Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering

Referred/Improvement/Backlog Examination, Winter 2018-2019 **Level-1 Term-I**

Course Code: ME 1181 **Course Title: Basic Mechanical Engineering**

Time: 03 (Three) hours **Full Marks: 210**

N.B. (i) Answer any three questions from each PART (ii) Use separate answer script for each PART
(iii) Marks allotted are indicated in the margin (iv) Special Instruction (if any)---------N/A--

PART-A

1 (a) Mention the Newton's second law of motion. 05

(b) What do you mean by particle and rigid body? 05

(c) State the law of transmissibility and explain it with diagrams. 07

(d) Four forces act on a point of a bracket specified in four different ways as shown in Fig for Q. No. 1(d). Determine the x and y-components of each of the four forces and also determine the resultant force. 18

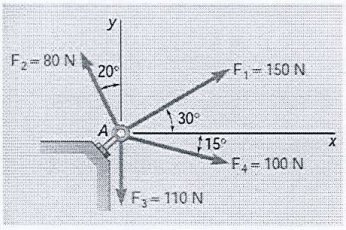

Fig for Q. No. 1(d)

2 (a) A force of 800 N acts on point A on a bracket as shown in Fig for Q. No. 2(a). Determine the moment of the force about point B. 15

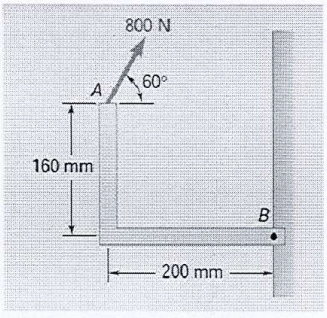

Fig for Q. No. 2(a)

(b) The homogeneous plate of 300 kg is supported by pin at A and a roller at C as shown in Fig for Q. No. 2(b). Determine the reaction forces at the supports. 20

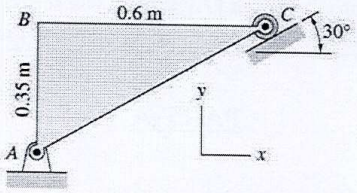

Fig for Q. No. 2(b)

3 (a) What is truss? Classify truss and draw any two types of truss. 10

(b) Why trusses are used in construction? 05

(c) Using the method of joints, determine the force in each member of the truss shown in Fig for Q. No. 3(c). Indicate whether the members are in tension or compression. 20

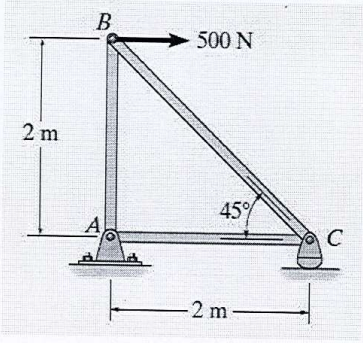

Fig for Q. No. 3(c)

4 (a) Determine the centroid of the plane area shown in Fig for Q. No. 4(a). 17

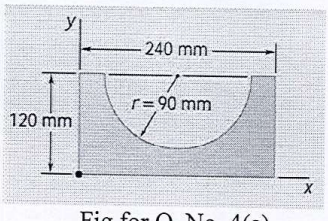

Fig for Q. No. 4(a)

(b) Determine the moment of inertia of the plane area shown in Fig for Q. No. 4(b) about x-axis only. 18

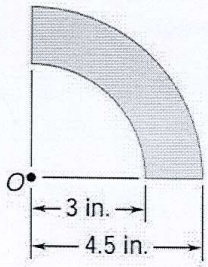

Fig for Q. No. 4(b)

PART-B

5 (a) Define ton of refrigeration. 03

(b) Briefly describe the processes of vapor compression cycle with neat sketch. 15

(c) Write the desirable properties of refrigerant. 10

(d) Discuss shortly about the window type air-conditioning system. 07

6 (a) Draw the valve timing diagram of a 4-stroke CI (Diesel) engine and show the important points. 08

(b) The stroke of an SI engine cylinder is 20 cm and the bore is 10 cm. The clearance volume is 25 cm^3. The speed of the crankshaft is 2800 rpm. Find the compression ratio and mean piston speed. 12

(c) Write down the difference between two-stroke and four-stroke engine. 10

(d) How can we prevent knocking in IC engine? 05

7 (a) What is the basic differences between a robot and a human being? 10

(b) What type of sensors are used in a robot? 10

(c) What are the main components of a robot? Describe them briefly. 15

8 (a) What is wind energy? 05

(b) What is conventional energy? Write the advantages and disadvantages of conventional energy. 12

(c) What is renewable energy and what are the main sources of renewable energy? 08

(d) Give a brief description on- (i) Solar energy (ii) Hydro energy. 10