

**KABARAK**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2008/2009 ACADEMIC YEAR**

**FOR THE CERTIFICATE OF PRE- UNIVERSITY PHYSICS**

**COURSE CODE: PPHYS 021**

**COURSE TITLE: BASIC MECHANICS AND WAVES**

**STREAM: SEMESTER TWO**

**DAY: MONDAY**

**TIME: 9.00 – 11.00 A.M.**

**DATE: 10/08/2009**

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**INSTRUCTIONS:**

1. Answer **Question ONE** and **any other TWO** questions.
2. Question ONE carries **40 marks** and the other questions carry **15 marks** each.
3. Assume  $\pi = 3.14$ , and  $g = 10 \text{ m/s}^2$ .

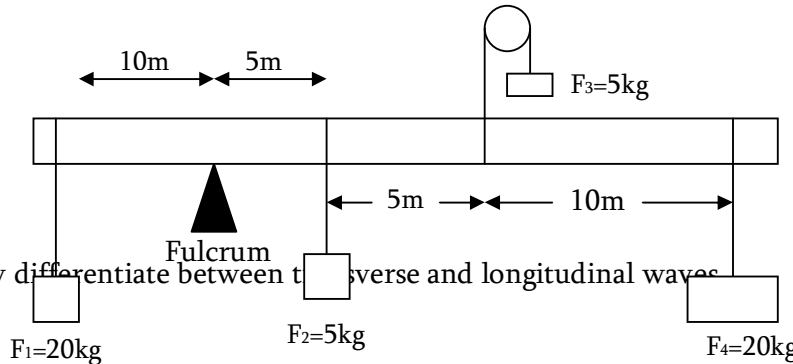
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**Question ONE (40 Marks)**

- a) Define *acceleration* of an object. (3 marks)
- b) What is the SI unit of *mass*? (2 marks)
- c) A car travels at a constant velocity of 18 m/s. What distance in kilometres will it have covered after 2 hours? (5 marks)
- d) A boy runs 30 m east, then 40 m north then 50 m west. Calculate;  
i. the total distance covered by the boy  
ii. the boy's final displacement from the starting point (6 marks)
- e) A force of 5 N is acting on an object of 5 kg mass. What will be the acceleration of the object? (3 marks)
- f) If you applied a force of 2000N to move an object over a distance of 9m, how much work will you have done? (4 marks)
- g) Briefly differentiate between elastic and inelastic collisions (4 marks)
- h) A bus of mass 5000 kg is moving at a velocity of 5 m/s. Calculate its;  
i. kinetic energy  
ii. momentum (6 marks)
- i) If a source of sound approaches and passes a listener;  
i. will the frequency of the sound emitted by the source be higher just before the source passes the listener or long after the source has passed the listener?  
ii. what is the name given to this phenomenon? (4 marks)
- j) If a protractor has its edge marked in degrees, how far apart (in radians) are the 0° and 90° marks along the edge? (3 marks)

**Question TWO (15 marks)**

- a) Calculate the resultant moment of the masses below and indicate whether the resultant moment will be clockwise, anticlockwise or nil. Which force has the largest moment?



- b) Briefly differentiate between transverse and longitudinal waves

(11 marks)

(4 marks)

**Question THREE (15 marks)**

- a) Do you think passengers in moving vehicles should wear seat belts? Explain your answer. (10 marks)
- a) From Newton's laws, calculate the net force acting on a free falling object of mass 4 kg. (5 marks)

**Question FOUR (15 marks)**

- a) A motorist drives from Nairobi to Nakuru (a distance of 154 km) in 2.5 hrs but makes the return trip from Nakuru to Nairobi in only 2 hrs. What is the average speed for;
- the trip from Nairobi to Nakuru?
  - the trip from Nakuru to Nairobi?
  - the entire trip?
- (7 marks)
- b) Ignoring the effects of air resistance, how long would it take an object to fall freely from the top of the Kenyatta International Conference Centre building in Nairobi if the building is 200 m tall? What would be the velocity of the object as it hits the ground? (6 marks)
- c) Define the frequency of a wave. (2 marks)