

- (b) Calculate the vendor rating for the following. The item under consideration is the same from all the suppliers.

Supplier's Data	A	B	C
Quantity supplied	90	80	75
Quantity accepted	78	80	70
Price of each item	Rs.4	Rs.4.2	Rs.3.9
Delivery promised	6 weeks	6 weeks	6 weeks
Actual delivery made	8 weeks	6.2 weeks	7 weeks

Weightage for Quality =70%, Price= 20%, Delivery = 10%.

[[CO2] (Evaluate)/HOCQ]

6 + 6 = 12

Group - C

4. (a) Name any six factors which must be considered while selecting the location of the factory. *[[CO 3] (Remember)/LOCQ]*
- (b) Discuss the advantages of sub-urban area over urban and rural area, while selecting a location for a plant. (any three points). *[[CO 3] (Understand)/ LOCQ]*
- 6 + 6 = 12**
5. (a) State any four objectives of plant layout. *[[CO 3] [(Understand) / IOCQ]*
- (b) Discuss the advantages of process layout. (any three points). *[[CO 3] [(Remember) / LOCQ]*
- 6 + 6 = 12**

Group - D

6. (a) What is meant by "Production Planning and Control(PPC)"? Mention the factors that determine production planning procedures. *[[CO3] (Remember)/IOCQ]*
- (b) Briefly discuss the concept for considerations in Make or Buy Decision of a manufacturing unit. *[[CO3] (Understand) /IOCQ]*
- 6 + 6 = 12**
7. (a) Discuss PPC function with respect to batch and mass production. *[[CO4] (Remember)/LOCQ]*
- (b) (i) Define the term "Process Planning". (ii) What are the information that are required for "Process Planning "? *[[CO4] (Understand)/LOCQ]*
- 6 + (2 + 4) = 12**

Group - E

8. (a) Mention the procedure for conducting Method Study (SREDIM). *[[CO6] (Remember)/HOCQ]*

- (b) An operator manufactures 110 jobs in 6 hours and 55 minutes. In case, this time includes the time for setting his machine, calculate the efficiency of the operator. Standard time allowed for job is : Set up time : 18 minutes , Production Time per piece =4 minutes.

[[CO6] (Evaluate)/HOCQ]

6 + 6 = 12

9. (a) The elemental times (in hours) for 5 cycles of an operation using a stop watch are presented below :

Elements	Cycle Time (in hours)				
	1	2	3	4	5
1	1.8	1.8	1.75	1.75	1.8
2	3.0	3.1	3.0	3.2	3.1
3	3.5	3.5	3.6	3.65	3.5
4	1.8	1.75	1.9	1.75	1.8
5	1.4	1.45	1.4	1.4	1.4

Here, elements 3 and 4 are machine elements. For all other elements (1, 2 and 5) operator is rated at 110%. Total allowances are 20% of the normal time. Find the standard time for doing the job.

[[CO6] (Evaluate)/HOCQ]

- (b) Interpret the relationship between Time and Method Study to Work Study.

[[CO6] (Remember)/ HOCQ]

8 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	37.5	25	37.5

Course Outcomes (CO):

At the end of the course, a student will be able to

- CO1: Identify different concepts of IE functions.(UNDERSTAND)
- CO2: Execute product development and design-manufacturing decisions with IE tools.(EXECUTE)
- CO3: Classify and implement plant layout/location decisions.(UNDERSTAND, APPLY)
- CO4: Explain different types of production systems and their characteristics.(UNDERSTAND)
- CO5: Judge the production planning and inventory management with a mechanism of proper control.(EVALUATE)
- CO6: Recognize and select appropriate tools of work-study for improvement in productivity.(UNDERSTAND, EVALUATE).

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