Register Number:……..

KUMARAGURU
college of technology
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B.E. DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Third Semester

AUTOMOBILE ENGINEERING

U18AUT3004**:** Materials and Metallurgy

COURSE OUTCOMES

CO1: Compare and explain materials based on structures and properties.

CO2: Infer the state and composition of material through phase diagram.

CO3: Explain the mechanism of deformation in materials.

CO4: Explain the various testing method of material Properties.

CO5: Select the suitable treatment processes for the engineering material.

CO6: Survey and report the material used in automotive sector.

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

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Distinguish between substitutional and interstitial solid solution.	CO1	[K_2]
2.	How Hume Ruther's rules for formation of substitutional solid solutions.	CO1	[K_2]
3.	What are metals? Classify engineering materials.	CO2	[K_2]
4.	How to enhance mechanical strength of Al?	CO2	[K_2]
5.	List the types of composite materials.	CO3	[K_2]
6.	Name five applications of composites on automobile.	CO3	[K_2]
7.	List some of the important heat treatment operations widely used.	CO4	[K_2]
8.	What are the purposes of the processing heat treatments?	CO4	[K_2]
9.	List any four technological properties of metals.	CO5	[K_2]
10.	Define the terms slip and twinning.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 4 = 20 Marks)
(Answer not more than 80 words)

11.	Examine the properties and applications of any two types of Steel and Cast iron.		CO1	[K4]
12.	What are the properties of aluminum? And what is the effect of different types of alloying elements such as copper and magnesium were added into the aluminum?		CO2	[K2]
13.	Explain the properties, advantages and its disadvantages of any four thermoplastics.		CO3	[K2]
14.	Distinguish between annealing and normalizing.		CO4	[K4]
15.	Inference on Hardenability and Nitriding.		CO5	[K4]
16.	Categorize the different types of mechanical properties and mechanism of plastic deformation by slip and twinning.		CO6	[K4]

Answer any FIVE Questions:-
PART C (5 x 12 = 60 Marks)
(Answer not more than 300 words)

17.	a)	Explain and infer the two types of solid solution with the help of neat sketch.	6	CO1	[K4]
	b)	Inspect and explain the various invariant reactions involved in the system with the help of the Fe-C equilibrium diagram.	6	CO1	[K4]
18.	a)	Write short notes on: Stainless steels and High-speed steels.	6	CO2	[K4]
	b)	Explain about the non-ferrous and ceramic materials used for the engine components.	6	CO2	[K4]
19.		Classify the types of polymer composites and its properties for structural applications.	12	CO3	[K4]
20.	a)	Explain with neat setup figure the working principle of an induction hardening.	6	CO4	[K4]
	b)	Explain TTT diagram with neat sketch and indicted all the phases.	6	CO4	[K4]
21.	a)	Distinguish between 'ductile' and 'brittle' fracture. Explain two ductile and brittle materials used in automobile components.	6	CO5	[K4]
	b)	Draw a typical creep curve and brief on the mechanism.	6	CO5	[K4]
22.	a)	Draw the S-N curve for mild steel and aluminum and explain its features. Explain the procedure used to obtain S-N diagram.	6	CO6	[K4]
	b)	Explain briefly about Izod Charpy impact test.	6	CO6	[K4]

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