UNIVERSITY
— OF —
JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA
		ENGINEERING: INDUSTRIAL
SUBJECT	:	**PRODUCTION ENGINEERING**
CODE	:	**BEP231**
DATE	:	WINTER SUPPLEMENTARY EXAMINATION 2016
		28 JULY 2016
DURATION	:	(SESSION 1) 08:00 – 11:00
WEIGHT	:	40 : 60
TOTAL MARKS	:	100

ASSESSOR	:	MR P. DUBE
MODERATOR	:	MR O. CHIMUSORO
NUMBER OF PAGES	:	3 PAGES

INSTRUCTIONS TO STUDENTS

PLEASE ANSWER ALL QUESTIONS.

REQUIREMENTS

ONLY ONE POCKET CALCULATOR PER CANDIDATE MAY BE USED.

Question 1

1.1 A manufacturing company has a weekly product input of 1,700 units. The average percentage of good-quality products is 83 percent. Of the poor quality products, 60 percent can be reworked and sold as good-quality products. Determine:-

1.1.1   Weekly product yield   (4)

1.1.2   Weekly product yield if the good-product quality is increased to 92 percent   (4)

1.2 A retail catalogue company orders from customers and then sends the completed orders to the warehouses to be filled. An operator processes an average of 45 orders per day. The cost of processing an order is R1.15, and it costs R0.65 to correct an order that has been filled out incorrectly by the operator. An operator averages 7 percent bad orders per day, all of which are reworked prior to filling the customer order. Determine the quality-productivity ratio for an operator.   (6)

[14 Marks]

Question 2

A project consists of 8 activities named A to H.

2.1 Construct a network so as to satisfy the scheduling requirements shown in the table below.   (5)

Task	Duration	Predecessors
A	3	-
B	6	A
C	7	A
D	5	A
E	13	B,C
F	8	C,D
G	11	D,F
H	6	G,E

2.2 Find the least time required to complete the whole project and identify the critical activities.   (7)

2.3 How is the project completion time affected if:

2.3.1   activity F is delayed by 3 days   (3)

2.3.2   activity E is delayed by 7 days   (3)

2.3.3   activity G is finished 7 days early   (3)

[21 Marks]

Question 3

A manufacturer of sails for small boats has a group of custom sails awaiting the last two processing operations before the sails are sent to the customers. Operation 1 must be performed before operation 2, and the jobs have different time requirements for each operation. The hours required are as follows:

	Job									
	1	2	3	4	5	6	7	8	9	10
Operation 1	1	5	8	3	9	4	7	2	4	9
Operation 1	8	3	1	2	8	6	7	2	4	1

3.1 Use Johnson's rule to determine the optimal sequence. (Show all the steps)   (6)
3.2 Draw a Gantt chart for each operation   (10)
3.3 Calculate the average flow-time   (5)

[21 Marks]

Question 4

The Dine Corporation is both a producer and a user of brass couplings. The firm operates 220 days a year and uses the couplings at a steady rate of 50 per day. Couplings can be produced at rate of 200 per day. Annual storage cost is R1 per coupling, and machine setup cost is R35 per run, Since there are 220 days per year and u is equal to 50, yearly demand is 50(220) =11000.

5.1 Determine the economic run size.   (4)
5.2 Approximately how many runs per year will there be?   (3)
5.3 Compute the maximum inventory level.   (3)
5.4 Determine the cycle time, run time and pure consumption time.   (6)
5.5 Compute the total cost.   (4)

[20 Marks]

Question 6

Develop a production plan and calculate the annual cost for a firm whose demand forecast is fall, 10, 000; winter, 8,000; spring 7,000; summer, 12,000. Inventory at the beginning of fall is 500 units. At the beginning of fall you currently have 30 workers, but you plan to hire temporary workers at the beginning of summer and lay them off at the end of summer. In addition, you have negotiated with the union an option to use the regular workforce on overtime during winter or spring if the overtime is necessary to prevent stock-outs at the end of those quarters. Overtime is not available during fall. Relevant costs are: hiring, R100 for each temp; layoff, R200 for each worker laid off; inventory holding, R5 per unit-quarter; backorder, R10 per unit; straight time, R5 per hour; overtime R8 per hour. Assume that the productivity is 0.5 units per worker hour, with eight hours per day and 60 days per season.

Develop a production plan using:
6.1 Level production   (12)
6.2 Chase strategy, no overtime, work hours not flexible   (12)

[24 Marks]