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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Automobile Engineering

Semester End Examination; June/July - 2015

Automotive Chassis and Suspension

Time: 3 hrs   *Max. Marks: 100*

Note: i) *Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part.*
ii) *Assume missing data suitable, if any. Use of design data hand book is permitted.*
iii) *Draw neat pencil sketches wherever necessary.*

PART - A

1. a.	With neat sketches describe salient features of any five types of automobiles.	10
b.	A car weighing 21336.75 N has a static weight distribution on the axles of 50:50. The wheel base is 3m and the height of C.G. above ground is 0.55 m. If the coefficient of friction on the highway is 0.6. Calculate the advantage of having rear wheel drive rather than front wheel drive as far as greadibility is concerned, if the engine power is not a limitation.	10
2 a.	Draw a neat layout of a conventional automobile chassis frame showing parts. Also explain its construction.	10
b.	Illustrate with sketch the following loading situation the chassis experience. (i) Vertical bending (ii) Longitudinal torsion (iii) Lateral bending (iv) Horizontal lozenging.	10
3 a.	Obtain the expression for the thrust load and knuckle pin bearing loads in terms of reaction of wheel spindle.	8
b.	Describe with suitable sketches any two types of steering gears. Mention the relative advantages and disadvantages.	12
4 a.	What is the function of a propeller shaft? Name the types of propeller shafts.	4
b.	Two shafts with an inclined angle of 160° are connected by a Hooke's joint. The drive shaft turns at uniform speed of 1500 rpm. The driver's shaft carries a flywheel of 12 kg and 100 mm radius of gyration. Find the maximum angular torque required.	7
c.	What is the need of a differential? Describe constructions and working of a differential with sketch.	9

PART - B

5 a.	Derive expression of a braking torque in an internal shoe brake.	6
b.	Sketch a neat layout of hydraulic braking system. Explain the function of each component.	8
c.	What are the essential characteristics of (i) Brake liner material (ii) Brake fluid?	6

6. a Draw a neat sketch of a semi elliptical leaf spring rear suspension system. Explain. 8

   b. What are the advantages and limitations of Independent front suspension? 6

   c. A torsion bar suspension is to be designed to support a maximum static of 3433.5 N at the end of a lever arm 250 mm long. The deflection of the lever above the horizontal is to be 30º with a total angle of deflection of 90º. Assuming a safe allowable stress of 784.8 MPa. Calculate; (i) The diameters of the torsion bar 6

           (ii) Length of torsion bar.

7 a. What are the types of wheels? Explain clearly the construction of wire wheel showing how different loads are taken up by spokes. 10

   b. Explain the construction of a tubed tyre with sketch. 10

8 Write short notes on any **Four** of the following:

      (i) Wheel alignment factors

     (ii) Hotchkiss drive

    (iii) Power brakes 20

    (iv) Rubber suspension

     (v) Power steering

    (vi) Tyre life

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