



Tertiary and Vocational Education Commission
Production Technology- Part II
NCT Equivalence Examination



Instructions:

01. This paper consist 05 questions.
02. Each question has part A and Part B.
03. Answer only one part of each question.

Duration: 03 Hours

1.0 Part A

A particular production company engage in mechanical manufacturing is planning to stablish a machining shop with the facilities to undertake variety of machining jobs. They are planning to produce variety of own products with batch production process. Also they plan to undertake machining jobs from the outside customers for any demand. By considering the above fact,

- i. Proposed a suitable type of layout for the production plant. (02 marks)
- ii. Briefly explain the proposed layout with appropriate diagram. (08 marks)
- iii. Briefly explain the differences between batch production and job production with examples. (05 marks)
- iv. State the advantage & Disadvantages of batch production when compare with the job production. (05 marks)

1.0 Part B

The **predecessors, duration and possible crash time** for each activity in a fabricating job are given in the table below.

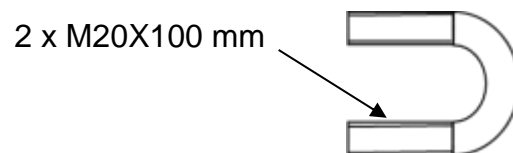
Activity	predecessor	Duration (days)	Possible crash time	Crash cost Rs. /per day
A	----	2	----	0
B	----	3	1	600
C	-----	5	2	500
D	A	3	1	550
E	A	2	1	900
F	B & D	2	-----	0

Activity	predecessor	Duration (days)	Possible crash time	Crash cost Rs. /per day
G	E	5	1	800
H	C	8	2	700
I	E	8	3	300
J	F & G	5	2	1200

- i. Draw the network diagram for the job. (05 marks)
- ii. Find the earliest and latest possible time for each activity. (04 marks)
- iii. State the job completion time under normal conditions. (02 marks)
- iv. Find the free float & total float for each activity and slack for each node. (04 marks)
- v. Hence, find the critical path. (02 marks)
- vi. What are the possible options, if the customer asks to complete the job, two days before the normal completion time? (03 marks)

2.0 Part A

A production company engage in metal manufacturing has the orders to produce **U - bolts** show in the figure bellow. The company obtained continuous orders for 1000 Nos of U - bolts per batch made from milled steel. The U- bolt has M20X100 mm thread on both side of the bolt as mentioned below.



- i. State the alternative manufacturing methods which can be used to manufacture the U-bolts. (04 marks)
- ii. Compare the above methods in terms of quality, cost & time of manufacture to select the best method. (06 marks)
- iii. State the machines required to execute the production from selected method mentioned above. (04 marks)
- iv. Briefly explain the production process of U - bolts in each machine stated above, based on the sequence of operation. (06 marks)

2.0 Part B

- i. Briefly explain Oxy-Acetylene gas welding process with the aid of appropriate sketch. (05 marks)
- ii. State the factors to be consider when selecting the welding rods for manual metallic arc welding. (04 marks)
- iii. Briefly explain the types of welding defects with suitable sketches. (05 marks)
- iv. How do you assure the quality of weld joint? Briefly explain. (05 marks)

3.0 Part A

- i.
 - a) What are the surface defects in machined component? Briefly explain any **three** of them with the aid of appropriate sketch. (06 marks)
 - b) Briefly explain any **two** methods of measuring surface hardness. (04 marks)
- ii. Twenty-five (25) metal pieces are inspected in a batch production process and their lengths are as shown below.
50.01, 50.00, 50.03, 49.99, 50.02, 49.98, 50.01, 50.00, 49.99, 50.01, 50.02, 50.02, 50.01, 50.03, 50.01, 50.00, 49.97, 50.02, 50.01, 50.02, 50.01, 49.99, 50.01, 50.04 & 50.01.
The standard length is defined as $50.00^{+0.03}_{-0.02}$ mm. Find,
 - a) Percentage of defective products. (03 marks)
 - b) Mode, median and the mean length of product. (07 marks)

3.0 Part B

- i.
 - a) Why **gauging** is more popular than **measuring** in mass production lines? (05 Marks)
 - b) Briefly describe the differences between **standard** gauges and **limit** gauges with suitable examples? (05 marks)
- ii. State the **process factors** govern by the product quality. Briefly explain them by taking any production process which is familiar to you. (10 marks)

4.0 Part A

- i. A 10mm thickness, flat belt run on a pulley 100 cm diameter and transmits the power of 7.5 kW at a speed of 200 rpm. Lap angle of the belt is 170° and the coefficient of friction between the belt & pulley is 0.2. Maximum permissible stress of the belt is 200 N/cm^2 . Find the necessary **width** of the belt by neglecting the centrifugal tension. (10 marks)
- ii. Explain the function of following electrical components in electrical installation (panel board).
 - a) Current transformer
 - b) Miniature circuit breaker (MCB)

- c) Earth leakage circuit breaker (ELCB)
 - d) Phase failure relay (PFR)
 - e) Electromagnetic relay
- (5x2 marks = 10 marks)

4.0 Part B

- i. Bearing is a commonly use interchangeable, standard component in most of the machines with rotating members.
 - a) What is meant by part interchangeability. (03 marks)
 - b) Classify the types of bearings. (04 marks)
 - c) Briefly describe the factors affecting for selection of bearings. (05 marks)
- ii. A single phase, 240 V, 50 Hz, AC induction motor is used to drive the cooling fan of an equipment. Output power and the power factor of the electric motor are 800W & 0.80 respectively. Calculate, input power and the current passing through the motor. (08 marks)

5.0 Part A

- i. Market Research is a good method to identify the demand for a product.
 - a) Briefly explain the data collection techniques use for Market Research. (06 marks)
 - b) Explain **two** forecasting technics use for forecast the next month product demand. (04 marks)
- ii.
 - a) How do you improve the **productivity** in a production plant? Briefly explain with example. (05 marks)
 - b) State the material handling systems use in manufacturing plants / factory. (05 marks)

5.0 Part B

Any production company cannot be maintained the adequate permeant labour because production demand is fluctuating time to time. Therefor many companies are acquired deferent type of employees to fulfil this fluctuating labour demand time to time.

- a) State the types of employees can be used to fulfil above labour demand (05 marks)
- b) State the human resource management functions. Briefly explain any **three** of them. (09 marks)
- c) Briefly explain the importance of having a Management Information system in an organization (06 marks)