KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.E.
Year : III

Course : MEEG 308
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 10 FEB 2025

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and mark in [X] the most appropriate option from each set of choices

1. Production Scheduling is simpler, and high volume of output and high labor efficiency are achieved in the case of?
   [ ] Fixed Position Layout
   [ ] Process Layout
   [ ] Product Layout
   [ ] A Combination of line and process layout

2. What is the most critical factor which impacts the design of planning and control system
   [ ] Non-Availability of Materials
   [ ] Changes in Demand and Rush Orders
   [ ] Standard Process Sheet and Load Charts
   [ ] Volume and Variety of the Expected Output

3. _____ refers to producing goods of predetermined specification, which helps in achieving uniformity and consistency in the output.
   [ ] Standardization [ ] Packaging [ ] Labelling [ ] Grading

4. Which of the following is not a component of Production Planning and Control (PPC)?
   [ ] Financial Accounting
   [ ] Production Scheduling
   [ ] Capacity Planning
   [ ] Demand Forecasting

5. What will be the mean forecast error of the following given data

Period	Demand	Forecast
1	13	14
2	12	14
3	14	13
4	16	15

   [ ] + 0.20 [ ] -0.20 [ ] +0.25 [ ] -0.25

6. What is the primary purpose of using the Moving Average Method in Time Series Forecasting
   [ ] To measure the correlation between two time series
   [ ] To smooth out short-term fluctuations and highlight longer-term trends
   [ ] To identify the trend component of the data
   [ ] To predict future values based on linear regression

7. Which of the following is the measure of forecast error
[ ] Mean Absolute Deviation [ ] Trend Value
[ ] Moving Average [ ] Price Fluctuation

8. The demand and forecast for February are 12000 and 10275, respectively. Using single exponential smoothening method (smoothening coefficient = 0.25), forecast for the month of March is
[ ] 431 [ ] 9587 [ ] 10706 [ ] 11000

9. A manufacturer has the following data regarding a product
Fixed Cost per month = Rs. 50,000, Variable Cost per unit = Rs. 200, Selling Price per unit = Rs. 300, Production Capacity = 1,500 units per month. If the production is carried out at 80% of the rated capacity that the monthly profit (in Rs.) is
[ ] 60,000 [ ] 70,000 [ ] 61,000 [ ] 71,000

10. It represents the process of determining short range capacity requirements.
[ ] Capacity Requirement Planning [ ] Aggregate Planning
[ ] Capacity Planning [ ] Schedule Planning

11. ABC Company produces and sells a product with a selling price of $50 per unit. The variable cost per unit is $30, and the total fixed costs are $80,000.
What is the financial breakeven point for ABC Company in terms of the number of units its needs to sell?
[ ] 2,000 units [ ] 3,000 units [ ] 4,000 units [ ] 50,000 units

12. A machine is used for turning operation and it takes 30 minutes to machine the component. Efficiency of the machine is 80% and scrap is 25%. The desired output is 1200 pieces per week. Considering 40 hours per week and 50 week in a year. The number of machines required in a year is
[ ] 3 units [ ] 4 units [ ] 5 units [ ] 6 units

13. In ABC Analysis, an inventory control technique in which
[ ] Inventory levels are maintained
[ ] Inventory is classified into A, B and C category with A being the highest quantity, lowest value
[ ] Inventory is classified into A, B and C category with A being the lowest quantity, highest value
[ ] Inventory are not classified based on quality

14. In the Classical Economic Order Quantity (EOQ) model, let Q and C denote the optimal order quantity and the corresponding minimum total annual cost (the sum of the inventory holding and ordering costs). If the order quantity is estimated incorrectly as Q' = 2Q, then the corresponding total annual cost C' is
[ ] C' = 1.25 C [ ] C' = 1.5 C [ ] C' = 1.75 C [ ] C' = 2C

15. The amount of time elapsed from the moment an inventory replenishment order is placed and the moment the supplier delivers the goods is
[ ] Lead Time [ ] Cycle Time [ ] Take Time [ ] Order Time

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16. The demand rate for a particular item is 12,000 units/year. The ordering cost is Rs. 100 per order and the holding cost is Rs. 0.80 per item per month. If no shortages are allowed, the replacement are allowed and the replacement is instantaneous, then the economic order quantity is

[ ] 1,500 units [ ] 2,000 units [ ] 500 units [ ] 1,000 units

17. In n job and two machines sequencing problems with machine order of processing the jobs is M1M2, let's say M1 and M2 are the two machines

[ ] Job having minimum time on the machine M2 is processed in the first
[ ] Job having minimum time on the machine M2 is processed in the last
[ ] Job having minimum time on the machine M1 is processed in the last
[ ] Job having maximum time on the machine M2 is processed in the last

18. Which of the following statements concerning a Gantt Chart is true

[ ] Gantt Charts are particularly helpful for scheduling and planning large projects
[ ] Gantt Charts are particularly helpful for scheduling and planning projects with complex precedence relationships
[ ] Gantt chart has been a popular project scheduling tool, but is not widely used now
[ ] The Gantt chart indicates where extra time is available and activities can be delayed

19. A Project starts with activity A and ends with activity F. The precedence relation and durations of the activities are as per the following data
The Minimum Project Completion Time (in days) is

Activity	Immediate Predecessor	Duration (in Days)
A	-	4
B	A	3
C	A	7
D	B	14
E	C	4
F	D,E	9

[ ] 30 [ ] 20 [ ] 40 [ ] 50

20. Which of the following statements is not true about Critical Path Method (CPM)

[ ] CPM is concerned with activities
[ ] CPM is suitable for non- repetitive projects
[ ] CPM cannot be analyzed statistically
[ ] CPM establishes a relationship between time and cost

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SECTION "B"

Attempt ALL questions. Assume suitable data if necessary.

1. What are all the types of Economic Analysis of New Products, In Short explain Risk Evaluation and Profit Considerations with suitable examples. [5]

2. A large Portland Manufacturer wants to forecast demand for a piece of pollution – control equipment. A review of past sales, as shown below, indicates that an increasing trend is present. [6]

Month (t)	Actual Demand (A_t)	Month (t)	Actual Demand (A_t)
1	12	6	21
2	17	7	31
3	20	8	28
4	19	9	36
5	24	10	?

Smoothing Constants are assigned the values of $\alpha = 0.2$ and $\beta = 0.4$. The firm assumes the initial forecast for month 1 (F_1) was 11 units and the trend over that period (T_1) was 2 units.

3. Define Capacity Planning and Control and Explain Capacity Planning Procedure with suitable example in Production Industry. [6]

4. Annual Demand for an item is 2400 units. Ordering cost is Rs. 350, Inventory Carrying Cost is 24% of the Purchase Price per year. Purchase Prices are: [6]

P_1 = Rs. 10 for purchasing $Q_1 < 500$

P_2 = Rs. 9.25 for purchasing $500 \leq Q_2 < 750$

P_3 = Rs. 8.75 for purchasing $750 \leq Q_3$

Determine the optimum purchase quantity using EOQ with Quantity Discount.

5. The eleven activities A to K which make up a project are subject to the following relations. [6]
   a. Construct an activity network for the project.
   b. Find the Earliest Starting Time of each activity in the network and the latest starting time of each activity.
   c. Calculate Free Float and Total Float of each activity, and hence determine the critical path.

Activity	A	B	C	D	E	F	G	H	I	J	K
Immediate Predecessors	C,F,J	E	--	B,H	C,J	--	A,I	J	E,F		B,H,I
Durations	7	6	9	7	3	8	4	9	9	7	5

P.T.O.

6. A machine operator has to perform several operations, on a number of different jobs. There are five jobs, which are to be processed on three machines M1, M2 and M3 in the order M1M2M3. The processing times in hours for the jobs are given below. Find the optimum sequence and total elapsed time using Johnson Bellman Rule. [6]

Machine/Job	J1	J2	J3	J4	J5
M1	6	4	3	8	5
M2	2	7	8	6	3
M3	3	5	2	4	7

7. Explain in detail about the Case Study "Automated Standard Setting for Casting and Cast Finishing Operations" by Jeffrey A. Arnold from H.B. Maynard and Co. Inc. from Industrial Engineering Handbook by Maynard. [5+5]
   a. Explain the Case Study in Short encompassing important topics discussed in the topic.
   b. Explain in detail about the Top- down Analysis used in Case Study.

8. Explain in detail about the Case Study "Ergonomic Consumer Product Design" by John G. Kreifeldt from Tufts University from Industrial Engineering Handbook by Maynard. [5+5]
   a. Why Consumer Product design is important and explain consumer product design process in detail.
   b. Explain the Morphological Approach applied in the case for Product Design Analysis.