

# nt Institution of Manipal University

## **III SEMESTER B.TECH. (INDUSTRIAL & PRODUCTION ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016**

### SUBJECT: PLANT LAYOUT AND MATERIAL HANDLING [MME 2112]

#### **REVISED CREDIT SYSTEM** (02-12-2016)

Time: 3 Hours

MAX. MARKS: 50

(04)

(04)

(05)

#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- **1A.** Select the best warehouse location for the problem given below:

| Locations     | Distance in miles | Load |
|---------------|-------------------|------|
| A (store)     | 2.5, 4.5          | 2    |
| B (store)     | 2.5, 2.5          | 5    |
| C (warehouse) | 5.5, 4.5          | 10   |
| D (store)     | 5, 2              | 7    |
| E (store)     | 8, 5              | 10   |
| F (warehouse) | 7, 2              | 20   |
| G (store)     | 9, 2.5            | 14   |

- 1B. Briefly discuss the layout used for batch production.
- 1C. Graphically discuss why the line layout is more economical for high volume of production? (02)
- **2A.** Briefly discuss the influence of machinery factor on plant layout.
- **2B.** Discuss how the layout flexibility, adaptability and versatility can be achieved (05) in a layout.
- 3A. A proposal has been submitted to replace a group of assembly workers, each working individually in an assembly line. The following table gives the individual work element, elemental time and immediate predecessors.

| Elements | Elemental time (min) | Immediate predecessor |
|----------|----------------------|-----------------------|
| 1        | 1                    |                       |
| 2        | 0.5                  |                       |
| 3        | 0.8                  | 1, 2                  |
| 4        | 0.3                  | 2                     |
| 5        | 1.2                  | 3                     |
| 6        | 0.2                  | 3, 4                  |
| 7        | 0.5                  | 4                     |
| 8        | 15                   | 567                   |

| Reg. No. |  |  |  |  |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|--|--|--|--|
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## MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University The demand rate for the job is 1600 units per week and plant operates 40 hours per week. Calculate the cycle time, minimum number of work station and also estimate the balance efficiency and percentage ideal time using Ranked Position Weight Method.

(05)

(02)

- **3B.** Briefly discuss the different material flow patterns used in indusries. **(03)**
- **3C.** State the different steps involved in organizing the installation of a layout. (02)
- **4A.** Explain in brief, the fundamental guidelines used for planning a layout. **(05)**
- **4B.** Enumerate and discuss the influence of waiting factor on a layout. **(05)**
- **5A.** Define material handling and state its scope in industries.
- **5B.** Estimate the number of Fork-lift Trucks required using the following data:

|                  |   | А  | В  | С  | D  |
|------------------|---|----|----|----|----|
|                  | А |    | 40 | 70 | 20 |
| W <sub>ij=</sub> | В | 15 |    | 45 | 50 |
|                  | С | 65 | 50 |    | 70 |
|                  | D | 30 | 32 | 60 |    |

|                  |   | Α  | В  | С  | D  |
|------------------|---|----|----|----|----|
|                  | А |    | 20 | 10 | 10 |
| D <sub>ij=</sub> | В | 22 |    | 15 | 10 |
|                  | С | 4  | 15 |    | 5  |
|                  | D | 12 | 10 | 5  |    |

Travel per unit distance is 0.5 min

Loading time is 1min

Unloading time is 5min

Allowance is 1min

The capacity of Truck is 90%

The number of working hours per shift is 8 hours (05)

**5C.** Briefly discuss the planning principle of material handling. **(03)**