**King Saud University**

**College of Science**

**Department of Physics and Astronomy**

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| **2nd term 1435-1436** | **Physics 103** | **2nd mid term** |
| **Monday 22 /7/ 1436 H** | **11th May 2015** | **7:00 – 8:30 PM** |

***Submit only this first page to the Examiner/ Invigilator***

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| **Name** |  |
| **University number** |  |
| **Section/ Dr Name** |  |

**Write your answers for each question in CAPITAL LETTERS in the table given**

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| **Q. 1** | **Q. 2** | **Q. 3** | **Q. 4** | **Q. 5** |
|  |  |  |  |  |
| **Q. 6** | **Q. 7** | **Q. 8** | **Q. 9** | **Q. 10** |
|  |  |  |  |  |
| **Q. 11** | **Q. 12** | **Q. 13** | **Q. 14** | **Q. 15** |
|  |  |  |  |  |

**Take g = 9.8 ms-2 where ever needed**

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| --- | --- | --- | --- | --- | --- |
| 1 | The TRUE statements is:  a) A car is at rest because the net force acting on it is zero.  b) A car is at rest because there is no force acting on it.  c) A car is at rest because of the inertia.  d) A car is at rest because of the gravity.  e) A car is at rest because an equal reaction force always opposes every action force. | | | | |
| 2 | In the system shown in the figure, a horizontal force *Fx* acts on the 3.00-kg object. The horizontal surface is frictionless. For what value of *Fx* does the 2.00-kg object accelerate with 1 m/s2:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) 20 N | b) 25 N | c) 30 N | d) 35 N | e) 50 N | | |  | | |
| 3 | A 5.00-kg object is observed to accelerate at 20.0 m/s2 in a direction 30.0° north of east as in Fig.. The force **F**2 acting on the object has a magnitude of 15.00 N and is directed north. Determine the magnitude and direction of the force **F**1 acting on the object.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) 10 N | b) 17.3 N | c) 26 N | d) 8.7 N | e) 50 N | | | | |  |
| 4. | The two blocks is accelerated in the attached figure by pushing on the bottom block M with a force **F**. The top block moves along with the bottom block. What force directly causes the top block to accelerate?    a) the normal force between the blocks  b) the force you apply to the bottom block  c) the gravitational force on the top block  d) the friction force between the blocks  e) there is no force acting on the top block | | | | |
| 5 | Two objects are connected by a light string that passes over a frictionless pulley and the objects move as shown in the Figure. If *m*2 = 4*m*1, what is the acceleration of the two objects if the incline makes 30o and has a surface friction coefficient of 0.2:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) 0.8 m/s2 | b) 0.4 m/s2 | c) 0.2 m/s2 | d) 1 m/s2 | e) 0.6 m/s2 | | | |  | |
| 6. | A coin placed 30.0 cm from the center of a rotating horizontal turntable starts to slip when its speed is 50.0 cm/s. The coefficient of static friction between coin and turntable is   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) | b) | c) | d) | e) | | | | | |
| 7 | A car moving at speed 15.0 m/s can negotiate frictionless curved road. Such a ramp is usually *banked;* this means the roadway is tilted toward the inside of the curve. Suppose the radius of the curve is 50.0 m. At what angle should the curve be banked?   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) | b) 24.66 | c) | d) | e) | | | | |  |
| 8 | A bucket of water is rotated in a vertical circle. The minimum speed condition of the bucket at the top of the circle (if no water is to spill out) take place when?     |  |  |  |  |  | | --- | --- | --- | --- | --- | | (a) normal force due to water on bottom of the pail > weight of water | (b) normal force due to water on bottom of the pail = weight of water | (c) normal force due to water on bottom of the pail = zero | (d) normal force due to water on bottom of the pail < weight of pail | (e) normal force due to water on bottom of the pail = weight of the pail | | | | | |
| 9 | The force acting on a particle is *Fx* = (8*x* – 16) N, where *x* is in meters. The net work done by this force on the particle as it moves from *x* = 0 to *x* = 3.00 m.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) 36J | b) 48J | c) 12J | d) -12J | e) -48J | | | | | |
| 10 | A 3.0-kg block is dragged over a rough horizontal surface by a constant horizontal force of 10N . The speed of the block increases from 4.0 m/s to 6.0 m/s in a displacement of 5.0 m. What work was done by the friction force during this displacement?   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) –34 J | b) –64 J | c) –30 J | d) –94 J | e) +64 J | | | | | |
| 11 | A person is lifting a 2.0-kg object from the bottom of a well at a constant speed of 2.0 m/s . What is his power output   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) | b) | c) | d) | e) | | | | | |
| 12 | The electrostatic force exerted by nucleus on the electron in the atom causes electron to revolve around the nucleus in a circular orbit. The work done by this electrostatic force on electrons when it moves through a short distance in the orbit is     |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) Positive | b) negative | c) zero | d) depending on the direction of rotation | e) impossible to determine | | | | | |
| 13 | A roller- Coaster car moving at 20 m/s along a straight track, after climbing the 15m hill can have final velocity ?(neglect the effects of friction)    **(a) 10.0 m/s (b) 5.00 m/s ( c) 17.0 m/s (d) 14.0 m/s ( e) 25m/s** | | | | |
| 14 | The force and displacement graph of a spring is shown in Fig, The elastic potential energy stored in the spring when it is stretched by 10 cm is?   |  |  |  |  |  | | --- | --- | --- | --- | --- | | a) 0.1 J | b) 0.2 J | c) 0.3 J | d) 0.4 J | e) 0.5 J | |  | | | |
| 15 | An Object I with a mass of 4 kg is lifted vertically 3m from the ground : another object II with a mass a mass of 2kg is lifted 6m up.,which of the following statements is true.  (I) Object 1 has greater potential energy since it is heavier.  (II) Object II has greater potential energy since it is lifted to a higher position.  (III) Two objects have the same Potential energy       1. I (b) II ( C) III (d) I and II ( e) II and III | | | | |

**The end**

**Rough work**