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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

Material Science and Engineering
V and VII Semester
ML5014 Materials for Automotive Applications
(Regulation 2019)

Time:3hrs Max.Marks: 100

CO1	Identify the criteria and forces that cause the changes in materials selection
CO2	Investigate the influence of structural index, manufacturing process, design and functional requirements on selection strategies.
CO3	Recognize the temperature regime, nature of load and property requirements of materials for engines and transmission system.
CO4	Analyse the various stresses acting on the structural members of automobile under dynamic loading and select suitable material.
CO5	Adjudicate the apt material for electronic devices used in automobiles.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	What are the four main families of engineering materials?	2	1	L1
2	Which material is used to make aircraft engine turbine blade?	2	1	L2
3	What is the formula for material index?	2	2	L2
4	What is meant by computer aided material selection?	2	2	L1
5	Which material is used in piston rings?	2	3	L1
6	What materials are used in clutch facing?	2	3	L1
7	What is the function of the differential gear box?	2	4	L2
8	What is the material of the wheels?	2	4	L1
9	Differentiate between power steering and manual steering.	2	5	L2
10	What is the coating material of anti-fog?	2	5	L2

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Explain the evolution of engineering materials from the Stone Age to the Modern Era with example.	13	1	L3
	OR			
11 (b)	Explain material selection with relevance to Arjun Main Battle Tank (MBT). Also suggest materials for each of its parts.	13	1	L3
12 (a)	Explain the procedure for material selection by using Ashby charts with examples.	13	2	L4
	OR			
12 (b)	Explain with an example, the relationship between material selection and shaping the product.	13	2	L4

13 (a)	Explain the following components with respect to functional requirement and advanced material selected for : (i) Engine block and (ii) Crank shaft.	 **7** **6**	3	L3
	OR			
13 (b)	Explain the following components with respect to functional requirement and advanced material selected for : (i) Gear box and (ii) Cylinder liner.	 **7** **6**	3	L3
14 (a)	Explain the following components with respect to functional requirement and advanced material selected for : (i) Bumper and (ii) Chasis & frames.	 **6** **7**	4	L4
	OR			
14 (b)	Explain the following components with respect to functional requirement and advanced material selected for : (i) Panels and (ii) Tubeless tyres.	 **6** **7**	4	L4
15 (a)	Explain the material selection with relevance to electronic components in automotive applications.	**13**	5	L4
	OR			
15 (b)	Explain the following components with respect to functional requirement and advanced material selected for : (i) Temperature sensor and (ii) Anti-collision sensor.	 **6** **7**	5	L4

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	With a neat sketch, explain the light motor vehicle structure and its allied parts with advanced materials.	**15**	5	L5