



**PROGRAM** : NATIONAL DIPLOMA  
**ENGINEERING: INDUSTRIAL**

**SUBJECT** : **PRODUCTION ENGINEERING 2**

**CODE** : **BEP 231**

**DATE** : WINTER SSA EXAMINATION 2019  
18 JULY 2019

**DURATION** : (SESSION 1) 08:00 - 11:00

**WEIGHT** : 40: 60

**TOTAL MARKS** : 100

---

**ASSESSOR** : MR MT. RAMOGAYANE

**MODERATOR** : MR P.DUBE

**NUMBER OF PAGES** : 4 PAGES

---

## **INSTRUCTIONS TO STUDENTS**

PLEASE ANSWER ALL QUESTIONS.

## **REQUIREMENTS**

ONLY ONE POCKET CALCULATOR PER CANDIDATE MAY BE USED.

---

### Question 1

1.1 Assume the quantity-discount schedule in Table 1.1 is appropriate.

Order Size	Discount	Unit cost
0 to 49	0%	R30
50 to 99	2%	?
100 or more	6%	?

If annual demand is 150 units, ordering cost is R30 per order, and annual inventory cost is R7.50, what order quantity would you recommend? (10)

1.2 Suppose you purchase from a supplier a part with which you assemble widgets. On average, you use 50,000 units of this part each year. Every time you order this particular part, you incur a sizeable ordering cost of R800 regardless of the number of parts you order. The carrying cost are R0.08 per unit per year.

1.2.1 How many parts should you purchase each time you place an order? (5)

1.2.2 To satisfy annual demand, how many times per year will you place orders from this part? (5)

### Question 2

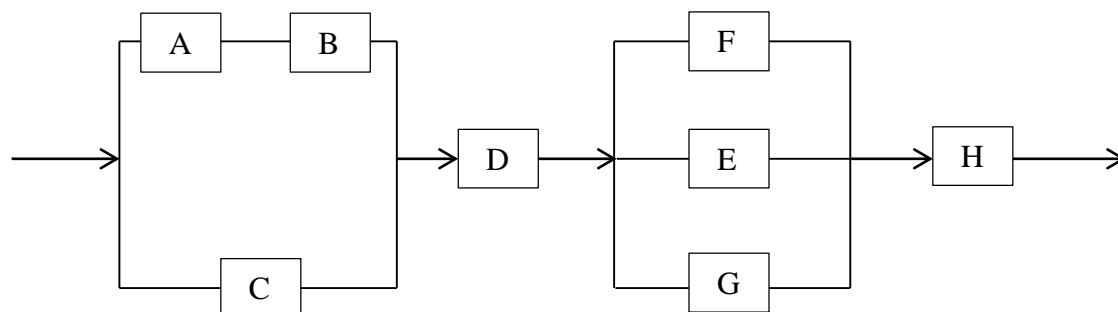
2.1 What is a functional failure? (2)

2.2 What is a reliability failure? (2)

A system consists of eight components, illustrated in Figure Q1.1 below. The reliabilities of each component are:

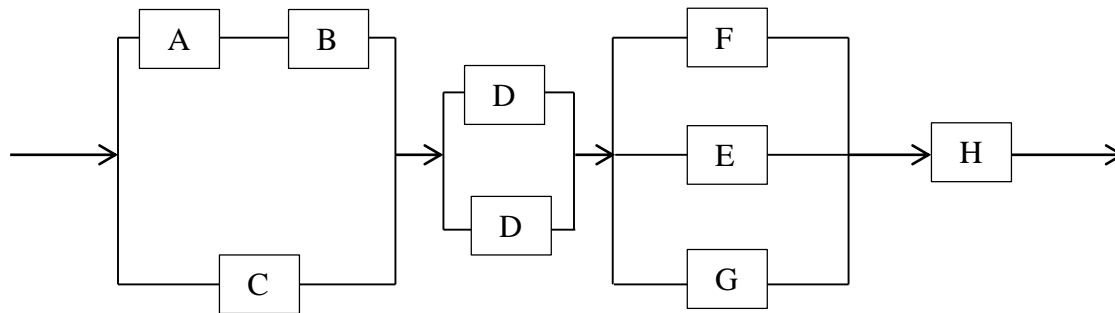
Component	A	B	C	D	E	F	G	H
Reliability	0.70	0.75	0.70	0.5	0.80	0.85	0.72	0.80

Figure 2.1



2.3 Analyse the system reliability, assuming there is one component of each type. (8)

Figure 2.1



2.4 How much has the reliability improved by having two parallel D components (See Figure 2.1). Explain your results. (8)

### Question 3

The Sipho Company has seven jobs waiting to be processed through its liner department. Each job's estimated processing times and due dates are as follows:

Job	Processing time (days)	Due date (days from now)
A	5	7
B	14	38
C	7	9
D	5	6
E	10	40
F	8	19
G	9	15

3.1 Using the shortest processing time scheduling rule, in what order would the jobs be completed? Processing can start immediately. (2)

3.2 What is the average completion time (in days) of the sequence calculate in question a? (2)

3.3 What is the average job lateness (in days) of the sequence calculated in question a? (2)

3.4 Using the earliest due date scheduling rule, in what order would the jobs be completed? Processing can start immediately. (2)

3.5 What is the average completion time (in days) of the sequence calculate in question d? (2)

3.6 What is the average job lateness (in days) of the sequence calculated in question d? (2)

### Question 5

5.1 Briefly discuss five key elements of just in time manufacturing system (15)

5.2 Define the quality characteristics for the following products and service and suggest ways in which each could be measured. Identify whether the characteristics are attribute or variable

5.2.1 A restaurant meal (5)

5.2.2 A Washing machine (5)

5.2.3 A Taxi Service (5)

**Question 6**

Explain in detail the *internal supply chain* of the focal manufacturing company. (10)

**Question 7**

Assume Machine A is a single product machine and is theoretically capable of producing 1,000 units every hour. In a 16 hour scheduled production day Machine A recorded throughput on the process as 12,632 units. It was found that only 12,000 of the units were deemed good units. On a particular day the process recorded the following:

Equipment breakdown	40 minutes
Maintenance	30 minutes
Machine set-up time	30 minutes

Calculate the Overall Equipment Effectiveness (10)

%%%%%%%%All the Best%%%%%%%%All the Best%%%%%%%%All the Best%%%%%%%%