Arab Republic of Egypt **Subject: Dynamics**

Ministry Of Education **Time Allowed: Two Hours**

Experimental Test for Third Secondary form 2017/2018

Answer the following questions:-

(1)A particle moves in a straight line, such that: $S = 3e^{t+2}$,then its initial velocity equals …….

(a) 3 (b) e (c) e^2 (d)$3e^2$

(2) If $V = 3t^2-2t$, then the distance covered within the time interval [0,2]…… length unit

(a) 1 (b) 2 (c) 4 (d) 10

(3) A body moves in a straight line such that a = (2t-6) m/cec^2. Calculate the mass of the body if the change of the momentum in the interval $3 \leq t \leq 5$ equals 32 kg.m/sec

(4) If a body moves under the action of the force F = $4s^3$ newton, then the work done by this force from s = 0 to s = 2 m equals …….

(a)16 erg (b) 16 Joule (c) 32 erg (d) 32 Joule

(5) A particle moves under the action of a constant force $\vec{F}$ newton on a body and its displacement vector $\vec{S}$ is given as a function of time by the relation $\vec{S} = (3t^2 + t)\hat{\imath} - 4t\hat{\jmath}$. Find $\vec{F}$ if the power of the force $\vec{F}$ equals 75 erg/ sec at t = 4 sec and the power of the force $\vec{F}$ equals 165 erg/sec at t =5 sec (is measured in cm , F is measured in dyne)

(6) If the two forces $\vec{F}_1 = \hat{\imath} + 5\,\hat{\jmath} + 7\,\hat{k}$, $\vec{F}_2 = 2\hat{\imath} - \hat{\jmath} - 7\hat{k}$ act on a particle for a time interval of magnitude 2 second , then the magnitude of the impulse of the forces

equals ….. Newton/ sec

(a) 5 (b) 10 (c) 25 (d) 10^6

(7) A body of mass 60 gm is placed on a rough horizontal table, then it is connected by a string passing over smooth pulley fixed at the edge of the table, the other end of the string is tied by a body of mass 38 gm suspended vertically. If the system moved from rest a distance of 70 cm in one second, calculate the coefficient of friction.

(8) A body moves in a straight line with a uniform velocity under the action of two forces $\vec{F}_1 = a\,\hat{\imath} - 3\,\hat{\jmath} + 4\,\hat{k}, \vec{F}_2 = 6\,\hat{\imath} + b\,\hat{\jmath} - c\,\hat{k}$, $then\ a + b + c = \cdots$ ...

a) 1 b) -1 c) 2 d) 7

(9) A force F =(3t+ 1) newton acts upon a body at rest of mass 4 kg starting its motion from the origin point "O " on a straight line , then V after 2 sec =.....

(a) 2 cm/sec (b) 2 m/sec (c) 5 m/sec (d) 9 m/sec

(10) A body is suspended in a spring balance fixed at the top of a lift. The balance reads 7 kg.wt when the lift is at rest. The balance reads 8 kg.wt when the left moves vertically with a uniform acceleration. Find the magnitude and direction of the acceleration of the lift

(11) A body of unity mass moves under the action of a force

$\overrightarrow{F}$ = (a+3 , b) with displacement vector $\vec{S} = t^2\,\hat{\imath} + \frac{1}{2}\,t^2\,\hat{\jmath}$ then a + b=.....

a) 0 b) 1 c) -1 d) 2

(12) A car with a constant power, if its maximum velocity equals 54 km/ sec when it ascends an inclined plane, and its maximum velocity equals 108 km/ sec when it descends the same plane. Find the maximum velocity which the car moves on a horizontal plane knowing that the resistance of the plane to the car is a constant on the three roads.

(13) A ball of mass 200 gm. moves with velocity 1 m/sec collides with a ball of mass 300 gm at rest. If both of them move together as one body after collision.

Answer one of the following parts

a) Find the common velocity for both balls directly after collision and the kinetic energy lost by collision.

b) Find the distance covered by the body formed from the two balls until it comes to rest if it faces a resistance 200 gm.wt

(14) A body of mass 2 kg is projected vertically upwards with velocity 7 m/sec , then the potential energy at the maximum height that the body reach = ……..joule

a)7 b) 14 c) 49 d) 98

(15) A train moves horizontally under the action of resistance proportional to the square of its velocity. If the resistance is equivalent to 45 kg.wt when its velocity 30 km/h . Calculate the maximum velocity of the train if the power of its engine equals 400 horses.

(16) A bullet of mass 45 gm moves with velocity 1440 km/hr , then its Kinetic energy equals …….. joule.

a)36 b) 360 c) 3600 d) 36000

(17) Two bodies of masses 5 kg and 2 kg are connected by the ends of a string passing over a smooth small pulley .The system is kept in equilibrium when the two parts of the string are vertical . If the system is let to move, then the magnitude of its acceleration =……m/sec^2

a) 7 b) 4.2 c) 2.4 d) 3

(18) Answer one of the following parts

a) A body is placed on the top of a smooth inclined plane 40 m length and its height is 10 m. Find the velocity of the body at the base of the plane. If the plane is a rough ,then the resistance equals $\frac{1}{5}$ of its weight. Find the velocity of the body at the base of the plane (using the principle work done and energy)

b) A body of mass 1 kg moves with a constant velocity 12m/sec ,If the resistance force acts on it in opposite direction of its motion equals $6\,x^2$ where x is measured in meter. Find the kinetic energy at x = 2.