Register Number : ……..

KUMARAGURU
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GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: DEC 2015

(Regulation 2014)

Third Semester

AUTOMOBILE ENGINEERING

U14AUT304 **:** Automotive Materials and Metallurgy

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching the Unit cell with its respective Effective number of atom. CO1 [K_1]

Unit cell	**Effective number of Atoms**
A. SC	i. 1
B. BCC	ii. 2
C. FCC	iii. 3

	A	B	C
a)	2	1	3
b)	3	1	2
c)	1	2	3
d)	3	2	1

2. Which of the following is an intermetallic compound CO4 [K_2]

a) TiC b) Fe4N

c) Fe3C d) Cu2Se

3. In AISI 1040 Steel, 40 indicates CO3 [K_2]

a) 40% C b) 40 Subgroup

c) 0.4% C d) Total alloy %

4. Material used in most of the petrol engine cylinder block is CO5 [K_3]

a) C.I b) LCS

c) Mild Steel d) Aluminum alloy

5. Consider the following statements. CO3 [K_2]

1. Edge dislocations are Line defects
2. Screw dislocation are 1D defects
3. Vacancies are 2D defects

a) 1,3 b) 1,2

c) 2,3 d) Only 1

6. Which of the following is not a thermoplastic commodity polymer CO4 [K_2]

a) PTFE b) PS

c) PA d) PC

7. The following item 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_3]

Assertion (A) : Brittle materials will fail suddenly without warning at Critical load applications.

Reason (R) : Brittle materials don't have the plasticity.

Codes :

1) Both A and R are individually true and R is the correct explanation of A
2) Both A and R are individually true but R is not the correct explanation of A
3) A is true but R is false
4) A is false but R is true.

a) 1 b) 2

c) 3 d) 4

8. _____ appears as mirror image across the boundary. CO2 [K_2]

a) Slip b) Vacancy

c) Twinning d) Brittle fracture

9. Consider the following and choose the correct sequence to conduct Creep test. CO3 [K_2]

1. Prepare the test specimen
2. Specimen placed in testing machine by gripped at both ends and enhance with furnace.
3. Load applied at particular temperature

4. Fracture Point noted.

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

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

10. Normalizing process for steel usually carried out by CO2 [K_2]

a) Above UCT b) Below LCT

c) Below UCT d) Above LCT

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Differentiate Hardenability with Hardness CO2 [K_2]

12. Discuss why Martensite structure is formed during the Hardening process? CO2 [K_3]

13. Briefly explain, How you form the Bainite Structure in eutectoid steel? CO1 [K_2]

14. List out the Demerits of Pack-Carburizing. CO2 [K_2]

15. Discuss Age Hardening Process. CO2 [K_2]

16. Explain How the Knoop hardness test is performed. CO3 [K_2]

17. List out the merits of Liquid-Carburizing. CO4 [K_1]

18. Enumerate the various advantages of polymers used in automotive sector. CO5 [K_2]

19. Briefly explain about Polymerization Process. CO4 [K_2]

20. How will you compute the Hardness value in Vickers Test? CO3 [K_2]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Compare the different types of Surface Hardening process. CO2 [K_2]

22. i) Identify the type of Phase diagram and draw the same for the following conditions. (7) CO1 [K_2]
Melting Point of Element A 340^0C, Element B 630^0C. Eutectic mixture formed at 12%B at 270^0C. Maximum Solubility of Alpha solution in B is 2%, Beta in A 4%.

ii) Give in own words why it is called as Iron- Iron carbide equilibrium diagram and (7)

	Explain it with neat sketch. Find out the Austenite percentage at the temperature 10500C at 5% of Carbon.		CO1	[K_2]
23.	i) Analyze the Tensile test for Mild Steel & Cast Iron and Relate the Engineering Stress Strain curve with True Stress Strain curve.	(7)	CO2	[K_4]
	ii) Compare the types of hardness test.	(7)	CO2	[K_4]
24.	i) Criteria for selection of materials for Chassis and Body panels.	(10)	CO5	[K_3]
	ii) Discuss Automotive Textiles in detail.	(4)		
25.	i) Explain about properties and applications of PVC, PET, ABS.	(7)	CO4	[K_2]
	ii) Explain about properties and applications of Al2O3, SiC, and PSZ.	(7)	CO4	[K_2]
26.	Discuss the Tension Test with Stress Strain Curve.		CO3	[K_2]

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