OBJECTIVES:

This course is an introduction to the concepts and problems underlying the design and operation of contemporary production systems. Emphasis is placed on the design and operation of manufacturing facilities, but many of the presented results apply also to the design, planning and control of operations taking place in the service sector.

More specifically, the course seeks to offer a balanced development of the following issues:

- A systematic exposition of the design, planning and control problems that arise in the context of the aforementioned facilities.
- A systematic introduction to inventory control theory and its application in the contemporary production and distribution networks.
- A formal analysis of the dynamics of production processes, based on queuing theoretic concepts and models.
- The integration of the results developed in Step 3 to the prevailing production planning and control framework(s).

UNIT 1

PART – A (Short Answer Questions)

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	Define product Analysis?	Understanding	1
2	Define Planning?	Understanding	1
3	Define PPC?	Understanding	1
4	Give details about the Production planning and Control?	Understanding	1
5	What are the needs for PPC?	Understanding	1
6	Define product Design?	Understanding	1

7	Define miniaturation?	Understanding	1
8	Define product analysis?	Understanding	1
9	Define margin of safety?	Understanding	1
10	What are the requirements of good design?	Understanding	1
11	What are the problems in production management?	Understanding	3
12	Define production?	Understanding	3
13	Define planning?	Understanding	3
14	Define control?	Understanding	3
15	Define scheduling?	Understanding	3
16	Define time estimating?	Understanding	3
17	Define production budget?	Understanding	3
18	What is Action Phase?	Understanding	3
19	What is Control Phase?	Understanding	3
20	What is Tool Control?	Understanding	3

PART – B (LONG ANSWER QUESTIONS)

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	List out the planning functions and controlling functions separately?	Understanding	3
2	What are differences between job shop, batch type and continuous production systems?	Understanding	3
3	Classify the production systems. Mention characteristics of each of those systems.	Analyzing	1
4	What are the effects of PPC? Explain them in detail.	Understanding	1
5	Compare various types of production systems.	Applying	1
6	Discuss the applications of computers in production control.	Understanding	1
7	Mention the nature of PPC function in those respective production system	Understanding	1
8	Explain the objectives of PPC?	Understanding	1
9	Classify the production systems. Mention characteristics of each of those systems?	Analyzing	1
10	What are the effects of PPC? Explain them in detail?	Understanding	1
11	Explain characteristics of Intermittent production systems	Understanding	1
12	Explain characteristics of Continuous production systems.	Understanding	1
13	Explain the objectives of PPC?	Understanding	1

S. No	Question	Blooms Taxonomy Level	Course Outcome
14	Write short notes on internal organizations department?	Understanding	1
15	Explain the different types of production system?	Understanding	1
16	Define Production Planning and Control and its objectives	Understanding	1
17	Analyze the importance of each of the functions of production planning and control?	Analyzing	1
18	Discuss the position of motion and time study in the organizational Structure of a manufacturing firm?	Applying	1
19	Write the principles of sound production control systems.	Applying	1
20	Describe continuous production. How does it differ from job order production?	Applying	1
	UNIT II		
PART A	SHORT ANSWER QUESTIONS		
1	Define sales forecasting	Understanding	2
2	Define short term forecasting	Understanding	3
3	Define long term forecasting	Understanding	3
4	State advantages of short term forecasting	Understanding	3
5	What is least square method?	Understanding	3
6	State disadvantages of short term forecasting	Understanding	3
7	State advantages of long term forecasting	Understanding	3
8	What is exponential smoothing method?	Understanding	3
9	State disadvantages of long term forecasting	Understanding	3
10	What is analytical forecasting method?	Understanding	3
11	What is the importance of sales forecasting?	Understanding	3
12	What is statistical forecasting method?	Understanding	3
13	Write the objectives of forecasting.	Understanding	3
14	What is market potential?	Understanding	3
15	List the methods of sales forecasting.	Understanding	3
16	What are the limitations of least square method?	Understanding	3
17	Write the advantages of exponential smoothing method?	Understanding	3
18	What are the advantages of least square method?	Understanding	3
19	Write the limitations of exponential smoothing method?	Understanding	3
20	What are the different types of forecasting.	Understanding	3
PART B	LONG ANSWER QUESTIONS		
1	Explain different types of fore casting?	Understanding	3
2	Write short notes on importance of fore casting?	Understanding	3
3	Explain the general principles of forecasting techniques?	Understanding	3
4	Define forecasting and its uses?	Understanding	3
5	Write short notes on objectives of forecasting?	Understanding	3

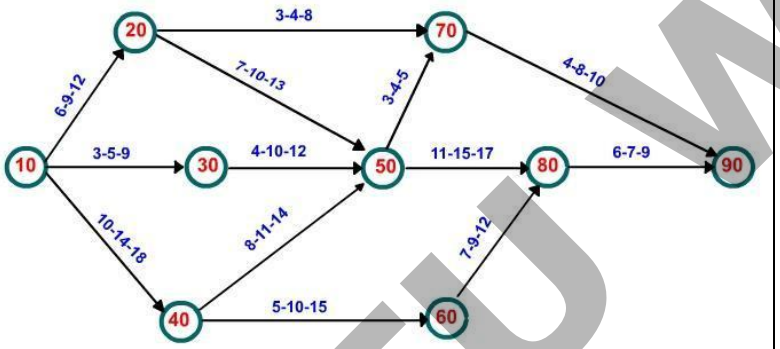
<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td>6</td><td>Explain the process of sales forecasting?</td><td>Understanding</td><td>3</td></tr>
<tr><td>7</td><td>Write short note on qualitative methods of forecasting ?</td><td>Analyzing</td><td>4,5</td></tr>
<tr><td>8</td><td>Write short note on Quantitative methods of forecasting?</td><td>Understanding</td><td>3</td></tr>
<tr><td>9</td><td>Derive expression for smoothing constant.</td><td>Applying</td><td>4</td></tr>
<tr><td>10</td><td>What are the effects of smoothing constant on the quality of forecast?</td><td>Understanding</td><td>3</td></tr>
<tr><td>11</td><td>Show that in exponential smoothing method, Weightage to the past data declines exponentially.</td><td>Understanding</td><td>3</td></tr>
<tr><td>12</td><td>Explain exponential smoothing method of forecasting</td><td>Applying</td><td>4</td></tr>
<tr><td>13</td><td>Explain the following terms
a. Qualitative methods and
b. Quantitative methods.</td><td>Understanding</td><td>3</td></tr>
<tr><td>14</td><td>Explain exponential smoothing method of forecasting
Define forecasting and its uses?</td><td>Applying</td><td>4</td></tr>
<tr><td>15</td><td>Describe jury executive opinion method of sales forecasting.</td><td>Understanding</td><td>3</td></tr>
<tr><td>16</td><td>Name and describe the various factors affecting sales forecasting.</td><td>Applying</td><td>4</td></tr>
<tr><td>17</td><td>Describe sales force composite method in sales forecasting.</td><td>Understanding</td><td>3</td></tr>
<tr><td>18</td><td>Describe moving average method in sales forecasting.</td><td>Applying</td><td>4</td></tr>
<tr><td>19</td><td>a) Name the various methods of sales forecasting and describe any two of them with their advantages and limitations
b) Explain analytical method.</td><td>Understanding</td><td>3</td></tr>
<tr><td>20</td><td>Describe survey of buyers’ intention method in sales forecasting.</td><td>Applying</td><td>4</td></tr>
<tr><td colspan="4">PART C ANALYTICAL QUESTIONS</td></tr>
<tr><td>1</td><td>A XYZ television supplier found a demand of 200 sets in July, 225 sets in August & 245 sets in September. Find the demand forecast for the month of october using simple average method. The average demand for the month of October</td><td>Applying</td><td>3,4</td></tr>
<tr><td>2</td><td>A XYZ refrigerator supplier has experienced the following demand for refrigerator during past five months.
<table><tr><th>Month</th><th>Demand</th></tr><tr><td>February</td><td>20</td></tr><tr><td>March</td><td>30</td></tr><tr><td>April</td><td>40</td></tr><tr><td>May</td><td>60</td></tr><tr><td>June</td><td>45</td></tr></table>
Find out the demand forecast for the month of July using five-period moving average & three-period moving average using simple moving average method.</td><td>Applying</td><td>4</td></tr>
<tr><td>3</td><td>The manager of a restaurant wants to make decision on inventory and overall cost. He wants to forecast demand for some of the items based on weighted moving average method. For the past three months he experienced a demand for pizzas as follows:</td><td>Applying</td><td>4</td></tr>
</table>

<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td></td><td>
<table>
<tr><th>Month</th><th>Demand</th></tr>
<tr><td>October</td><td>400</td></tr>
<tr><td>November</td><td>480</td></tr>
<tr><td>December</td><td>550</td></tr>
</table>
Find the demand for the month of January by assuming suitable weights to demand data.
</td><td></td><td></td></tr>
<tr><td>4</td><td>One of the two wheeler manufacturing company exprienced irregular but usually increasing demand for three products. The demand was found to be 420 bikes for June and 440 bikes for July. They use a forecasting method which takes average of past year to forecast future demand. Using the simple average method demand forecast for June is found as 320 bikes (Use a smoothing coefficient 0.7 to weight the recent demand most heavily) and find the demand forecast for August.</td><td>Applying</td><td>3,4</td></tr>
<tr><td>5</td><td>Farewell Corporation manufactures Integrated Circuit boards(I.C board) for electronics devices. The planning department knows that the sale of their client goods depends on how much they spend on advertising, on account of which they receive in advance of expenditure. The planning department wishes to find out the relationship between their clients advertising and sales, so as to find demand for I.C board.
The money spend by the client on advertising and sales (in dollar) is given for different periods in following table :
<table>
<tr><th>Period(t)</th><th>Advertising (Xt)</th><th>Sales (Dt)</th><th>Dt^2</th><th>Xt^2</th><th>XtDt</th></tr>
<tr><td></td><td>$(1,00,000)</td><td>$(1,000.000)</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>20</td><td>6</td><td>36</td><td>400</td><td>120</td></tr>
<tr><td>2</td><td>25</td><td>8</td><td>64</td><td>625</td><td>200</td></tr>
<tr><td>3</td><td>15</td><td>7</td><td>49</td><td>225</td><td>105</td></tr>
<tr><td>4</td><td>18</td><td>7</td><td>49</td><td>324</td><td>126</td></tr>
<tr><td>5</td><td>22</td><td>8</td><td>64</td><td>484</td><td>176</td></tr>
<tr><td>6</td><td>25</td><td>9</td><td>81</td><td>625</td><td>225</td></tr>
<tr><td>7</td><td>27</td><td>10</td><td>100</td><td>729</td><td>270</td></tr>
<tr><td>8</td><td>23</td><td>7</td><td>49</td><td>529</td><td>161</td></tr>
<tr><td>9</td><td>16</td><td>6</td><td>36</td><td>256</td><td>96</td></tr>
<tr><td>10</td><td>20</td><td>8</td><td>64</td><td>400</td><td>120</td></tr>
<tr><td></td><td>211</td><td>76</td><td>592</td><td>4597</td><td>1599</td></tr>
</table>
</td><td>Applying</td><td>3,4</td></tr>
<tr><td colspan="4">UNIT III</td></tr>
<tr><td colspan="4">PART A SHORT ANSWER QUESTIONS</td></tr>
<tr><td>1</td><td>Define Inventory.</td><td>Understanding</td><td>3</td></tr>
<tr><td>2</td><td>Write the various types of inventory.</td><td>Understanding</td><td>3</td></tr>
<tr><td>3</td><td>Why inventory should be maintained?</td><td>Understanding</td><td>3</td></tr>
<tr><td>4</td><td>What is safety stock?</td><td>Understanding</td><td>3</td></tr>
<tr><td>5</td><td>What is direct inventory?</td><td>Understanding</td><td>3</td></tr>
<tr><td>6</td><td>What is indirect inventory?</td><td>Understanding</td><td>3</td></tr>
</table>

S. No	Question	Blooms Taxonomy Level	Course Outcome
7	What is lead time?	Understanding	3
8	What is reorder point?	Understanding	3
9	What is order quantity?	Understanding	3
10	What is economic order quantity?	Understanding	3
11	Write the formula for economic order quantity?	Understanding	3
12	Why safety stock is needed?	Understanding	3
13	What are the types of inventory models?	Understanding	3
14	What are the characteristics of two bin system.	Understanding	3
15	What is tool control system?	Understanding	3
16	What is periodic inventory ordering system?	Understanding	3
17	What is purchase cost?	Understanding	3
18	What is ordering cost?	Understanding	3
19	What is carrying cost?	Understanding	3
20	What is stock out cost?	Understanding	3
PART B	**LONG ANSWER QUESTIONS**		
1	How do you classify inventories into A class, B class and C class items?	Understanding	3
2	Mention the control procedures are to be exercised on A class; B class and C class items?		
3	Derive the Wilson EOQ formula	Applying	3,4
4	Explain various costs associated with inventory	Understanding	3
5	Explain the VED analysis		
6	Write short notes on P-System	Understanding	3
7	Write short notes on Q-System		
8	Mention the control procedure is to be exercised on A class, B class and C class items.	Understanding	3
9	Explain the procedure involved in carrying ABC analysis		
10	What are short comings of ABC classification?	Understanding	3
11	Explain the effect of demand on Inventories?	Understanding	3
12	Explain in brief Reorder Quantity?	Understanding	3
13	Explain various functions of inventory?	Understanding	3
14	Describe the EOQ problem with one price break.	Understanding	3
15	Describe the various re ordering systems with their advantages and limitations.	Applying	3,4
16	Describe in detail ABC analysis. State its advantages, limitations and applications.	Understanding	3
17	Describe briefly the ABC, HML and VED analysis of inventory control.	Understanding	3
18	a. Explain various steps involved in MRP system? b. Explain the JIT Kanban working principle?	Understanding	3
19	a. What types of demand are formally considered in MRP? b. Explain the methodology of MRP system briefly	Analyzing	5
20	a. List out and explain any three various segments of ERP system? b. Define Line Of Balance (LOB)? State its objectives?	Analyzing	5
21	a. Write short notes on. Japanese concepts? b. Write short notes on MRP	Understanding	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
PART C	**ANALYTICAL QUESTIONS**		
1	ABC manufacturer's produces 1, 25,000 oil seals each year to satisfy the requirement of their client. They order the metal for the bushing in lot of 30,000 units. It cost them $40 to place the order. The unit cost of bushing is $0.12 and the estimated carrying cost is 25% unit cost. Find out the economic order quantity? What percentage of increases or decrease in order quantity is required so that the ordered quantity is Economic order quantity?	Applying	3,4
2	The XYZ Company produces wheat flour as one of their product. The wheat flour is produced in the pack of 1kg. The demand for wheat flour is 40,000 packs/year & the production rate is 50,000 packs/year. Wheat flour 1kg pack cost $0.50 each to make. The Procurement cost is $5. The carrying cost is high because the product gets spoiled in few week times span. It is nearly 50 percent of cost of one pack. Find out the operating doctrine.	Applying	3,4
3	What are the practical limitations of the EOQ formula A company requires 10000 units of an item per annum. The cost of ordering is Rs. 100 per order. The inventory carrying cost is 20%. The unit price of the item is Rs. 10. Calculate a. the economic order quantity b. Optimal total annual cost c. Time between the orders? d. Define inventory?	Applying	3,4
4	a. Describe the MRP process, including netting, b. Describe the exposing and time phasing	Understanding	3
5	a. Explain the following inputs of MRP systems Master Production schedule b. Explain the following inputs of MRP systems Bill of Material	Analyzing	5
6	Find the optimal order quantity for a product for which the price breaks are as follows. Quantity (units) | Price per unit(rupees) $0 \le q1 < 500$ | 10.00 $200 \le q2 < 750$ | 9.25 $750 \le q3$ | 8.75	Analyzing	5
	UNIT - IV		
PART A	**SHORT ANSWER QUESTIONS**		
1	Define scheduling.	Understanding	3
2	State objectives and advantages of scheduling.	Understanding	3
3	Define production control.	Understanding	3
4	State the purpose of scheduling	Understanding	3
5	Write the factors affecting scheduling.	Understanding	3
6	Write the types of scheduling.	Understanding	3
7	Define master schedule.	Understanding	3
8	Draw man machine chart.	Understanding	3
9	What is Gantt chart?	Understanding	3
10	Write the Johnson's rule for scheduling.	Understanding	3
11	Define critical ratio.	Understanding	3
12	Define line balancing.	Understanding	3
13	What do you mean by MRP?	Understanding	3
14	State objectives of MRP.	Understanding	3
15	List MRP system components.	Understanding	3
16	Define routing.	Understanding	3
17	Define bill of materials.	Understanding	3
18	What is aggregate planning?	Understanding	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
19	What is chase planning?	Understanding	3
20	What is expediting?	Understanding	3
PART B	**LONG ANSWER QUESTIONS**		
1	Discuss in detail the following functions of routings Interpretation of detailed drawings	Understanding	3,5
2	Discuss in detail the following functions of routings Methods analysis .	Understanding	3,1
3	Distinguish between the route card and route sheet, with an example	Analyzing	5
4	What are the factors affecting routing procedure	Understanding	3,1
5	State the important factors that affecting routing procedure	Analyzing	7,5
6	Explain the importance of bills of material in production control. How does it help in assembly production?	Understanding	3,1
7	Distinguish between loading and scheduling	Analyzing	5
8	Explain it by drawing a route sheet		
9	a. What is route sheet? b. What is the information it contains	Understanding	3,1
10	Distinguish between single level bill of materials and indented bill of materials, with an example for each type	Analyzing	4,1
11	Distinguish between the route card and route sheet, with an example	Understanding	3,1
12	Write short notes on Routing Procedure	Understanding	3
13	Write short notes on Route Sheets & Route card	Understanding	3,1
14	Explain factors effecting routing procedure?	Understanding	3
15	Explain the factors to be considered for bill or materials?	Understanding	3
16	Explain scheduling in brief?	Understanding	3
17	a. What is the distinction between a scheduling rule and scheduling criterion b. Explain the scheduling rules with their relative advantages and disadvantages	Analyzing	5
18	a. Write short notes on Job shop. b. Write short notes on Flow shop	Understanding	3
19	a. Write short notes on Scheduling polices. b. Write short notes on Job shop and Flow shop	Analyzing, Applying	3,5
20	a. List out various scheduling rules. Explain at least three of them b. State the standard scheduling methods. Explain at least one in detail	Analyzing	5
PART C	**ANALYTICAL QUESTIONS**		
1	a. Describe any one method of sequencing of jobs for arriving at minimum elapsed time for loading on two machines and N jobs b. Calculate minimum elapsed time for processing te jobs on two machines with the time period hours as shown on the each of the machine given below Jobs are to be processes first on the	Applying, Evaluating	4

<table>
<tr><th>S. No</th><th>Question</th><th>Blooms Taxonomy Level</th><th>Course Outcome</th></tr>
<tr><td></td><td>machine 1
<table>
<tr><td rowspan="2">Machine</td><td colspan="6">Jobs</td></tr>
<tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr>
<tr><td>M1</td><td>4</td><td>8</td><td>3</td><td>6</td><td>7</td><td>5</td></tr>
<tr><td>M2</td><td>6</td><td>3</td><td>7</td><td>2</td><td>8</td><td>4</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>2</td><td>a. Explain the following devices used for loading and scheduling Product-Trol Board and
b. Explain the following devices used for loading and scheduling Sched-U-Graph</td><td>Applying, Understanding</td><td>4,3</td></tr>
<tr><td>3</td><td>In the network of figure below, the PERT time estimates of the activities are written along the activity arrows in the order to-tm-tp. Compute the expected time and variance for each activity. Also compute the expected duration and standard deviation for the following paths of the network.
a. 10-20-50-80-90
b. 10-30-50-70-90
c. 10-40-60-80-90
 

The computation of expected times and variances for different activities are carried in a table given below.
<table>
<tr><td colspan="2">Activity</td><td colspan="2">Time Estimates</td><td colspan="2">Expected Time</td><td>Variance</td></tr>
<tr><td>i</td><td>j</td><td>t_0</td><td>t_m</td><td>t_p</td><td>t_E</td><td>σ^2</td></tr>
<tr><td>10</td><td>20</td><td>6</td><td>9</td><td>12</td><td>9.00</td><td>1.00</td></tr>
<tr><td>10</td><td>30</td><td>3</td><td>5</td><td>9</td><td>5.33</td><td>1.00</td></tr>
<tr><td>10</td><td>40</td><td>10</td><td>14</td><td>18</td><td>14.00</td><td>1.78</td></tr>
<tr><td>20</td><td>50</td><td>7</td><td>10</td><td>13</td><td>10.00</td><td>1.00</td></tr>
<tr><td>20</td><td>70</td><td>3</td><td>4</td><td>8</td><td>4.5</td><td>0.69</td></tr>
<tr><td>30</td><td>50</td><td>4</td><td>10</td><td>12</td><td>9.33</td><td>1.78</td></tr>
<tr><td>40</td><td>50</td><td>8</td><td>11</td><td>14</td><td>11.00</td><td>1.00</td></tr>
<tr><td>40</td><td>60</td><td>5</td><td>10</td><td>15</td><td>10.00</td><td>2.78</td></tr>
<tr><td>50</td><td>70</td><td>3</td><td>4</td><td>5</td><td>4.00</td><td>0.11</td></tr>
<tr><td>50</td><td>80</td><td>11</td><td>15</td><td>17</td><td>14.67</td><td>1.10</td></tr>
<tr><td>60</td><td>80</td><td>7</td><td>9</td><td>12</td><td>9.17</td><td>0.69</td></tr>
<tr><td>70</td><td>90</td><td>4</td><td>8</td><td>10</td><td>7.67</td><td>1.00</td></tr>
<tr><td>80</td><td>90</td><td>6</td><td>7</td><td>9</td><td>7.17</td><td>0.25</td></tr>
</table></td><td>Applying, Evaluating</td><td>4,5</td></tr>
<tr><td>4</td><td>a) Explain the problems of random order scheduling?
b) Explain multiproduct scheduling in Batch production?</td><td>Understanding</td><td>4</td></tr>
<tr><td>5</td><td>Describe a)master scheduling
b)Production scheduling</td><td>Understanding</td><td>4</td></tr>
<tr><td colspan="4">UNIT - V</td></tr>
<tr><td colspan="4">PART A SHORT ANSWER QUESTIONS</td></tr>
</table>

S. No	Question	Blooms Taxonomy Level	Course Outcome
1	What is Dispatching?	Understanding	5
2	What are the activities of dispatcher?	Understanding	5
3	Explain dispatching rule.	Understanding	5
4	What is move order?	Understanding	5
5	What is tool order?	Understanding	5
6	What is job ticket?	Understanding	5
7	What is inspection order?	Understanding	5
8	What is store order?	Understanding	5
9	What is finished product order?	Understanding	5
10	What is machine load chart?	Understanding	5
11	What is material requisition form?	Understanding	5
12	What is move ticket?	Understanding	5
13	What is inspection ticket?	Understanding	5
14	What is labor card?	Understanding	5
15	What is tool and gauge ticket?	Understanding	5
16	List the advantages of centralized dispatching.	Understanding	5
17	Write the rules of dispatching?	Understanding	5
18	List the disadvantages of centralized dispatching.	Understanding	5
19	Define critical ratio.	Understanding	5
20	List the advantages of decentralized dispatching.	Understanding	5
PART B	**LONG ANSWER QUESTIONS**		
1	Write short notes on Dispatching procedure.	Understanding,	3,1
2	Write short notes on Activities of dispatches	Applying	
3	Write short notes on Applications of computer in PPC.	Applying,	3,4
4	a. What is follow up b. Explain follow up significance in production	Understanding	5,2
5	Explain the applications of computer in Production Planning & Control	Applying	4,5
6	Explain various activities of dispatcher	Applying	4,5
7	a. List out various forms raised by dispatcher? b. Explain any three with neat sketch	Understanding, Creating	4,5

S. No	Question	Blooms Taxonomy Level	Course Outcome
8	Describe the forms used in dispatching Move order	Understanding	4,5
9	Describe the forms used in dispatching Production ticket	Applying	4,5
10	Discuss about a) issue of move orders. b) Issue of tool orders.	Understanding, Creating	4,5
11	Discuss in detail the sequential steps involved in dispatching	Understanding	4
12	Explain the applications of computer in Production Planning & Control	Understanding	4
13	Discuss about a) issue of inspection orders. b) Issue of job orders.	Understanding	4
14	Explain briefly about centralized dispatching.	Understanding	4
15	Explain briefly about combination rules.	Understanding	4
16	Discuss about a) issue of inspection orders. b) Issue of orders to finished product stores.	Understanding	4
17	Explain briefly about decentralized dispatching.	Understanding	4
18	Write briefly about the duties of a dispatcher.	Understanding	4
19	Write briefly about the sequence of dispatching activities	Understanding	4
20	Explain about manufacturing order with a neat flow chart.	Understanding	4