L-4/T-2/MME **Date : 02/08/2015**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2012-2013

Sub : **IPE 483** (Production Planning and Control)

Full Marks : 210 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) A drugstore chain plan to open four stores in medium-sized city. However, funds are limited; so, only two can be opened this year: **(12)**

(i) Given the following matrix showing the weighted population distance costs for each of the four areas and four store sites, select the two to be opened up first.

		Store			
		1	2	3	4
Geographic area	1	0	20	160	60
	2	80	0	40	80
	3	120	80	0	100
	4	80	100	60	0

(b) A wholesale grocery distribution center uses a two-step process to fill orders. Tomorrow's work will consist of filling the seven orders shown. **(11)**

Job	Operations time	
	Machine 1	Machine 2
A	1.20	1.40
B	0.90	1.30
C	2.00	0.80
D	1.70	1.50
E	1.60	1.80
F	2.20	1.75
G	1.30	1.40

(i) Determine a job sequence that will minimize the time required to fill the orders.

(ii) Construct a chart of the resulting sequence, and find the idle time of machine 1 and 2.

(c) Describe product layout, process layout and fixed position layout with appropriate examples and their uses. **(12)**

2. (a) What is capacity planning? **(5)**

(b) A construction project is broken down into the following 10 activities: **(18)**

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Contd ... Q. No. 2(b)

Activity	Time(weeks)	Immediate Predecessors
1	4	-
2	2	1
3	4	1
4	3	1
5	5	2,3
6	6	3
7	2	4
8	3	5
9	5	6,7
10	7	8,9

(i) Draw the network diagram.

(ii) Find the critical path and calculate the project completion time.

(iii) If activities 1 and 10 cannot be shortened, but activities 2 through 9 can be shortened to a minimum of one week each at a cost of $10,000 per week, which activities would you shorten to cut the project by four weeks?

(c) What is project management? Briefly describe project life cycle and work breakdown structure. **(12)**

3. (a) Describe the supporting goals of JIT. What are the elements of JIT? **(11)**

(b) Describe the functions of inventory? What are the basic assumptions of EOQ inventory model? **(9)**

(c) Assume you have a product with the following parameters: **(15)**

Annual Demand = 360 units

Holding cost per year = $1.00 per unit

Order cost = $100 per order

(i) What is the EOQ for this product? Assuming a 300-day work year, how many orders should be processed per year? What is the expected time between orders?

(ii) What is the total cost for the inventory policy used?

(iii) If demand for an item is 3 units per day, and delivery lead-time is 15 days, what should we use for a simple re-order point?

(iv) What should cost be if the demand was actually higher than estimated (i.e., 500 units instead of 360 units), but the EOQ established above is used? What will be the actual annual total cost?

4. (a) What is Master scheduling? Describe duties of a master scheduler. **(6)**

(b) Nowjuice, Inc. produces bottled pickled juice. A planner has developed an aggregate forecast for the demand (in cases) for the next six months as shown below: **(22)**

	1	2	3	4	5	6
Forecast	4,000	4,800	5,600	7,200	6,400	5,000

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Contd ... Q. No. 4(b)

The costs are shown below:

Output Costs

Regular time (normal output)	$10 per case
Overtime	$16 per case
Subcontracting	$20 per case

Inventory Costs

$1 per case per month on average inventory

Beginning inventory is 0 cases, and regular production capacity is 5,000 cases per month. No backorders are allowed.

(i) Develop an aggregate plan using a combination of regular time, overtime (maximum of 500 cases per month), inventory, and subcontracting (maximum of 500 cases per month) to handle variations in demand. Show your plan in the following table. Note: you do not need to enter cells which have a value of 0. Note: half units are acceptable.

(ii) Develop an aggregate plan using a level regular production strategy, inventory and overtime. Show your plan in the following table. Note: you do need to enter cells which have a value of 0.

(c) What is JIT? Explain briefly how JIT systems differ from traditional production systems. **(7)**

SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) Write down the uses of forecast throughout the organization. Briefly describe the elements of a good forecast. **(10)**

(b) The manager of a sea food restaurant was asked to establish a pricing policy on lobster dinners. Experimenting with prices produced the following data: **(20)**

Average number sold per day, y	Price, x
200	$ 6.00
190	6.50
188	6.75
180	7.00
170	7.25
162	7.50
160	8.00
155	8.25
156	8.50
148	8.75
140	9.00
133	9.25

(i) Obtain a linear regression line for the data.

(ii) Predict price if average number sold per day is 135.

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Contd ... Q. No. 5

(c) How forecasting accuracy can be checked? **(5)**

6. (a) What is production system? Briefly describe different types of production systems. **(10)**

(b) The following tasks and the order in which they must be performed according to their assembly requirements are shown in the following table. These are to be combined into workstations to create an assembly line. The assembly line operates 7.5 hours per day. The output requirement is 1,000 units per day. **(25)**

Task	Preceding task	Time (seconds)
A	-	15
B	A	24
C	A	6
D	B	12
E	B	18
F	C	7
G	C	11
H	D	9
I	E	14
J	F, G	7
K	H, I	15
L	J, K	10

(i) Draw a precedence diagram

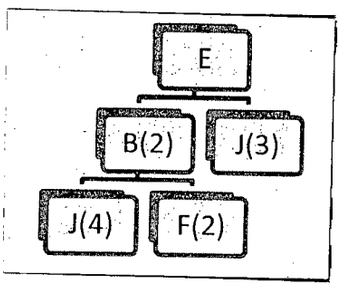
(ii) What is the cycle time?

(iii) Balance the line using the longest task time based on 1,000 units of forecast, stating which tasks would be done in each workstation.

(iv) For iii, what is the efficiency of the assembly line?

7. (a) Briefly describe MRP II and indicate how it relates to MRP. **(10)**

(b) Eighty units of end item E are needed at the beginning of week 6. Three cases (30 units per case) of J have been ordered and one case is scheduled to arrive in week 3, one in week 4, and one in week 5. Note: J must be ordered by the case, and B must be produced in multiples of 120 units. There are 60 units of B and 20 units of J now on hand. Lead times are two weeks each for E and B, and one week for J and F. **(17)**



Contd P/5

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Contd ... Q. No. 7(b)

(i) Prepare a material requirement plan for component J.

(ii) Suppose that in week 4 the quantity of E needed is changed from 80 to 70. The planned order released through week 3 has all been executed. How many more Bs and Js will be on hand in week 6?

(c) A time study analyst timed an assembly operation for 30 cycles, and then computed the average time per cycle, which was 18.75 minutes. The analyst assigned a performance rating of 96%, and decided that an appropriate allowance was 15 percent. Assume the allowance factor is based on the total work period. **(8)**

(i) What is the normal time for the task?

(ii) What is the standard time for the task?

8. (a) Briefly describe work study. Explain the methodology of method study. **(10)**

(b) Assign trucks to delivery routes so that total costs are minimized, given the cost data shown. What is the total cost? **(20)**

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	15

(c) Briefly describe each of these priority rules: SPT, STR. **(5)**

L-4/T-2/MME **Date : 06/08/2015**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2012-2013

Sub : **MME 447** (Industrial Metal Working Processes)

Full Marks : 210 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **EIGHT** questions in this Section. Answer any **SIX**.

1. (a) Draw the forging load vs forging stroke curve for impression die forging. **(5 ½)**

   (b) A round rod of Annealed brass is being drawn from a diameter of 6 mm to 3 mm at a speed of 0.6 m/s. Assume that the frictional and redundant work together constitute 35% of the ideal work of deformation. Calculate the power required in this operation. Material property data: k = 895 MPa and n = 0.49. **(12)**

2. (a) Briefly describe the states of stresses for a workpiece that is subjected during deep drawing operation. **(10)**

   (b) With necessary sketch explain the effect of die angle on the forces of extrusion. **(7 ½)**

3. Briefly explain the effect of coefficient of friction and thickness reduction during rolling on the pressure distribution in the roll gap. **(17 ½)**

4. Estimate the roll force and power for annealed low carbon steel strip of 200 mm wide and 10 mm thick to be rolled to a thickness of 6 mm. The roll radius is 200 mm and the roll rotates at 200 rpm. Given μ = 0/1, k = 530 MPa, n = 0.26. **(17 ½)**

5. Define limiting drawing ratio. A cylindrical specimen made of annealed 1112 steel has a diameter of 200 mm and is 125 mm high. The upset at room temperature is set to a height of 50 mm. Assuming that the coefficient of friction is 0.2. Calculate the upsetting force required at the end of the stroke Material property data: k = 760 MPa, n = 0.19. **(17 ½)**

6. Draw the figure that depicts the processing scheme and structural evolution during the two step heat treatment of TRIP steel. **(17 ½)**

7. (a) With necessary sketches, explain why rolled threaded screws are superior in quality as compared to machined threaded screws. **(7 ½)**

   (b) Discuss the forces that are supposed to be active at various contact points between a roller and a metal to be rolled. **(10)**

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8. Using schematic diagram, briefly describe the differences in die pressure distribution in compressing a rectangular workpiece under plain strain and plain stress condition. **(17 ½)**

SECTION – B

There are **EIGHT** questions in this Section. Answer any **SIX**.

9. Derive Von Mises' and Tresca yield criteria. **(17 ½)**

10. (a) What is Bauschinger effect? Explain the reasons of this effect. **(10)**

    (b) Determine the relationships between true stress and engineering stress, and true strain and engineering strain. **(7 ½)**

11. What do understand by grain boundary sliding? Describe briefly how you can accommodate strains developed by grain boundary sliding. **(17 ½)**

12. A cold worked metallic alloy was annealed for an excess period of time. Describe the microstructural changes that may occur during this heat treatment. **(17 ½)**

13. What is dynamic recrystallization? Describe the development of microstructure during dynamic recrystallization. **(17 ½)**

14. Perform a slab analysis on stresses acting on an element during strip drawing of a wide sheet considering frictionless condition. **(17 ½)**

15. Describe the following types of defects observed in TMT processes: (i) process related; (ii) microstructural; (ii) surface defects and (iv) fracture related defects. **(17 ½)**

16. (a) When a material was subjected to an yield stress of 75 MPa, its principal stresses in two directions are σ_1 and σ_2, and σ_2 is found to be zero and in the third direction is $\sigma_3 = \sigma_1 /2$. If the material deforms following von Mises'criterion, what would be the value of σ_1? **(7 ½)**

    (b) A mild steel plate of size 75 mm × 75 mm × 4 mm is subjected to biaxial tension of $\sigma_1 = \sigma_2$, and $\sigma_3 = 0$. Following von Mises criterion, find out the largest possible change in volume at yielding. Material property data: ν = 0.30, E = 200 GPa and σ_0 = 350 MPa. **(10)**

L-4/T-2/MME **Date : 10/08/2015**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-4/T-2 B. Sc. Engineering Examinations 2012-2013

Sub : **MME 457** (Powder Metallurgy)

Full Marks : 140 Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **FOUR** questions in this Section. Answer any **THREE**.

1. (a) Discuss the solid state theory of sintering. **(13)**

   (b) Write a short note on pore-structure evolution of sintering. **(6 ⅓)**

   (c) What are the advantages of liquid phase sintering over solid state sintering? **(4)**

2. (a) List the pre-requisites of a sintering furnace. "It is necessary to have three distinct zones in a continuous sintering furnace" – Explain. **(12)**

   (b) Why is it necessary to control furnace atmosphere during sintering? What atmospheres are generally used in sintering? **(6 ⅓)**

   (c) Define mechanical alloying. Mention the examples of synthesis of various materials by mechanical alloying. **(5)**

3. (a) Explain the steps involved in the production of self-lubricating bearings. **(10)**

   (b) Describe the production of tungsten carbide powder with the help of a flow sheet. **(10 ⅓)**

   (c) List the types of cermets. **(3)**

4. (a) What is double-sintering process? Why are pre-sintering and heat treatment of green carbide done? Explain. **(10)**

   (b) What advantages are there in the production of ferrites by powder metallurgy technique? Write a short note on the application of ferrites for microwave devices. **(9)**

   (c) Write down the finishing operation of a sintered product. **(4 ⅓)**

SECTION – B

There are **FOUR** questions in this Section. Answer any **THREE**.

5. (a) Mention the basic steps of powder metallurgy. Discuss the applications of this manufacturing technology. **(17 ⅓)**

   (b) Differentiate between apparent density and tap density of powders. **(6)**

6. (a) Name the mechanical and physico-chemical processes of powder manufacture. **(8)**

   (b) What is atomization? Mention its advantages. **(8)**

   (c) Write the droplet formation sequences in gas atomization. **(7 ⅓)**

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MME 457

7. (a) Why is preliminary heat treatment necessary before mixing or blending of metal power? Differentiate between high temperature and low temperature heat treatment. **(7)**

   (b) What are the problems associated with mixing? **(7)**

   (c) Compare stress states in unidirectional compaction with isostatic compaction. **(9 ⅓)**

8. With appropriate diagrams, discuss radial and vertical density gradients of isostatically and triaxially compacted iron powder at different levels of confining pressure. **(23 ⅓)**
