

c) State the factors affect the choice of protection system in synchronous motor.[5]

**Question (4):**

(20 Marks)

a) Enumerate the numbers ,types and code number of relays used to protect the large synchronous motor. [5]

b) What are the main causes for motor damage in industrial drive? [5]

c) 950 hp, 4.1 kV,  $\cos \phi = 0.87$ , 50 Hz, three phase induction motor, the motor starting current at full load condition is equal to  $4 I_N$ , where  $I_N$  is the motor rated current. [10]

- Determine the C.T. ratio.
- Find the overcurrent and earth fault relays setting.

**Question (5):**

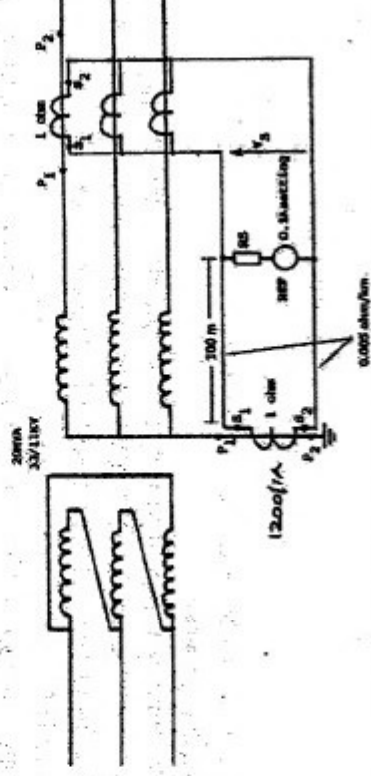
(15 Marks)

a) Draw a simple diagram of digital relays components and briefly state the function of each part.[3]

b) Why busbar protection is needed?[3]

c) What are the causes of busbar zone faults?[3]

d) A 20 MVA, 33/11 KV,  $\Delta / Y$  transformer, the neutral earthed Y winding is protected against earth fault by using a restricted earth fault relay. Calculate the stability resistance if the max through fault level at 11 kV side is 180 MVA, assume the line CT ratio and the neutral CT ratio is 1200/1 A, the CT resistance is  $1 \Omega$ , the wire distance between the CT and REF relay is 100 m, the relay burden is  $100 \Omega$ , and the pickup current for the relay is 0.1 A. Note that resistance of wire is  $0.005 \Omega/\text{km}$ . [6]



End of Exam Questions, Good Luck

DREMAN SAAD  
Dr.Fathalla Selim  
Dr. Amlak Abaza



**Machines of Metal Cutting and Forming**

مكينات تشغيل و تشكيل

This exam measures the following ILOs: a.13, a.19, b.12, b.18, c.13, and c.18.

**Question 1**

(20 Marks)

- 1) Describe the characteristics of the fluid used as jet in WJM.
- 2) Briefly explain the operating principles of AJM.
- 3) What are types of the carrier gas and abrasive particles material usually used with AJM? Give some examples of operations that can be done on AJM.
- 4) Sketch and briefly describe the factors affects the machining process of AJM.

**Question 2**

(20 Marks)

- 5) With the aid of sketches, describe the types of mixing head design available in AWJM.
- 6) Briefly explain and sketch the operating principle of USM.
- 7) Define and describe the characteristics of the Ultrasonic waves used in USM.
- 8) What are the advantages of using RUM over USM and diamond grinding.

**Question 3**

(25 Marks)

- 9) Sketch and briefly describe the basic principle involved in EDM. Explain the concept of material removal.
- 10) What would be the challenges in using Ti as the tool in EDM? Name some materials suitable to be used as the tool (electrode).
- 11) Why conductivity is an important property of an EDM wire? What will happen if low wire conductivity used in WEDM?
- 12) What is the characteristic of the electron beam in EBM?
- 13) What are the key elements in LASER?

**The End**

Open Book Exam

Student may assume any missing data

- 1- Describe at least 2 different types of plastic injection moulds, one without slides and the other with slides? %5
- 2- Discuss briefly the cycle of the plastic injection moulding machine? %5
- 3.1 Explain the following with drawings  
- Stripper plate ejection - Sprue puller - Mould venting %5
- 3.2 Give 3 different designs for the cooling circuit of plastic mould cores? %5
- 3.3 Describe 3 different types of moulds sliding splits mechanisms? %5

- 4 Choose the correct design figure 1a or figure 1b of the correct length for the guide pillar, and state why? %5

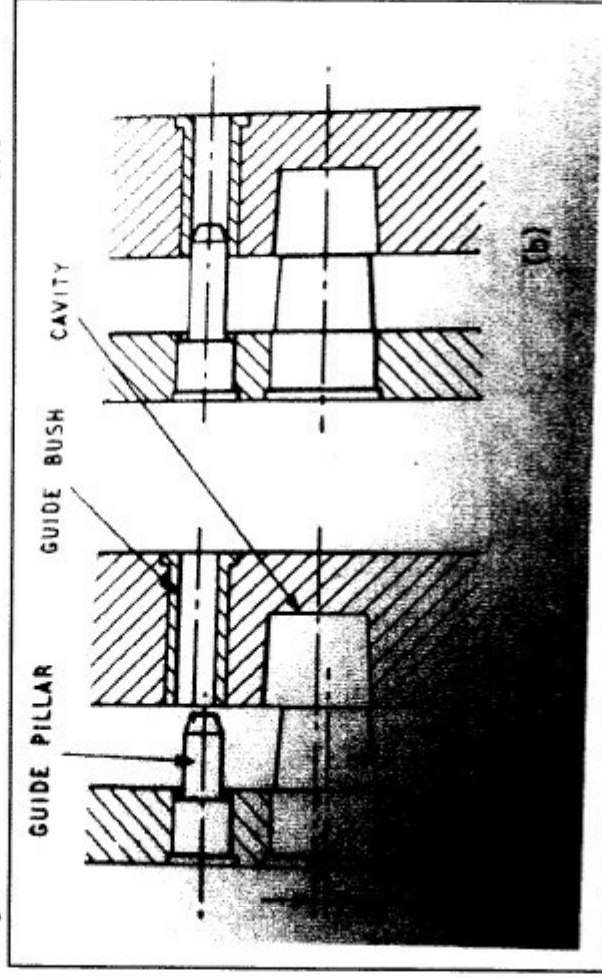
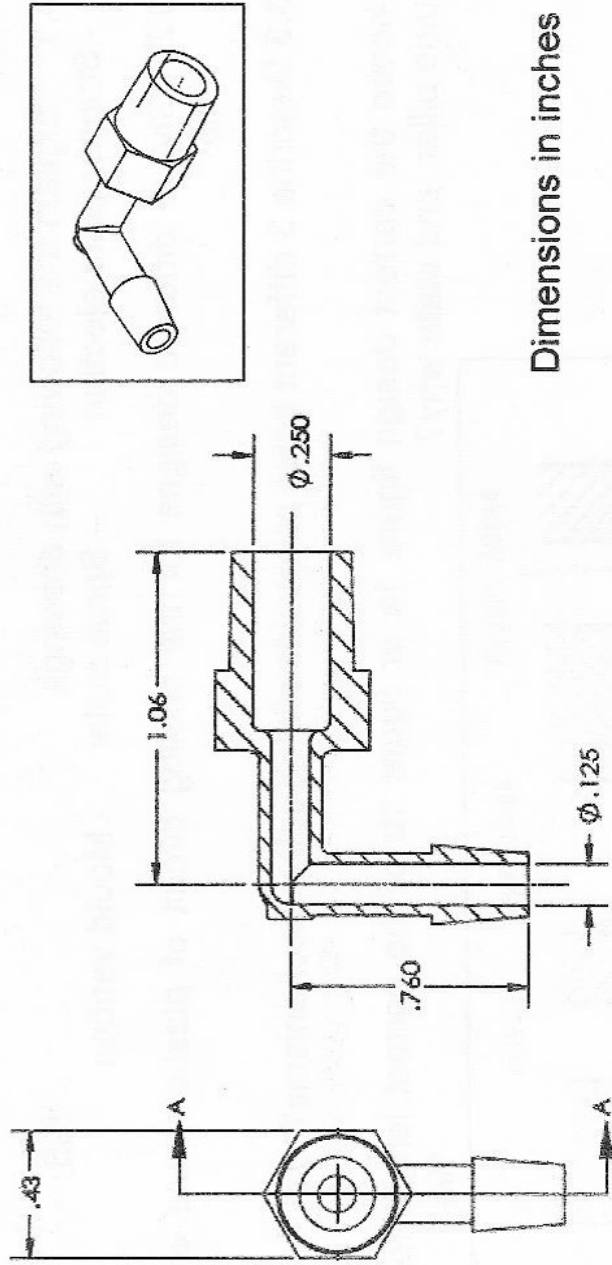


Figure (1)

- 5.1 Calculate the runner diameter to feed a plastic injection mould if the weight of the moulded part is 80g and the height of the runner is 60 mm? %5
- 5.2 Calculate the depth of the gate in mm for a plastic product which may be made of polypropylene if its wall section thickness is 2 mm? %5

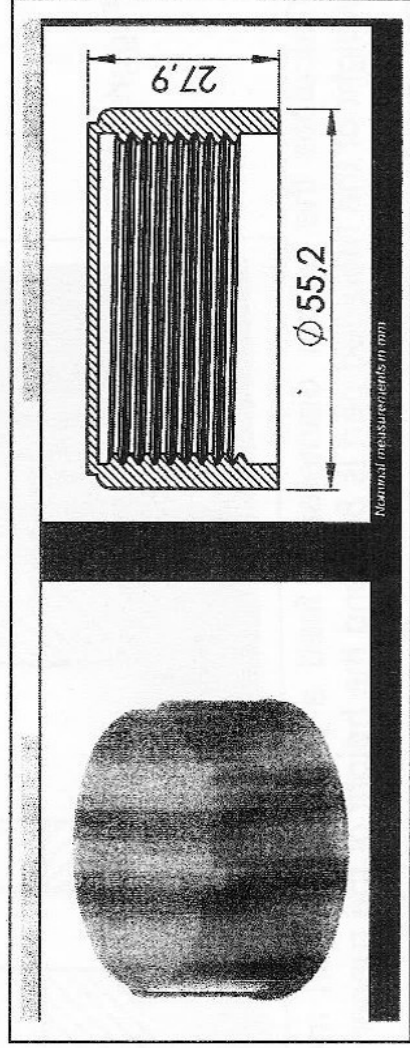
6 Design and construct correct injection moulds to produce the following plastic products A, and B. The required are the complete free hand sketches of the moulds including all details? 40%



Dimensions in inches

SECTION A-A

A- PP - Elbow 1/8" x 3/16" , 4 cavities



Dimensions in mm

B- HDPE - Valve Cap, 4 cavities

Best wishes