

Mech

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Question Paper Code : 52682

B.E/B.Tech. DEGREE EXAMINATION, APRIL 2016

Eighth Semester

Mechanical Engineering

ME2036/ME802/10122 MEE44 – PRODUCTION PLANNING AND CONTROL

(Common to Production Engineering/Mechanical and Automation Engineering)

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. List the various types of production. Give examples.
2. What is meant by standardization and simplification ?
3. Differentiate Cycle graph and Chrono cycle graph.
4. What are the steps involved in Method Study ?

5. A job is performed on the milling machine. The following details are given below :

Standard time for the job : 6 minutes

No. of jobs to be produced : 70,000 units

Machine Capacity : 2000 hours/month

Machine Utilization : 90%

Compute the number of machines required.

6. List the problems associated with lack of production planning.

7. What is Master Scheduling ?

8. ABC bakery produces short run of cakes that are shipped to grocery stores. The owner of the bakery wish to reduce inventory by changing to a Kanban system, based on the given data determine the number of kanbans needed.

Demand during lead time : 1000 cakes

Safety stock : 250 cakes

Container size : 250 cakes

9. What are the types of inventories ? Give examples for each type.

10. Write the advantages of ERP system.

PART – B (5 × 16 = 80 Marks)

11. (a) Discuss in detail about the various aspects involved in product development and design with appropriate examples.

OR

- (b) What are the assumptions made in Break-Even Analysis ? An analysis of a company reveals the following information :

| Cost Element | Variable Cost | Fixed Cost |
|----------------------------------|---------------|------------|
| Direct Material | 32.8 | – |
| Direct Labour | 28.4 | – |
| Factory Overheads | 12.6 | 1,89,900 |
| Distribution Overheads | 4.1 | 58,400 |
| General Administrative Overheads | 1.1 | 66,700 |
| Budgeted sales | 18,50,000 | |

Determine Break-Even sales volume. The profit at the budgeted sales volume. The profit if the actual sales drop by 10%, the profit if the actual sales increase by 5% for budgeted sales.

12. (a) (i) Explain in detail about “Effective Therbligs” with suitable examples. (8)
- (ii) The elemental times for 4 cycles of an operation using a stop watch are presented below :

| Elements | Cycle time in minutes | | | |
|----------|-----------------------|------|------|------|
| | I | II | III | IV |
| 1 | 1.5 | 1.5 | 1.3 | 1.4 |
| 2 | 2.6 | 2.7 | 2.4 | 2.6 |
| 3 | 3.3 | 3.2 | 3.4 | 3.4 |
| 4 | 1.2 | 1.2 | 1.1 | 1.2 |
| 5 | 0.51 | 0.51 | 0.52 | 0.49 |

Calculate the standard time for the operation if

- (1) Elements 2 and 4 are machine elements.
- (2) For other elements, the operator is rated at 110%.
- (3) Total allowances are 15% of the normal time. (8)

OR

(b) (i) A work sampling study was conducted to establish the standard time for an operation. The observations of the study conducted are given below :

| | | |
|--|---|--------|
| (1) Total number of observations | : | 160 |
| (2) Manual (hand controlled) work | : | 14 |
| (3) Machine controlled work | : | 106 |
| (4) Machine idle time | : | 40 |
| (5) Average performance rating | : | 80% |
| (6) Number of parts produced | : | 36 |
| (7) Allowance for personal needs and fatigue | : | 10% |
| (8) Study conducted for | : | 3 days |
| (9) Available working hours/day | : | 8 hrs |

Calculate the standard time per piece. (10)

(ii) How the standard time for a simple manual job is made up ? Explain the various allowances used to build the standard time. (6)

13. (a) (i) Define Process Planning and explain the various factors considered for selecting a process and equipment. (8)

(ii) Define Value Analysis and present a FAST Diagram for a PEN. (8)

OR

(b) Three components are to be manufactured on three machines – Center lathe, Milling machine and Cylindrical grinding machine.

(i) Calculate the number of machines required of each kind to produce the components if the plant works for 48 hours per week.

(ii) Calculate the number of machines required assuming the machine efficiency of 75%

(iii) How do you reduce the number of machines ?

The following information is given :

| Machines | Component A | | Component B | | Component C | |
|---------------------------|-------------------|----------------------|-------------------|----------------------|-------------------|----------------------|
| | Set up time (min) | Operation time (min) | Set up time (min) | Operation time (min) | Set up time (min) | Operation time (min) |
| Center lathe | 30 | 2 | 55 | 2.5 | 40 | 1.5 |
| Milling machine | 45 | 8 | 30 | 4 | – | – |
| Cylindrical grinding | 50 | 10 | 60 | 8 | 60 | 10 |
| Other Details | | | | | | |
| Lot Size | 350 | | 400 | | 600 | |
| Quantity Demanded / month | 1750 | | 4000 | | 3000 | |

14. (a) A small scale unit manufactures a product and it is expected to supply 80 units in week 1, 120 in week 4, 120 in week 6, 100 in week 8. Each product is made of 2 housings, a shaft assembly and one wheel. For these components order quantities, lead times and inventories on hand at the beginning of period 1 are given below :

| Part | Order Quantity | Lead Time | Inventory on Hand |
|----------------|----------------|-----------|-------------------|
| Housings | 600 | 2 weeks | 200 |
| Shaft Assembly | 400 | 3 weeks | 440 |
| Wheel | 800 | 1 week | 100 |

Apart from the above requirement, another 180 shaft assembly is required for another customer. 600 units of housing are already scheduled to be received at the beginning of week 2. Complete the Material Requirement plan for housing, shaft and wheel. Show that quantities of orders must be released and when they must be released in order to satisfy the MPS.

OR

- (b) (i) Four items A, B, C and D are to be processed successively in batches on the same facility. The demand and production rates, set up costs and holding costs for each product are given below :

| Item | Demand per year | Production rate per day | Holding cost / unit / annum | Set-up cost per batch |
|------|-----------------|-------------------------|-----------------------------|-----------------------|
| A | 10000 | 250 | 0.05 | 100 |
| B | 5000 | 100 | 0.05 | 50 |
| C | 8000 | 200 | 0.10 | 80 |
| D | 12000 | 300 | 0.05 | 60 |

Determine the number of cycles per annum and the quantity in batches and the production times for each item in a cycle. Assume 250 working days in a year. (10)

(ii) Discuss in detail the various steps involved in Line of Balance Technique. (6)

15. (a) (i) Store of a repair shop has 10 items whose details are shown in the following table. Apply ABC analysis to the stores and identify A Class, B Class and C Class items. (8)

| Component Code | C ₀₁ | C ₀₂ | C ₀₃ | C ₀₄ | C ₀₅ | C ₀₆ | C ₀₇ | C ₀₈ | C ₀₉ | C ₁₀ |
|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Price / Unit (₹) | 500 | 4000 | 2000 | 3000 | 4000 | 500 | 500 | 1000 | 1500 | 500 |
| Annual Demand (units / year) | 600 | 600 | 600 | 600 | 600 | 1200 | 600 | 1200 | 600 | 600 |

(ii) Discuss in detail about MRP-II. (8)

OR

(b) (i) A manufacturer has to supply his customers 3600 units of his product per year. Shortages are not permitted. Inventory carrying costs amounts ₹ 1.20 per unit per annum. The set-up cost per run is ₹ 80. Find the Economic Order Quantity, Optimum number of orders per annum, Average annual inventory cost and Optimum period of supply per optimum order. (8)

(ii) Elaborate the various elements of JIT systems with suitable examples. (8)