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UNIVERSITY EXAMINATIONS 2024/2025

SECOND YEAR FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION TECHNOLOGY IN MECHANICAL ENGINEERING

EMT 3152: MECHANICAL TECHNOLOGY AND PRACTICE I

DATE: JANUARY 2025 **TIME: 2 HOURS**

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

a) State the roles of each of the following hand tools (2 marks)

i) cold chisel

ii) joint chisel

b) Calculate the pitch of a hack saw whose blade is 635 mm long and has 250 teeth (3 marks)

c) Using neat diagrams, illustrate the difference between draw filing and cross filing (6 marks)

d) Explain the functional difference between a crosscut saw and a rip cut saw (2 marks)

e) State any four applications of a dial indicator (4 marks)

f) Using a neat diagram, describe the working principle of a telescoping gauge (6 marks)

g) Outline two types of accidents that can occur in a workshop and state, with a reason, the accident that is more dangerous (5mark)

h) State any two possible causes of errors while using the vernier height gauge (2 marks)

QUESTION TWO (15 MARKS)

a) Define a drill press (1 mark)

b) List three advantages of using a drill press (4 marks)

c) Using neat diagrams, illustrate the difference between a claw hammer and an upholstery hammer (4 marks)

d) While measuring the diameter of a round metal bar, a reading of 40.55 mm was taken from a micrometer screw gauge. When checking for zero error, it was noted that the zero mark on the thimble scale was 2 divisions below the datum line on the main scale. Compute the magnitude and categorize the zero error, if any, and calculate the correct diameter of the metal bar. (4 marks)

e) State the functional difference between a tap wrench and a die wrench (2 marks)

QUESTION THREE (15 MARKS)

a) Identify two types of limit gauges and state two areas each is applied (4 marks)

b) Using a well labelled neat diagram, describe the working principle of a dial indicator (5 marks)

c) In the quality assurance section of a mass component production factory, a product with a hole that accommodates a shaft of specified dimensions as shown in figure Q3(c) is to be tested for dimensional accuracy. Using Taylor's Principle, design the gauges that will be used to inspect the hole to ascertain whether the dimensions lie within the allowed limits.

(6 marks)

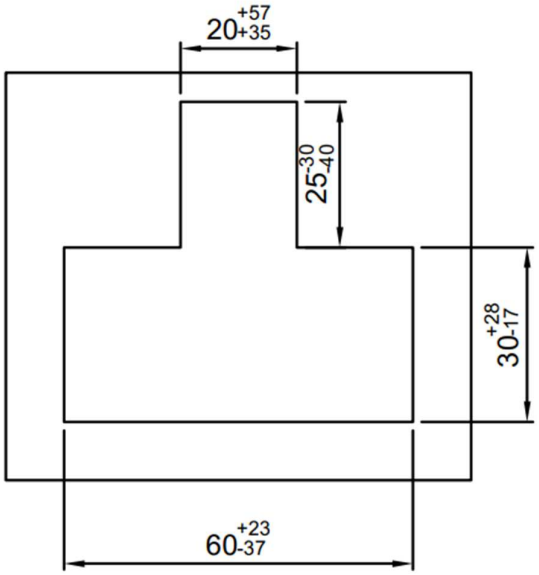

Figure Q3(c)

QUESTION FOUR (15 MARKS)

a) Define welding (1 mark)

b) Outline three types of flames that can be achieved during gas welding and state one application for each. (6 marks)

c) Using a neat diagram, illustrate the features of the enlarged welded area under shielded metal arc welding. (5 marks)

c) A gauge block set designated S2CS 45. MA1 contains a range of gauge blocks as shown in table Q 4 (c). Using this set, determine a suitable combination of gauge blocks that would be used to build the following dimensions:

(i) 97.749 mm (3 marks)

Range (mm)	**No**	**Steps**
1.0	1	-
2.001 - 2.009	9	0.001
2.01 - 2.09	9	0.01
2.1 - 2.9	9	0.1
1 - 9	9	1
10 - 90	8	10

S2CS 45. MA1 GAUGE BLOCK SET

QUESTION FIVE (15 MARKS)

a) Using neat diagrams, explain the difference between Oscar rivets and flush rivets. (6 marks)

b) Explain two roles of oil in manual thread cutting and state the consequence of not using it in the process (2 marks)

c) Two separate pieces of sheet metal, one measuring 2m long, 0.5 m wide and 0.10 mm thick and the other 2 m long, 0.5 m wide and 0.15 mm thick are to be joined through riveting to form a lap joint.

i) Calculate the minimum diameter of the rivets required (3marks)

ii) Calculate the total length of the rivet (4 marks)