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Code No. : 13557 S O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

*Accredited by NAAC with A++ Grade*

**B.E. (Mech. Engg.) III-Semester Supplementary Examinations, August-2023**

**Materials Engineering**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	Differentiate between steels and cast iron based on carbon percentage.	2	1	1	1
2.	List the applications of Low carbon steels.	2	1	1	1
3.	Explain the Quenching process in hardening of steel.	2	1	2	2
4.	Identify the purpose of Heat Treatment of steels.	2	2	2	1
5.	List the various point defects in a crystal.	2	1	3	2
6.	Write the Packing fraction and effective number of atoms present in a unit cell of a simple cubic crystal structure.	2	1	3	3
7.	Sketch the S-N Curve for ferrous specimen i.e steels.	2	2	4	4
8.	Define the term fatigue.	2	1	4	1
9.	Identify the importance of adding chromium and Tungsten to plain carbon steel.	2	1	5	1
10.	List the applications of Brass.	2	1	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Draw the Iron carbide Phase diagram indicating all the phases and Explain the three Invariant reactions in Iron - Iron carbide system.	5	3	1	2
b)	Explain the Lever rule in finding the percentage of phases in a phase diagram.	3	4	1	4
12. a)	Explain the Annealing process to improve the ductility of the steel.	4	2	2	3
b)	Discuss the carburising process to improve the surface hardness of Low carbon steels.	4	2	2	2
13. a)	Explain the terms (i) Cold working (ii) Hot working.	3	3	3	1
b)	Describe briefly the mechanism of Recovery, Recrystallisation , Grain growth on a strain hardened material.	5	3	3	4

Contd... 2

14. a)	Describe briefly the Griffith theory of Brittle Fracture.	4	2	4	2
b)	Explain the procedure of conducting RR-Moore test for determining fatigue strength of a material.	4	4	4	5
15. a)	Explain the composition, properties of Tungsten based High speed steels.	4	2	5	2
b)	Discuss the composition properties and applications of ferritic stainless steels.	4	3	5	2
16. a)	Define the terms (i). Solid Solution (ii). Ferrite (iii). Pearlite.	4	2	1	1
b)	Describe the importance of Tempering process in heat treatment of steel.	4	2	2	2
17.	Answer any <i>two</i> of the following:				
a)	Derive an expression for finding the packing fraction in Body centered cubic (BCC) unit cell.	4	4	3	3
b)	Explain various stages of a creep curve.	4	3	4	2
c)	Discuss the composition, properties & applications of Inconel.	4	3	5	1

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	21%
ii)	Blooms Taxonomy Level - 2	36.8%
iii)	Blooms Taxonomy Level - 3 & 4	42.2%

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