SIR ARTHUR LEWIS COMMUNITY COLLEGE
DIVISION OF TECHNICAL EDUCATION AND MANAGEMENT STUDIES

EXAMINATION SESSION	:	May 2015
TUTOR	:	Mr. Damian Combie
PROGRAMME TITLE	:	Carpentry & Joinery Pt2; Building Services II
PROGRAMME CODE	:	3BD-CAJ-CE; 3BD-BS-CE
COURSE TITLE	:	BUILDING SCIENCE III
COURSE CODE	:	BLS 103
DATE	:	May 7, 2015
TIME	:	1:00 p.m.
DURATION	:	2½ HOURS
INVIGILATORS	:	Mr. L. Philbert (Chief); S. Herelle
ROOM(S)	:	TRA R3

#B35

INSTRUCTIONS:

- This paper has two sections.

- Students must answer **all** questions.

- Students **must** show sufficient working steps to indicate the method of solution.

- Working **must** be done in **blue** or **black** ink. **Pencil** work will not be accepted.

- **All** questions must be answered on the answer sheet provided.

SECTION A
(Attempt **all** questions)

You are required to write the appropriate missing word or phrase on the answer sheet provide.

1 **mark** is allocated for **each** correct response.

(i)   Heat travels through metals by ....

(ii)   Heat travels through liquids by ....

iii)   Heat travels through empty spaces by ....

(iv)   Gases have no fixed .... or ....

(v)   The spread of a gas through a room is called ....

(vi)   Solids normally have a fixed .... and ....

(vii)   An example of a good conductor ....

(viii) An example of a bad conductor ....

(ix)   An example of convection is ....

(x)   An example of radiation is ....

(xi)   Applying latent heat to a liquid will cause it to ....

(xii)   What is the effect of applying sensible heat to a gas ....?

(xiii) Applying latent heat to a solid will cause it to ....

(xiv)   The .... of a free falling body is 10 m/s^2.

(xv)   The acceleration of a body is the amount the .... changes in one second.

(xvi)   The turning effect of a force about a point is called its .... and depends upon two things; the .... of the force and its .... from the point under consideration.

xvii)   What must your average speed be to travel 425 km in 2.75 hrs.

xviii) At an average speed of 5.5 km/h how far will a man travel in 135 minutes.

xix)   At an average speed of 25 km/h how long will it take a cyclist to travel 180 km.

SECTION B
(Attempt **all** questions)

1)   a)   Figure 1 shows a uniform plank resting on two trestles at **A** and **B**. In addition it supports a man of weight 1400 N and a block 650 N. Ignoring the weight of the plank:

i)   What is the sum of the upward forces **X** and **Y**?   (**1 mark**)

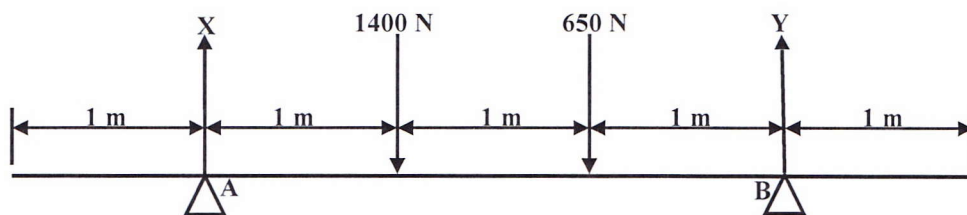ii)   What are the individual values of **X** and **Y**?   (**3 marks**)

FIGURE 1

b)   If the man walks towards the end of the plank, at what distance is the man from the support at **A** when the reaction **Y** equals 200 N?   (**2 marks**)
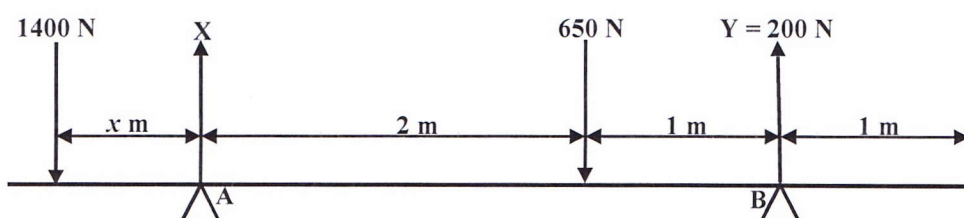

FIGURE 2

1

2) a) An electric kettle has a power rating of 2.5 kW. It is filled with 2 kg of water at a temperature of 40°C. How long after it is switched on will the water start to boil? (Specific heat capacity of water is 4200 J/kg K). (**3 marks**)

b) Calculate the specific heat capacity of lead if 2400 J of heat raises the temperature of 250 g of the metal from 0°C to 75°C. (**2 marks**)

c) The temperature of 200 g of iron metal is raised to 80°C and then placed in 150 g of water at 15°C. What is the final steady temperature of the water? (Specific heat capacity of water is 4200 J/kg K; specific heat capcity of iron is 460 J/Kg K). (**5 marks**)

3) Calculate the amountof heat required to melt 0.5 kg of ice at -14°C and to convert the water so formed to steam at 110°C.

Specific heat capacity of ice	=	2100 J/kg°C
Specific heat capcity of water	=	4200 J/kg°C
Specific heat capacity of water vapor	=	1996 J/kg°C
Specific latent heat of fusion of ice	=	336 kJ/kg
Specific latent heat of vaporization	=	2260 kJ/kg

(**8 marks**)

4) a) A plane starting from rest needs to achieve a speed of 30 m/s for takeoff. If acceleration is constant at 3.0 m/s² how long a runway is required? (**2 marks**)

b) A car decelerates from a speed of 20 m/s to rest in a distance of 85 m. What was its acceleration, assumed constant? (**2 marks**)

5) Figure below shows the velocity of an object overa twenty second time interval.
a) What is its acceleration, assumed constant during the first six seconds? (**1 mark**)
b) What is its *velocity* and *acceleration* at $t = 8$ seconds? (**2 marks**)
c) What distance does it travel during the first 18 seconds? (**2 marks**)

Time t (secs)
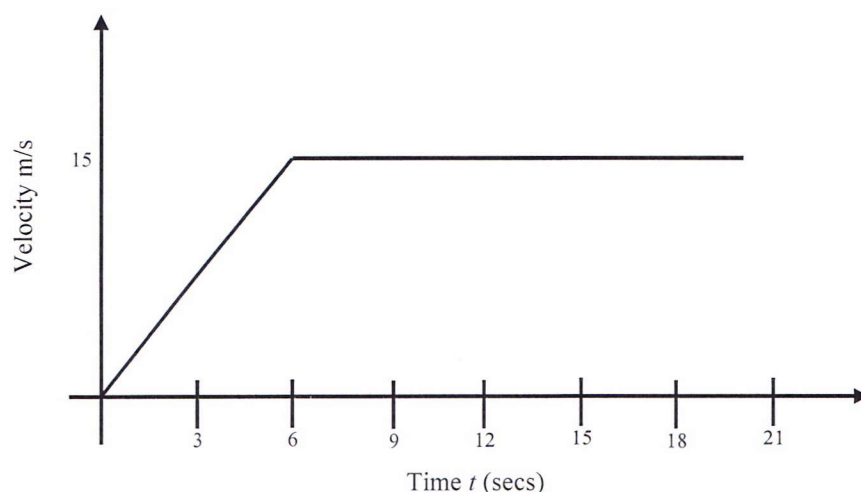
END OF EXAM

FORMULAS

Heat:
i) $Q = ml$;   ii) $Q = mc(\theta_2 - \theta_1)$

Motion:
i) $v = u + at$;   ii) $s = ut + \frac{1}{2}at^2$ iii) $v^2 = u^2 + 2as$