

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No. : 13568 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. (Mech. Engg.) III-Semester Main & Backlog Examinations, Jan./Feb.-2024****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.	Explain the Gibbs phase rule.	2	1	1	1
2.	What are the main uses of gray cast iron?	2	1	1	1
3.	What is the principle and purpose of heat treatment?	2	1	2	1
4.	What are the three steps in age hardening?	2	1	2	1
5.	What is the APF in BCC crystal?	2	1	3	1
6.	What do you mean by the Bauschinger effect?	2	1	3	1
7.	List out the causes of the brittle fracture?	2	1	4	1
8.	How do you calculate low cycle fatigue life?	2	2	4	1
9.	State whether INCONEL is stronger than titanium?	2	2	5	1
10.	What is the composition of Hadfield steel?	2	1	5	1
Part-B (5×8 = 40 Marks)					
11. a)	Explain various types of equilibrium diagrams and explain in detail the equilibrium diagram for two metals completely insoluble in solid state and completely soluble in liquid state?	5	3	1	1
b)	Explain composition, properties and applications of nodular cast iron.	3	2	1	1
12. a)	How is pearlite formed? Explain in detail.	3	2	2	1
b)	Explain the Construction and Interpret Transformation Temperature Time curve for eutectoid steel?	5	3	2	1
13. a)	What is the Hall-Petch principle? What are the constants in the Hall-Petch equation?	2	2	3	1
b)	Explain the various types of crystal defects with neat sketches?	6	2	3	1

Contd... 2

145

R 201

14. a)	Explain the R-R Moore Test? What is the importance of fatigue testing?	5	2	4	1
b)	Explain the Griffith theory of brittle fracture?	3	3	4	1
15. a)	Explain types, composition, properties and applications of various stainless steel?	5	3	5	1
b)	Contrast between Brass and Bronze.	3	4	5	1
16. a)	Explain the three main types of plain carbon steels? List out the applications of plain carbon steels?	4	2	1	1
b)	Differentiate between Austempering and Martempering.	4	4	2	1
17.	Answer any <i>two</i> of the following:				
a)	Illustrate the concept of critical resolved shear stress with a diagram.	4	3	3	1
b)	Sketch and explain creep curve and its importance.	4	3	4	1
c)	Explain properties and applications of (i) HSS (ii) Maraging steel.	4	3	5	1

21
22
23
8
9
10

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

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	34%
iii)	Blooms Taxonomy Level - 3 & 4	46%

Handwritten calculations and notes:

104
45
60
35
Ch.F
SL
PF - 3
+ 15
18
17
12
11
10
9
8
7
6
5
4
3
2
1