VISHWAKARMA INSTITUTE OF INFORMATION TECHNOLOGY

Department of Mechanical Engineering

End Semester Assessment Examination

M. E. (Mechanical) (Design Engineering), 2013-Course

ELECTIVE – II (MI & MII)

Date: 28\5\2016   May 2016   Time: 2.30 am to 5.30pm

Time: 3 Hr.   **[Max. Marks: 50]**

Instructions:
1. **Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6**
2. **Question number 7 and 8 are compulsory**
3. **Figures to the right indicate full marks.**

Q. 1   a) Derive an Expression for maximum tractive, effort when the vehicle is climbing hill and

equation of motions?   (5)

b) Explain performance of tires on wet surface?   (2)

c) A car weighing 1460 goes from 96Km/hr to stop in 55m if the C.G of the vehicle is 61cm

above the ground and wheel base is 305cm and car has static weight distribution of 50/50.

Calculate the vertical forces on the front and rear axles during the stop?   (3)

OR

Q. 2   a) Explain the condition for front wheel lockup and rear wheel lock up with necessary

equations?   (5)

b) Explain (I) Toe-in, Toe-out (II) Reference frame III) camber and camber thrust IV) slip

angle and aligning torque ?   (2)

c) What are the types of suspension systems? Explain any one in detail?.   (3)

Q. 3   a) A light weight truck weighing 16170N performing full stop from 100 Km/hr on a level

road with the brake application that develops a steady brake force of 8895N, determine the

deceleration , sopping distance, time to stop, energy dissipated, and the brake power at initial

application and power averaged over the stop   (5)

b) What is rolling resistance? Show the tire axis system with the help of neat sketch explains

each term?   (3)

c) Explain engine transmission and matching?   (2)

OR

Q. 4   a) Explain I) Roll center analysis II) Steering force and moments III) Sprung and unsprung

mass.   (5)

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b) A passenger car weighs 21.24 KN and has a wheel base of 2.87m. The C.G of the car is 1.27m from the front axle and 0.508m above the ground level. The braking force distribution on the front axle is 60% coefficient of rolling resistance is 0.02 determine which set of tires lock first if 1) μ is 0.8 2) μ is 0.2. (3)

c) Explain calculation of spectral density? (2)

Q. 5 a) Explain steady state handling characteristic of two axle vehicle with necessary equations? (5)

b) A truck of mass 6800kg has a brake system capable of exerting an instantaneous braking effort of 670kw at 17.88 m/s velocity while travelling at the speed the driver seize in his path an obstacle i.e. 45m away assuming driver reaction time in ¾ quarter of second and assuming deceleration and before hitting the obstacle calculate stopping distance. (3)

c) Explain characterization of cornering behavior of tires? . (2)

OR

Q. 6 a) what are the types of testing of handling characteristic of vehicle? Explain each of them in detail. (5)

b) Derive an expression for braking performance and stopping distance ? (3)

c) Explain directional stability of the vehicle? (2)

Q. 7 a) what are the numerical methods for determining the response of a quarter-car model to irregular surface profile excitation (5)

b) Explain I) Torsion bar II) Air Springs III) Dampers IV) Bump Stop. (5)

Q. 8 a) Describe the different steps and procedure in pipe line design so as to find a pipeline configuration and size within the constraints, which is safe and economical. (10)

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