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18ME72

Seventh Semester B.E. Degree Examination, June/July 2024
Computer Aided Design and Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Define automation. Explain the reasons for automation in brief.   **(10 Marks)**
    b.   An average part produced in a certain batch manufacturing plant must be processed through an average of six machines. 20 new batches are launched each week. Average operation time is 6min, average set up time is 5hr, average non operations time per batch is 10hr / machine and average batch size is 25 parts. There are 18 machines in the plant. The plant operates an average of 70 production hours per week. If the availability is 95%, determine
    i)   Manufacturing lead time for an average part.
    ii)   Production rate
    iii) Production capacity
    iv)   Plant utilization
    v)   Work in process
    vi)   WIP ratio
    vii) TIP ratio.   **(10 Marks)**

OR

2   a.   What are the symbols used in an automated flow line?   **(05 Marks)**
    b.   Sketch and explain the walking beam transfer mechanism.   **(06 Marks)**
    c.   The ideal cycle time of a 16 station transfer line is 2min. The average downtime is 6 min and the probability of breakdowns per cycle is equal for all cycles and is equal to 0.004. Determine the production rate and line efficiency using upper and lower bound approach.   **(09 Marks)**

Module-2

3   a.   Explain the functions of graphic package system.   **(08 Marks)**
    b.   List and explain the phases involved in a design process.   **(08 Marks)**
    c.   A point (3, 4) has to be translated at a distance of 6 units in x-axis and 2 units in y-axis. Determine the coordinates of the translated point.   **(04 Marks)**

OR

4   a.   Explain retrieval CAPP system with the help of a neat block diagram.   **(10 Marks)**
    b.   Explain the various inputs and outputs of a MRP system.   **(10 Marks)**

Module-3

5   a.   What is group technology? Enumerate the advantages of GT.   **(05 Marks)**
    b.   With a neat block diagram, explain the components of FMS.   **(10 Marks)**
    c.   Define AS/RS and explain any two types of AS/RS system.   **(05 Marks)**

OR

6 a. Explain the following:
   i)   Total work content
   ii)   Cycle time
   iii) Line efficiency.   **(06 Marks)**
   b. Define line balancing and list its objectives.   **(04 Marks)**
   c. In a plant, a product is to be assembled as per the following data:

Element	1	2	3	4	5	6	7	8	9	10
Time (min)	6	4	9	3	2	7	5	6	4	7
Precedence	-	1	1	2	2	3	4, 5	3, 5	7, 8	6, 9

   i)   Construct precedence diagram.
   ii)   If the cycle time is 12 min, calculate the number of stations required.
   iii) Determine the balance delay and balance efficiency of the line using largest candidate
         rule.   **(10 Marks)**

Module-4

7 a. Explain the elements of CNC system with the help of a block diagram.   **(10 Marks)**
   b. Write a manual part program for multiple turning operation for the component shown in
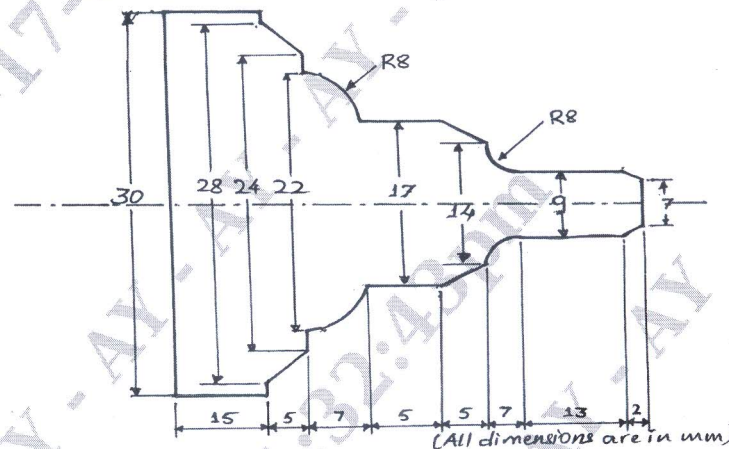   Fig.Q.7(b).   **(10 Marks)**

Fig.Q.7(b)

OR

8 a. Explain the following with neat diagram:
   i)   Slip sensor
   ii)   Range sensor
   iii) Tough sensor
   iv)   Proximity sensor
   v)   Force and torque sensor.   **(10 Marks)**
   b. Define robot. Explain the different types of robot joints with neat sketches. **(10 Marks)**

Module-5

9 a. Define additive manufacturing. Explain the steps involved in additive manufacturing
       process.   **(10 Marks)**
   b. With a neat sketch, explain photo polymerization process.   **(10 Marks)**

OR

10 a. List and explain the components of Industry 4.0 in brief.   **(10 Marks)**
    b. Define IOT and explain its applications in manufacturing.   **(10 Marks)**

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