Bangladesh Army University of Science and Technology

Department of Computer Science and Engineering

Final 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) What is Mechanics? Classify mechanics. 05

(b) Differentiate between 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

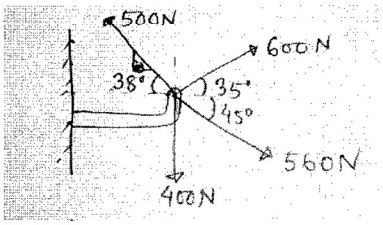

Fig. for Q. No. 1(d)

2 (a) The 6-m boom AB has a fixed end A as shown in Fig. for Q. No. 2(a). A steel cable is stretched from the free end B of the boom to a point C located on the vertical wall. If the tension in the cable is 2.5 kN, determine the moment about A of the force exerted by the cable at B. 20

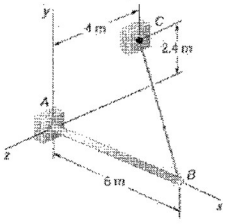

Fig. for Q. No. 2(a)

(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. 15

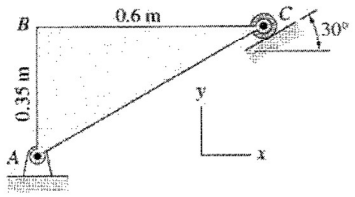

Fig. for Q. No. 2(b)

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

(b) What is zero force member on a truss? 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

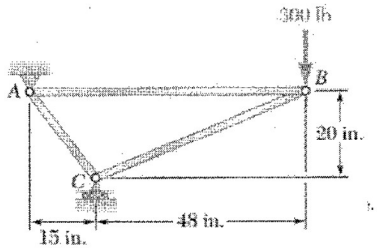

Fig. for Q. No. 3(c)

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

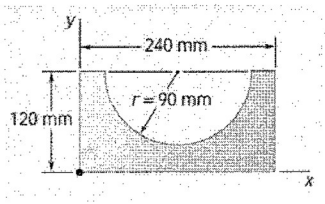

Fig. for Q. No. 4(a)

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

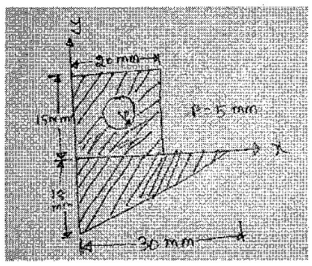

Fig. for Q. No. 4(b)

PART-B

5	(a)	Define ton of refrigeration and COP.	06
	(b)	What are the differences between vapor compression and vapor absorption cycle?	10
	(c)	Write the desirable properties of refrigerant.	10
	(d)	Discuss shortly about the split type air-conditioning system.	09
6	(a)	Draw the valve timing diagram of a 4-stroke SI (petrol) 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 SI and CI engine.	10
	(d)	What is knocking in IC engine?	05
7	(a)	What is the definition of Robot?	03
	(b)	Mention the laws of robotics.	07
	(c)	What are the main components of a robot? Describe them briefly.	15
	(d)	Discuss the applications of robotics.	10
8	(a)	What is energy and sources of 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 sources of renewable energy?	08
	(d)	Give a brief description on- (i) Solar energy, and (ii) Hydro energy.	10