CBCS SCHEME

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15AU81

Eighth Semester B.E. Degree Examination, July/August 2021
Vehicle Body Engineering and Safety

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Draw the layouts of bus and coach bodies and explain. **(08 Marks)**

b. Explain the following terms used in body building construction:
(i) Wheel arch (ii) Seat rail
(iii) Cant rail. (iv) Angle of approach. **(08 Marks)**

2 a. What are the different methods of construction of vehicle body? Explain. **(08 Marks)**

b. Discuss the classification of Car bodies with neat sketches and mention their features. **(08 Marks)**

3 a. Discuss the salient features of following materials used for body work of an automobile:
(i) Aluminium alloy (ii) Alloy steel (iii) Timber (iv) Plywood **(08 Marks)**

b. What are the different types of glasses and rubbers used in vehicle body construction? Explain. **(08 Marks)**

4 a. What are the salient features of glass reinforced plastics? Discuss. **(08 Marks)**

b. Briefly explain the types of corrosion and their prevention methods. **(08 Marks)**

5 a. Explain with a suitable sketch, aerodynamic forces and moments acting on vehicle body and their effects. **(08 Marks)**

b. Explain the various methods of reducing aerodynamic drag in a vehicle. **(08 Marks)**

6 a. With a neat sketch, explain the construction and working of wind tunnel used to determine drag co-efficient of a vehicle. **(08 Marks)**

b. Describe the longitudinal loads and side loads acting on a vehicle body with suitable sketches. **(08 Marks)**

7 a. Explain the complete design considerations for drive seat of a car, with a neat sketch. **(08 Marks)**

b. With a neat sketch, explain the construction and working of window winding mechanism. **(08 Marks)**

8 a. Sketch and explain the concept of visibility of a driver for both front and rear. **(08 Marks)**

b. Briefly explain longitudinal and lateral stability. **(08 Marks)**

9 a. What are various sources of noise in a vehicle? Explain. **(08 Marks)**

b. Discuss the various methods used for controlling noise and vibration in a vehicle. **(08 Marks)**

10 a. What are the necessary features of safe vehicle body? **(06 Marks)**

b. Discuss the safety aspects of a bumper design and also explain the different types of bumper. **(10 Marks)**

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6 a. Derive an expression for motion of rotating unbalanced machine. **(08 Marks)**

b. The weight of an electric motor is 125 kg and it runs at 1500 rpm. The armature weighs 35 kg and its centre of gravity lies 0.05 cm from axis of rotation. The motor is mounted on 5 springs of negligible damping so that the force transmitted is one-eleventh of impressed force. Assuming the weight is equally distributed among the 5 springs.
Determine following :
(i) Stiffness of each spring.
(ii) Dynamic force transmitted to base.
(iii) Natural frequency of the system. **(08 Marks)**

7 a. What is dynamic vibration absorber? **(02 Marks)**

b. The figure Fig. Q7 (b) below shows a vibrating system having 2 degrees of freedom. Determine the 2 natural frequencies of vibrations and the ratio of amplitudes of motion of m_1 and m_2. For the two modes of vibration. **(14 Marks)**

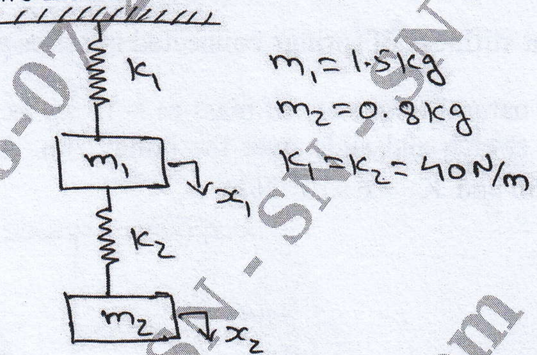

Fig. Q7 (b)

8 a. Explain Fullerron and Fran m tachometer with neat sketches. **(12 Marks)**

b. A vibrometer indicates 2 percent error in measurement and its natural frequency is 5 Hz. If the lowest frequency that can be measured is 40 Hz. Find the value of damping factor (ξ). **(04 Marks)**

9 a. Explain Maxwell reciprocal theorem. **(06 Marks)**

b. Find the influence coefficients, for the system shown in Fig. Q9 (b). **(10 Marks)**

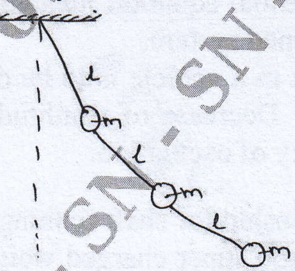

Fig. Q9 (b)

10 Determine natural frequency and mode shape of system shown in Fig Q10 by Holzer's method. **(16 Marks)**

$m_1 = 2$ kg ;
$m_2 = 4$ kg ;
$m_3 = 2$ kg ;
$K_1 = 5$ N/m ;
$K_2 = 10$ N/m

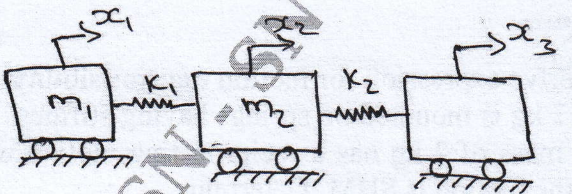

Fig. Q10

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