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Code No. : 13544 S

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. (Mech. Engg.) III-Semester Supplementary Examinations, July-2022****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.	Write Gibbs phase rule.	2	1	1	1
2.	Draw cooling curve of pure iron by labelling all phases.	2	1	1	2
3.	What is Martempering process?	2	3	2	1
4.	What type of cooling is adopted in Annealing and Hardening?	2	2	2	1
5.	Write down atomic packing factor for Simple Cubic and FCC.	2	2	3	2
6.	Discuss Strain Hardening.	2	3	3	1
7.	Show S-N curve for MS and Aluminum.	2	4	4	2
8.	Draw the creep curve of a material subjected to creep load.	2	2	4	2
9.	Differentiate Brass and Bronze.	2	2	5	1
10.	Write the composition and properties of Invar.	2	4	5	1
Part-B (5 × 8 = 40 Marks)					
11. a)	Sketch and label Iron-Iron carbide equilibrium diagram and explain the three invariant reactions.	5	1	1	3
b)	Describe the microstructure, composition, and applications of low carbon steels.	3	4	1	1
12. a)	Construct and interpret T-T-T diagram for eutectoid steel.	5	1	2	3
b)	Discuss about Induction Hardening.	3	2	2	1
13. a)	Explain Griffith theory for brittle fracture. Develop the formula for average applied stress at which crack spreads.	5	2	3	4
b)	Explain point imperfections in crystal.	3	1	3	1
14. a)	Differentiate between Ductile and Brittle fracture in Materials.	4	2	4	1
b)	How do you determine fatigue strength of metals experimentally?	4	2	4	2

15. a)	Discuss the effect of various alloying elements on steels.	5	4	5	1
b)	Discuss about Properties and applications of High speed steel (HSS).	3	4	5	1
16. a)	What is eutectic, peritectic, peritectoid and monotectic reactions?	4	2	1	3
b)	Explain the Normalising Process in Heat Treatment of steels	4	2	2	1
17.	Answer any <i>two</i> of the following:				
a)	How hot working is different from cold working?	4	3	3	1
b)	Discuss various creep mechanisms.	4	3	4	2
c)	Write a short note on super alloys.	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	40%
iii)	Blooms Taxonomy Level – 3 & 4	39%
