



**PROGRAM** : BACHELOR OF ENGINEERING  
*TECHNOLOGY: CIVIL*

**SUBJECT** : **BASIC SCIENCE (APPLIED  
MECHANICS) 1A**

**CODE** : **APMCIA1**

**DATE** : SUPPLEMENTARY EXAM  
19 JULY 2019

**DURATION** : (SESSION 1) 08:00 - 10:30

**WEIGHT** : 40 : 60

**TOTAL MARKS** : 70

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**ASSESSOR** : Mr SD Ngidi

**MODERATOR** : Miss N Reynecke

**NUMBER OF PAGES** : 6 PAGES

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**INSTRUCTIONS** : ONLY ONE POCKET CALCULATOR PER CANDIDATE  
MAY BE USED.

**REQUIREMENTS** : 2 ANSWER BOOKLETS

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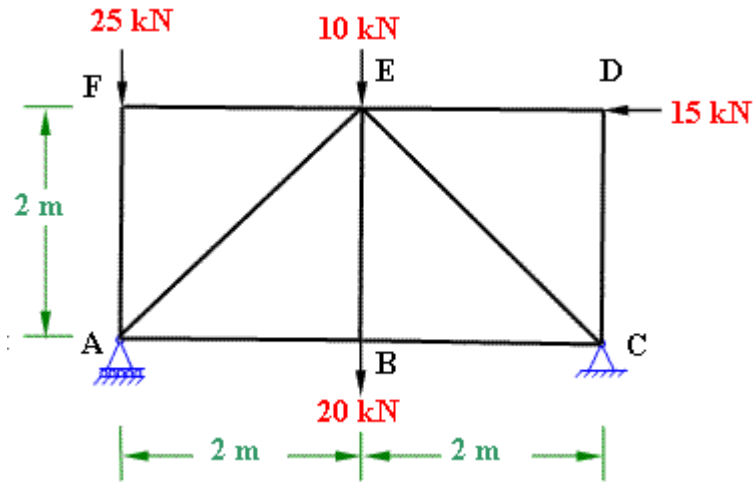
**INSTRUCTIONS TO STUDENTS**

PLEASE ANSWER ALL QUESTIONS.  
SHOW ALL THE STEPS FOR CALCULATIONS CLEARLY.

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### QUESTION 1 [10]

Calculate the magnitude and direction of reactions at A and C of the truss in the following figure.

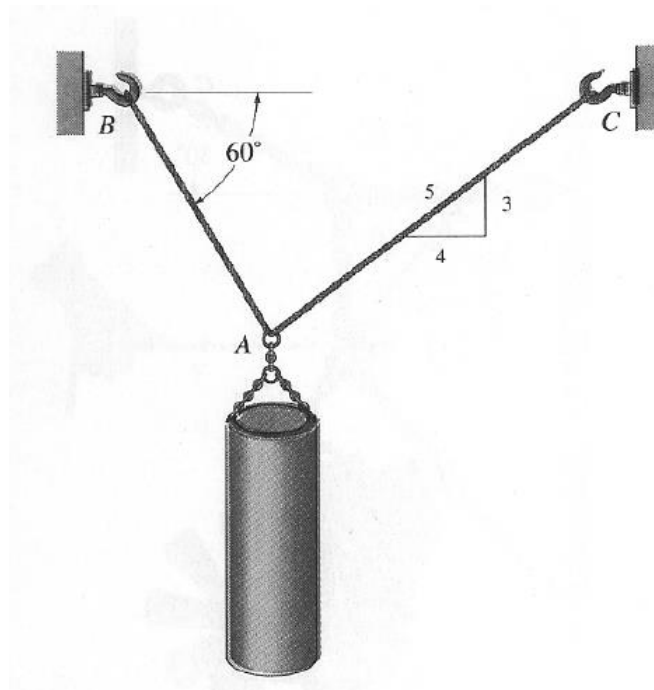


(10)

Figure Q1

### QUESTION 2 [10]

Determine the forces in cables AB and AC necessary to support the weight 500 N.



(10)

Figure Q2

### QUESTION 3 [10]

Determine the force in each member of the truss in Figure Q3. Indicate whether the member is in Tension or Compression.

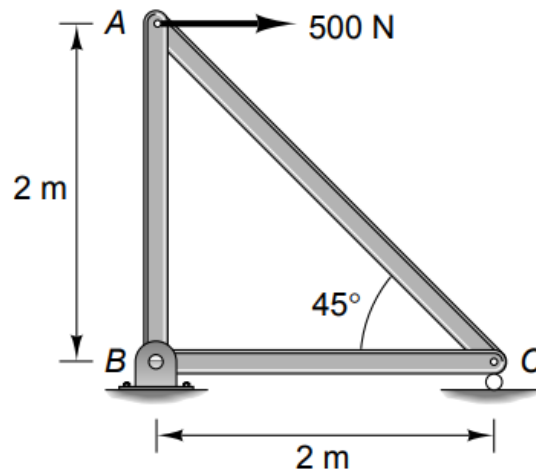


Figure Q3

(10)

### QUESTION 4 [10]

A Reavaya bus starts from rest and accelerates uniformly over a distance of 500 m, reaching a speed of 100 km/hr. This speed is maintained until the bus brakes and stops 15 km from the starting point. If the total time taken is 11 minutes:

- Draw a velocity time graph (3)
- Find the magnitude of the deceleration and the distance travelled at full speed. (7)

### QUESTION 5 [15]

Determine the centre of gravity of the lamina shown in Figure Q5. (Use point B as a reference point.)

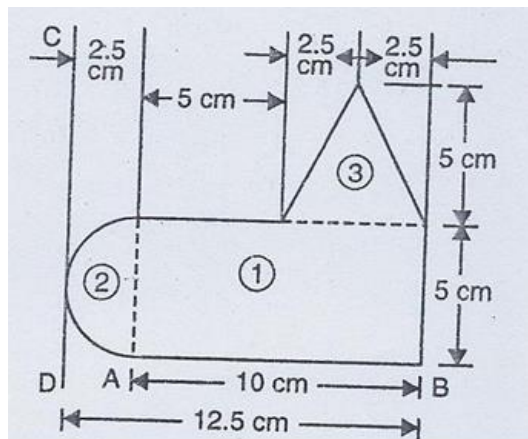
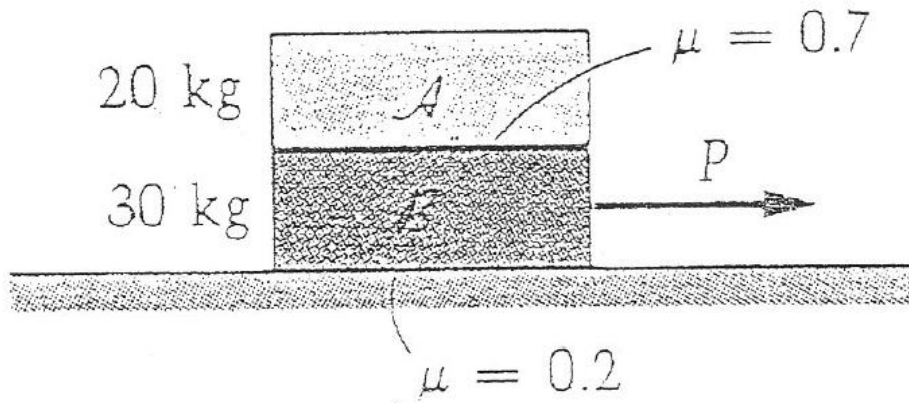


Figure Q5

(15)

**QUESTION 6 [15]**

Find the largest force  $P$  for which A in the figure will not slide on B.



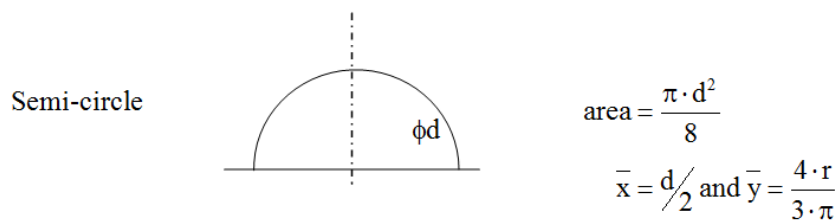
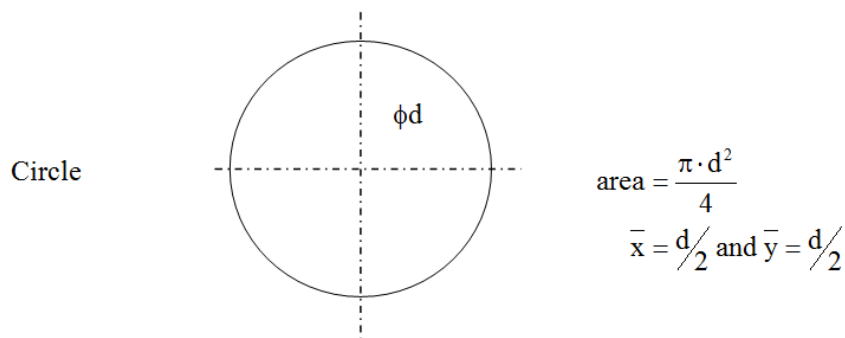
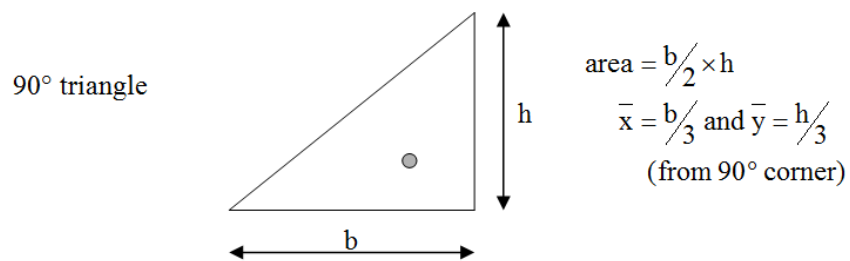
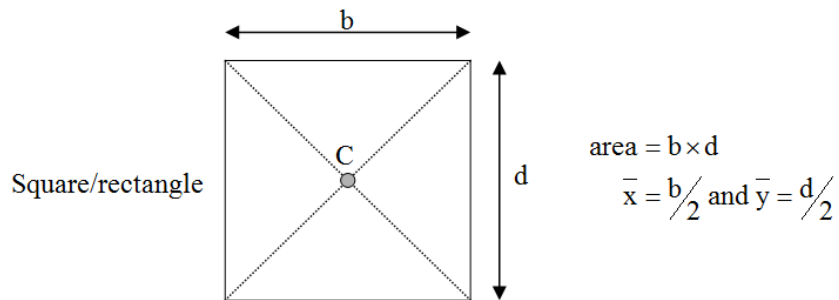
(15)

Figure Q6

--ooOOoo--

## Formula sheet

### Centroids of regular areas



### Motion formulae

$$v = u \pm a \cdot t$$

$$v^2 = u^2 \pm 2 \cdot a \cdot s$$

$$s = u \cdot t \pm \frac{1}{2} \cdot a \cdot t^2$$

**Basic equations**

$$\text{average velocity} = \frac{\text{initial velocity} + \text{final velocity}}{2}$$

$$\bar{v} = \frac{u + v}{2}$$

$$\text{displacement} = \text{average velocity} \times \text{time}$$

$$s = \bar{v} \times t$$

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time}}$$

$$= \frac{\Delta v}{t}$$