KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.E.
Year : III

Course : MEEG 308
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 13 DEC 2024

SECTION "A"

[20 Q. × 1 = 20 marks]

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

1. Which one of the following is correct?
   Production planning and control functions are extremely complex in:
   [ ] Job-production shop producing small number of pieces only once
   [ ] Batch production shop producing a batch at irregular intervals
   [ ] Batch production shop producing a batch only once
   [ ] Job-production shop producing small number of pieces intermittently

2. The routing function in a production system design is concerned with
   [ ] Manpower utilization
   [ ] Quality assurance of the product
   [ ] Optimizing material flow through the plant
   [ ] Machine utilization

3. Which one of the following is the preferred logical sequence in the development of a new product?
   [ ] Technical Feasibility, Social Acceptability and Economic Viability
   [ ] Social Acceptability, Economic Viability and Technical Feasibility
   [ ] Economic Viability, Social Acceptability and Technical Feasibility
   [ ] Technical Feasibility, Economic Viability and Social Acceptability

4. Which of the following is true in context of market demand?
   [ ] It is the total volume that would be bought by a defined customer group
   [ ] This is for a defined geographical area
   [ ] The Marketing period and time are never static
   [ ] Market demand is not a fixed number

5. Assume that the long run demand for a given product is relatively stable and a smoothing constant (alpha) of 0.05 is considered appropriate. If the exponential smoothing method were used, a forecast would have been made for the last month. Assume that the last month's forecast (F_{t-1}) was 1050 units and 1000 units were actually demanded (A_{t-1}). Find the forecast for current month.
   [ ] 1052.5 [ ] 1050 [ ] 1047.5 [ ] 1002.5

6. Time-series analysis is based on the assumption that
   [ ] Random error terms are normally distributed.
   [ ] There are dependable correlations between the variable to be forecast and other independent variables.
   [ ] Past patterns in the variable to be forecast will continue unchanged into the future.
   [ ] the data do not exhibit a trend.

7. The greatest smoothing effect is obtained by using
[ ] A moving average based on a small number of periods.
[ ] Exponential smoothing with a small weight value.
[ ] The root-mean-square error.
[ ] The barometric method.

8. In a forecasting model, at the end of period 13, the forecasted value for period 14 is 75. Actual value in the periods 14 to 16 are constant at 100. If the assumed simple exponential smoothing parameter is 0.5, then the MSE at the end of period 16 is
[ ] 273.44 [ ] 43.75 [ ] 14.58 [ ] 820.31

9. Breakeven analysis identifies the
[ ] Profit-maximizing level of output.
[ ] Level of output where economic profit is equal to zero.
[ ] Level of output where marginal revenue is equal to marginal cost.
[ ] Profit –minimizing level of output.

10. For a particular product, selling price per unit is Rs 100, Variable Cost per unit is Rs. 60, Fixed costs is Rs. 10, 00,000 .Due to inflation the variable costs have increased by 10% while fixed costs have increased by 5%. If the breakeven quantity is to remain constant by what percentage should the sales be raised?
[ ] 8 [ ] 0.8 [ ] 9 [ ] 12

11. A work shift is for 8 hours duration; 30 minutes lunch break and two 15 minutes (each) tea breaks are allowed per shift. If products are to go out after assembly at the rate of 60 per shift, and total assembly time content for a product is 42 minutes, then minimum number of work stations needed is
[ ] 8 [ ] 6 [ ] 12 [ ] 20

12. A company is faced with a situation where it can either produce some item by adding additional infrastructure which will cost them Rs. 15,00,000/- but unit cost of production will be Rs. 5/- each. Alternatively it can buy the same item from a vendor at a rate of Rs. 20/- each. When should the company add to its capacity in terms of demand of items per annum?
[ ] 100000 [ ] 120000 [ ] 150000 [ ] 50000

13. In ABC Analysis, A items require
[ ] No Safety Stock [ ] Low Safety Stock
[ ] Moderate Safety Stock [ ] High Safety Stock

14. In inventory control theory, the economic order quantity (E.O.Q.) is :
[ ] Average level of inventory
[ ] Optimum lot size
[ ] Lot size corresponds to break- even analysis
[ ] Capacity of a warehouse

15. A company uses 2555 units for an item annually. Delivery lead time is 8 days. The re order point (in number of units) to achieve optimum inventory is
[ ] 56 [ ] 58 [ ] 60 [ ] 62

16. A local tire distributor expects to sell approximately 9600 steel belted radial tires next year. Annual Carrying cost is Rs.16 per tires and ordering cost is 75. The economic order quantity of the tires is

[ ] 320 [ ] 300 [ ] 360 [ ] 240

17. Using Johnson's Rule find the right sequence of the Job

Jobs	Machine 1 (Time)	Machine 2 (Time)
A	2	5
B	9	7
C	8	12
D	10	3
E	4	9
F	11	14

[ ] AECFBD [ ] ABCDEF [ ] DBFCEA [ ] ADBCEF

18. Gantt Chart is applicable to

[ ] Time Study [ ] Production Scheduling

[ ] Sales Forecasting [ ] Motion Study

19. Critical Activities have

[ ] Maximum Float [ ] Minimum Float

[ ] Zero Float [ ] Negative Float

20. The given table lists the project activities, precedence relationships and duration. Find the Critical Path of the Project.

Activity	Precedence	Duration (in Days)
P	-	3
Q	-	4
R	P	5
S	Q	5
T	R,S	7
U	R,S	5
V	T	2
W	U	10

[ ] P-R-U-V [ ] P-R-T-U [ ] Q-S-T-U [ ] Q-S-U-W

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SECTION "B"
[55 marks]

Attempt *ALL* questions. *Assume any suitable data if required.*

1. According to the Paper "*Improving Product Development process design : A method for managing information flows, risks and iterations*"
Discuss the paper in short about the case research made regarding the various organizations PDP Design processes. [6]

2. How Industrial Engineers can in modern day Production can effectively integrate emerging technologies like AI, IoT and Robotics in existing manufacturing processes to maximize efficiency and Productivity. Give a critical feedback for the same. [6]

3. Define and Explain Forecasting based on Time Horizon. [2+4]
Solve the below given Problem.
Demand for a certain item has been as shown below.

Time	Actual Demand
April	200
May	50
June	150

The Forecast for April was 100 units with a smoothing constant of 0.20 and using first order exponential smoothing what is the July Forecast? What do you think about a 0.20 smoothing constant?

4. A manufacturer has the following information on its major product
Regular time production capacity = 2600 units/period, Overtime production costs = Rs. 12 unit, Inventory costs = Rs. 2 unit /period based on the ending inventory), Backlog costs = Rs. 5 unit/period, Beginning Inventory = 400 units
Demand in units) for periods 1, 2, 3, 4 is 4000, 3200, 2000 and 2800 respectively and the production output is 2900 units. Develop a level output plan that yields zero inventory at the end of period 4. What costs results from this plant? [6]

5. In Inventory Control, if delivering items depending on its production rate per day is followed. A Production Rate Model or a Gradual Replacement Model is used. So, derive an expression to find a Maximum Inventory required for the same. [7]

P.T.O.

6. The following data's given in the table represents the completion of a Project given ideas about the Activities, Immediate Predecessor and Durations. [7]

a. Draw the CPM network; analyze the paths through the network.
b. Determine the Critical Path and Project Completion Time.
c. Compute Total Floats, Free Floats for all the activities.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Immediate Predecessors	--	--	--	B	A	A	B	C,D	C,D	E	F,G, H	F,G, H	I	J,K
Durations	2	5	4	5	7	3	3	6	2	5	4	3	12	8

7. A machine operator has to perform three operations, on a number of different jobs. There are five jobs, which are to be processed on three machines A, B and C in the order ABC. The processing times in hours for the jobs are given below. Find the optimum sequence and total elapsed time using Johnson Bellman Rule. [7]

Machine/Job	J1	J2	J3	J4	J5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

8.

As per the Case Study "Design for Manufacturing and Assembly" by Peter Dewhurst, University of Rhode Island from Industrial Engineering Handbook by Maynard.

a. Explain detail about the new approach to Design for Manufacture and Assembly and its role in Product Simplification. [5]
b. Discuss about DFA Index with the redesign of the DFA case study discussed about the Pressure recorder. [5]

OR

Explain in detail about the Case Study "A Quantitative Approach to the Site Selection Process" by Raj M. Patel of Forest City Ratner Companies from Industrial Engineering Handbook by Maynard. [10]