KUMARAGURU college of technology
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Register Number:……..

B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

AUTOMOBILE ENGINEERING

U18AUT6003: Vehicle Body Engineering

COURSE OUTCOMES

CO1: Classify the vehicles and define basic terminologies.

CO2: Select appropriate body material for automobiles.

CO3: Calculate various aerodynamic forces and moments acting on vehicle.

CO4: Examine the various loads distribution in vehicle frames.

CO5: Familiarize the ergonomics concepts related to the vehicles.

CO6: Apply various safety aspects as per the norms.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Relate the appropriate values of CD to the vehicle. CO3 [K_2]

Types of Vehicle	Aerodynamic Drag Coefficient (CD)
A. Cars	1. 0.50 – 0.80
B. Vans	2. 0.74 – 1.00
C. Buses	3. 0.30 – 0.52
D. Trucks - Trailers	4. 0.40 – 0.58

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	i	ii
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. In the event of collision, which part of a passenger car's body is responsible for high risk to pedestrians? CO4 [K_3]

a) Front Bumper b) Bonnet

c) Radiator Cross Member d) Front Cross Member

3. For better aerodynamics, the car body should have CO3 [K_3]

i. large grill

ii. minimal ground clearance

iii. upright windshield

iv. fastback style rear window

v. diverging tail

a) ii, v b) ii, iv, v

c) ii, iv d) i, iv, v

4. When a fluid flows in smooth layers around the object, the type of flow is _____ flow. CO3 [K_L]

a) Swirl b) Turbulent

c) Vortex d) Laminar

5. The following items consists of two statements, one labeled as the "Assertion (A)" and the other as "Reason (R). You are to examine those two statements carefully and select the answers to these items using the codes given below: CO3 [K_2]

Assertion (A) : Tufft Test is a Flow Visualization Technique

Reason (R) : Dense White Smoke is used to analyze the flow pattern in tufft test.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. This form of corrosion occurs due to concentration difference in a component. CO2 [K_2]

a) Uniform b) Galvanic

c) Inter-Granular d) Stress

7. Identify the correct sequence of Bus Body Building operation. CO1 [K_2]

1. Body Framing
2. Chassis Preparation
3. General Inspection
4. Truss Panel Riveted
5. Paneling and Moulding
6. Final Finish

a) 2-1-4-3-5-6 b) 2-1-3-4-5-6

c) 1-2-4-3-5-6 d) 1-2-3-4-5-6

8. Which type of frame section is used in ladder type of construction? CO4 [K_3]

a) I – Section b) Tubular Sections

c) Box Sections d) Channel Section

9. The following items consists of two statements, one labeled as the "Assertion (A)" and the other as "Reason (R). You are to examine those two statements carefully and select the answers to these items using the codes given below: CO1 [K_2]

Assertion (A) : Bolts are used to join the body and chassis.

Reason (R) : The body and chassis will be as separate unit in chassis type construction.

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

10. _____ are structural members that connect two bus body sections above the window section — CO1 [K1]

a) Cant Rails

b) Side Rails

c) Waist Rails

d) Seat Rails

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Sketch the bus step with appropriate dimensions recommended to the bus body regulations. — CO5 [K2]
12. Describe Pitching, Rolling and Yawing for a passenger car. — CO3 [K2]
13. Review the role of crumble zones in a car. — CO4 [K3]
14. Suggest methods to enhance the visibility in a vehicle. — CO5 [K3]
15. Illustrate the various elements of a Body-In-White structures that provide access to the engine compartment. — CO1 [K3]
16. List down the types of tanker truck bodies. — CO1 [K1]
17. Examine the thickness of heavy duty vehicle's window. — CO6 [K1]
18. Distinguish FRP & GRP. — CO2 [K2]
19. Inspect the mechanism involved in an adjustable steering column — CO1 [K2]
20. Identify the main factors a vehicle's aerodynamics. — CO3 [K2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)

21. a) Classify the types of body construction techniques. (02) CO4 [K1]

    b) A Truck Manufacturing company is planning to enter the Commercial Bus segment in India. Device a technology for their bus body construction with effective use of their existing resources of truck manufacturing. (12) CO4 [K4]

22. a) Draw a neat sketch of a car and Identify the car body parts. (4) CO1 [K2]

    b) Classify the types of cars & Explain each with a neat sketch. (10) CO1 [K2]

23. a) Write a note on types of corrosion in automobiles. (6) CO2 [K2]

    b) (b) Discuss the following methods of anticorrosion. CO2 [K2]

    i. Active Corrosion Protection (2)

ii. Passive Corrosion Protection (2)

iii. Permanent Corrosion Protection (2)

iv. Temporary Corrosion Protection (2)

24.	a)	Debrief the classification of Commercial vehicle bodies.	(04)	CO1	[K_1]
	b)	Reconstruct a One-Way tipper truck into a Three-Way tipper truck and Explain its operation and mechanism with neat sketches.	(10)	CO5	[K_4]
25.	a)	Define visibility.	(2)	CO5	[K_1]
	b)	Explain the various test procedures adopted to measure the visibility index of a vehicle.	(12)	CO6	[K_3]
26.	a)	Describe the types and function of wind tunnel.	(4)	CO3	[K_2]
	b)	Explain the flow visualization techniques used for automotive wind tunnel testing.	(10)	CO3	[K_3]

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