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RM-7167-R

B. E. III (Sem. VI) (Mech.) Examination

May / June – 2010

Industrial Engineering

Time : **3** Hours] [Total Marks : **100**

Instruction :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 6) (Mech.)**

Name of the Subject :

☛ **Industrial Engineering**

☛Subject Code No. : **7 1 6 7** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** questions.
(3) Assume suitable data if **necessary** giving justification.
(4) Use of graph paper is allowed.
(5) Figure to the right indicate full marks.

SECTION - I

1 (a) Answer the following. **8**

(i) What is productivity? What is its relationship with production?

(ii) What do you mean by long term and short term forecasts?

(iii) What are inventories? Why does it essential to keep inventories?

(iv) What do you mean by factory costs and factory overheads?

(b) Write short notes : **12**

(i) Objective of PPC.

(ii) Need for demand forecasting.

(iii) Application of B.E.P.

2 Attempt any **two**: **12**

(i) The sales for the domestic water pumps manufactured by XYZ Company is given. Forecast the demand for the pumps for the next three years using least square method :

Year	*Sales ('000)*
2001	30
2002	33
2003	37

2004 39
2005 42
2006 46
2007 48
2008 50
2009 55
2010 58

(ii) Estimate the forecast for the year 2010, using exponential smoothing forecastor. Take α =0.05 and the forecast for the year 2005 as 160 $\times$ 10^5 units :

Year :	2005	2006	2007	2008	2009
Sales (Rs.) $\left(\times 10^5\right)$:	180	168	159	170	188

(iii) Explain in detail, the judgemental techniques for demand forecasting.

3 Attempt any **three** : 18

(i) A company purchases in lots of 500 items which is a 3 month supply. The cost per item is Rs.50 and the ordering cost is Rs.100. The inventory carrying cost is estimated at 20% of unit value. What is the total cost of the existing inventory policy? How much money could be saved by employing the economic order quantity?

(ii) The demand for a certain item is 50 units per year. Unsatisfied demand causes a shortage cost of Rs.0.45 per unit per short period. The ordering cost for purchase is Rs.20 per order and the holding cost is 15% of average inventory valuation per year. Item cost is Rs. 5 per unit. Find the EOQ, the shortage inventory and the minimum cost.

(iii) An analysis of the Company reveals the following information :

Cost element	***Variable Cost (%)***	***Fixed Cost (Rs)***
Direct Material	32.8	-
Direct labour	28.4	-
Factory Overheads	12.6	1,89,900
Distribution overheads	4.1	58,400
General adm. overheads	1.1	66,700

Budgested sales are 18,50,000

Determine :

(a) Break-even sales volume

(b) The profit at the budgeted sales volume.

(c) The profit if the actual sales droped by 10%

(iv) Derive the equation to find out the order quantity which minimize the total costs when stock replenishment is non-instantaneous. Also derive the equation for optimum total cost.

SECTION - II

4 Answer the following: (Attempt any **ten**) **20**

(i) SIMO chart is used in time study. True or False. Justify

(ii) What do you mean by DARSIRI approach.

(iii) Enlist the principles of motion economy related to design of tool and equipment.

(iv) Compare MTM and work factor system.

(v) What do you mean by the term value in value engineering.

(vi) Give symbols of given process charts;
- (a) Operation
- (b) Transportation
- (c) Storage
- (d) Delay

(vii) Draw two handed process chart of assembling Nut and Bolt.

(viii) Give two example of unavoidable delay.

(ix) Compare cycle graph and chrono cycle graph.

(x) Explain micro motion study.

(xi) Name the various charts and diagrams used as recording techniques.

(xii) "Improving the present method and finding standard time" – work study is concerned with this statement. True or False. Why?

5 Attempt any **three** : **15**

(i) Flow diagram

(ii) Multiple activity chart.

(iii) Explain : Job Enrichment
Job Enlargement
Job Rotation.

(iv) Work sampling procedure

(v) Factor affecting effective job design.

6 Attempt any **three** : **15**

(i) An operation consists the following elements.

Load the machine	:	1 minute (manual)
Macine component	:	4.5 minutes (automatic)
Inspect component	:	0.5 minutes (manual)
Unload machine	:	0.5 minutes (manual)

Draw a man machine chart and find out the time per component under the following condition :

(a) one machine per operator

(b) two machines per operator

(c) three machines per operator.

(ii) Following data relate to a work sampling study of a long cycle non-repetitive operation :

Total time study = 10 days

Total no of obervation = 1200

Obervation of productive activity = 900

Manually controlled element = 600

Machine controlled element = 300

Total acceptable units produced = 4000 pieces

Average rating index = 110%

Observations of unavoidable delay = 100

Calculate the standard time.

(iii) Prepare two handed process chart:

Activity : Assembly of nut and bolt.

Chart begins: Both hands free before assembly.

Chart ends : Both hands free after assembly.

(iv) In making time study of lab technician doing analysis of processed food industry following time noted for particular operation :

Cycle No. :	1	2	3	4	5	6	7	8	9	10	11	12	13
O. Time (sec.) :	21	21	16	19	20	16	20	19	19	20	40	19	21

14	15	16	17	18	19	20	21	22	23	24
18	23	19	15	18	18	19	21	20	20	19

If the performance of technician as rated 120% and Company provided fatigue allowance as 13%, reading following 50% above and 25% below average may be discarded, determine first normal time and standard time.