Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2022

ME5CA06 Vehicle Design

Programme: M.Tech. Branch/Specialisation: AU

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. An upraised part on the hood which directs the air flow into the engine compartment is called- **1**

(a) Spoiler (b) Hot pipe (c) Hood scoop (d) Wings

ii. An automobile chassis does not include which one of the following parts- **1**

(a) Shock absorbers (b) Steering system

(c) Differential (d) Brakes

iii. Which of the following is not an active safety system? **1**

(a) Child safety system (b) Anti-lock braking system

(c) Night vision system (d) Electronic stability control system

iv. Why do ergonomists use task analysis? **1**

(a) To gain an understanding of what people do in the jobs they carry out

(b) To make jobs more efficient

(c) To identify job errors and improve job satisfaction

(d) To discover interface issues

v. Vehicle will accelerate as long as- **1**

(a) Air resistance is greater than thrust

(b) Air resistance is greater than inertia

(c) Thrust is greater than air resistance and friction

(d) Friction is greater than thrust

vi. Which of these forces will have to be analysed using CFD to improve the aerodynamic performance of a vehicle? **1**

(a) Lift (b) Drag (c) Thrust (d) Weight

P.T.O.

vii. Squeeze casting is used for manufacturing of components of _____. **1**
(a) Aluminium alloys (b) Iron alloys
(c) Chromium alloys (d) Carbon alloys

viii. Which of the following material is not made by injection moulding? **1**
(a) Nuts (b) Tubes
(c) Car handles (d) Electrical fittings

ix. Which of the following is not an objective of supercharging? **1**
(a) To reduce the weight to power ratio.
(b) To overcome power loss at higher altitudes
(c) To increase the power output
(d) To increase compression ratio

x. The turbocharger uses- **1**
(a) Engine energy (b) Energy of exhaust gases
(c) Steam energy (d) Water energy from radiator

Q.2 i. What are the important assumptions to be made in designing a vehicle? **2**

ii. Explain the various steps involved in vehicle body design. **8**

OR iii. Explain various basic load cases to be considered while designing a Chassis. **8**

Q.3 i. What are active and passive safety features in vehicles? **4**

ii. Explain in detail the fundamental fallacies related to passenger comfort ergonomics. **6**

OR iii. Explain the various strategies for improving occupant accommodation and comfort. **6**

Q.4 i. List the applications of CFD in vehicle design. **3**

ii. Explain the various aerodynamic forces & moments acting on a vehicle and their effect on stability of vehicle. **7**

OR iii. Discuss the effect of hatch back, fast back & square back dust flow pattern on vehicle. **7**

Q.5 i. Write the advantages of plasma spray coated engine blocks over normal engine blocks. **4**

ii. Explain powder injection moulding process with the help of a neat sketch. **6**

OR iii. Explain the main process parameters that need to be controlled to produce a successful squeeze casting. **6**

Q.6 Attempt any two:

i. Write the difference between supercharger and turbocharger. **5**

ii. Write a short note on the following: **5**
(a) Cross flow Scavenging (b) Uniflow scavenging

iii. Explain any two methods of turbocharging. **5**

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Scheme of Marking

Faculty of Engineering
End Sem (Even) Examination May-2020
Vehicle Design (T) - ME5CA06 (T)

Programme: M.Tech. | | Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	c. Hood scoop	1
	ii)	c. Differential	1
	iii)	a. Child safety system	1
	iv)	a. to gain an understanding of what people do in the jobs they carry out	1
	v)	c. thrust is greater than air resistance and friction	1
	vi)	b. Drag	1
	vii)	b. Iron alloys	1
	viii)	b. Tubes	1
	ix)	d. To increase compression ratio	1
	x)	b. Energy of exhaust gases	1
Q.2	i.	Writing 4 assumptions .....0.5 marks each	2
	ii.	Explaining 8 steps.....1 marks each	8
OR	iii.	Explaining 4 basic load cases.....2 marks each	8
Q.3	i.	Explaining active safety systems.....2 marks Explaining passive safety system..... 2 marks	4
	ii.	Writing 6 fundamental fallacies related to passenger comfort ergonomics..... 1 marks each	6
OR	iii.	Explaining any three strategies.....2 mark each	6
Q.4	i.	Writing 3 applications of CFD .....1 marks each	3
	ii.	Explaining the various aerodynamic forces.....2.5 marks Explaining moments acting on a vehicle.....2.5 marks Explaining effect on stability of vehicle.....2 marks	7
OR	iii.	Discussing effect of hatch back dust flow pattern..... 2 marks fast back dust flow pattern..... 2 marks square back dust flow pattern .....3 marks	7
Q.5	i.	Writing any four advantages .....1 marks each	4
	ii.	Drawing Sketch .....2 Marks Explaining powder injection moulding..... 4 marks	6
OR	iii.	Explaining 6 main process parameters.....1 marks each	6
Q.6		Attempt any two:	
	i.	Writing 5 difference.....1 marks each	5
	ii.	Write a short note on: a. Cross flow Scavenging.....2.5 marks b. Uniflow scavenging.....2.5 marks	5
	iii.	Explaining 2 methods of turbocharging in detail.....2.5 marks each	5

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