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| **ASSIGNMENT** | |
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| **Course Name** | Elements of Electrical Engineering |
| **Programme** | B.Tech |
| **Department** | Electrical Engineering |
| **Faculty** | FET |

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| **Declaration Sheet** | | | | | | | | |
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| Course Code | ESC107A | | | | | | | |
| Course Title | ELEMENTS OF ELECTRICAL ENGINEERING | | | | | | | |
| Course Date | 22/08/2017 | | to | | 22/09/2017 | | | |
| Course Leader | MR.S.NAGARAJ.RAO | | | | | | | |
| **Declaration**  The assignment submitted herewith is a result of my own investigations and that I have conformed to the guidelines against plagiarism as laid out in the Student Handbook. All sections of the text and results, which have been obtained from other sources, are fully referenced. I understand that cheating and plagiarism constitute a breach of University regulations and will be dealt with accordingly. | | | | | | | | |
| Signature of the Student | |  | | | | | Date |  |
| Submission date stamp  (by Examination & Assessment Section) | |  | | | | | | |
| Signature of the Course Leader and date | | | | Signature of the Reviewer and date | | | | |
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| --- | --- | --- |
| **Symbol** | **Description** | **Units** |
| A | Current | Amp |
| g | Acceleration due to gravity - 9.81 | m/s2 |
| V | Voltage | Volts |
| w | Width | mm |
|  |  |  |

< Arrange in alphabetical order>

# **Question No. 1**

# **Solution to Question No. 1 Part A:**

# 

# **Question No. 2**

# **Solution to Question No. 1 Part B:**

# **Introduction:**

Given data:

Initial velocity (u): 120 km/hr = 33.334 m/s

Final velocity (v) : 45 km/hr = 12.5 m/s

Radius : 0.3 m

Revolution : N+10 = 75+ 10 = 85 rev

**B1.1:**

Distance covered by wheel is

Using linear equation of motion to solve :

Here acceleration is negative because the wheel is decelerating.

Now angular acceleration is given by

Angular deceleration is

**B1.2:**

Using the same deceleration value which was obtained above, time requreid for wheel to stop can be calculated.

Using the 1st linear equation of motion :

Here final velocity is zero therefore

Substituting the above values :

# **Question No. 3**

**Solution to Question No. 2 Part B:**

**INTRODUCTION:**

Moment of inertia of a body is the tendency of the body to rotate it about the given axis. Where as centre of mass is a point where a whole of mass is constituted and can be treated as point mass object.

B.2.1:

Mass of the solid sphere is M= N+10 grm which is equivalent to 85grm. Radius is 1cm.

Now moment of inertia for a solid sphere is given by where M is mass of the sphere and R is the radius of the sphere.

As the system of two solid sphere is given to which are connected by a massless rod. Moment of inertia about this rod which acts as axis for the system is

B.2.2:

Center of mass for the given system can be calculated easily:

Distance between the centers is 20cm, so considering center of sphere 1 as (0,0) then center for sphere 2 will be (20,0). Also mass of both sphere is same ()

Now moment of inertia about the axis passing through CM and perpendicular to axis of rod is calculated by parallel axis theorem.

where R Is the distance from center to axis.

As the given system is symmetry about the line passing through CM and perpendicular to axis of rod. Therefore

# **Question No. 4**

**Solution to Question No. 3 Part B:**

**Introduction:**

Static friction is applicable when object is at rest and its value is always variable. Kinetic friction is applicable when object starts to slide or moves in the direction of applied force.

**B3.1:**

Given mass of the object is (150+X\*10)= (150+3\*10)grm = 0.18kg.

Coefficient of kinetic friction is 0.2+0.01\* x= 0.2+0.03=0.23

Velocity of the given object is 7+N\*0.05= 7+75\*0.05= 10.75 m/s

Net force parallel to inclined surface is difference of sliding force and frictional force. This is equal to : where a is net acceleration of the body when it starts to slide on the given inclined surface. Substituting the values we get an equation :

now,

**B.3.2:**

For static friction net acceleration must zero. =0

The minimum coefficient of static friction between the block and the ramp, for the block to be stationary on the ramp is 0.466307

# **Question No. 5**

# **Solution to Question No. 4 part B:**

# **INTRODUCTION**:

**B4.1:**

According to BOLTZMANN’S Equation we have where Ei= Energy of ith level, k is Boltzmann constant (1.38j/k) and T is temperature in kelvin.

Here T= (300+X+0.1N) K, E2 = 2eV, E1 = 0 eV.   
substituting in the BOLTZMANN Equation we get :

**B4.2.**

According to BOLTZMANN Equation we have:

Where E3 = 2.5eV and K is BOLTZMANN constant

Taking natural log on both sides we get:

**B4.3**

We know that ENERGY is given by product of wavelength and frequency.

We will be mainly using where h is plank’s constant

life time of photon can be calculated by

for E3 = 2.5 eV, life time of photon is

similarly for E2= 2ev, life time of photon is

Therefore, life time of excited states E2 and E3 are 2.0625 respesctively

**Bibliography**

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