KADI SARVA VISHVAVIDHYALAYA
B.E. SEM III

Subject Code: ME-304/AE-304 **Subject Name: Material Science & Metallurgy**

Date: 16/04/2015 **Time: 10.30a.m.-1.30p.m.** **Total Marks: 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of Scientific calculator is permitted.
3. All questions are **compulsory.**
4. Indicate **clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

Section - I

Q 1	(A)	Give differences between metals and nonmetals.	**[5]**
	(B)	State the four major materials groups for materials classification, bring out the basis of its classification and mention the important characteristics of each group.	**[5]**
	(C)	Compare and Contrast: Destructive test with Non Destructive test.	**[5]**
		OR	
	(C)	Explain selection criteria for engineering materials.	
Q 2	(A)	Differentiate: Macrostructure and Microstructure Examination.	**[5]**
	(B)	State composition, specific properties and applications of Grey Cast Iron.	**[5]**
		OR	
Q 2	(A)	State the types of solid solution and explain Hume Rothery's rule for the formation of solid solution.	**[5]**
	(B)	Which are advantages and limitations of powder metallurgy?	**[5]**
Q 3	(A)	Specify, with reasons alloy suitable for the manufacture of: Aerospace application, Glass Cutter.	**[5]**
	(B)	What is solid solution? Explain types of solid solution.	**[5]**
		OR	
Q 3	(A)	Explain Lever arm principle for solid solution.	**[5]**
	(B)	Explain Tempering process.	**[5]**

Section - II

Q 4	(A)	Draw and explain TTT Diagram	**[5]**
	(B)	Enlist types of corrosion. Explain any two type of corrosion with sketch.	**[5]**
	(C)	Explain the effects on steel by alloying elements Cobalt, Tungsten and Nickle.	**[5]**
		OR	
	(C)	Explain in brief: Sintering Process.	**[5]**
Q 5	(A)	Explain Radiography Testing with advantages and limitations.	**[5]**
	(B)	Compare and contrast Austempering and Martempering.	**[5]**
		OR	

Q 5	A)	Write short note on Nitriding process.	**[5]**
	(B)	Explain any one organic coating process.	**[5]**
Q 6	(A)	Explain White metal along with its application.	**[5]**
	(B)	Explain Pitting and Crevice corrosion.	

OR

Q 6	(A)	Show Eutectic and Eutectoid point on Fe – C Diagram. Explain its importance.	**[5]**
	(B)	Explain Phosphorous Print.	**[5]**

----ALL THE BEST----

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester: III MECHANICAL ENGINEERING

Subject Code: - ME-304 **Subject Name:** - MATERIAL SCIENCE & METALLURGY

Date: - 28/11/13 **Time:** -10:00 am TO 1:00 pm **Total Marks:** - 70

Instruction:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **Clearly,** the option you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

Section – I

Q-1 (All compulsory)

(A) State the importance of study of materials science briefly. Explain Engineering requirements of materials **[5]**

(B) What is Gibb's phase rule? Explain its importance. **[5]**

(C) Enlist the properties of pure aluminum and mention the composition, properties and application of any one aluminum alloy. **[5]**

OR

(C) What is the purpose of Alloying? Give effects of nickel as an alloying element. **[5]**

Q-2 Answer the following questions.

(A) Name the different annealing processes. Is spheroidising different from annealing? Explain. **[5]**

(B) Draw TTT diagram for eutectoid steel. Explain it briefly by considering few cooling rates. **[5]**

OR

(A) Which are various surface hardening processes? Explain induction hardening process. **[5]**

(B) Classify types of cast iron. Discuss any one. **[5]**

Q-3 Answer the following questions.

(A) Explain with neat sketches the arrangement of atoms in B.C.C, F.C.C. and H.C.P. lattice. Define unit cell. Show that a F.C.C. structure is always more close packed than B.C.C. structure. **[5]**

(B) What is "Wrought iron "? enlist the properties and uses of It. **[5]**

OR

(A) Explain selection criteria for engineering materials. **[5]**

(B) Define (1) Creep, (2) Malleability (3) Hardness (4) Machinability (5) Fatigue **[5]**

Section – II

Q-4 (All compulsory)

(A) With the aid of an iron-iron carbide equilibrium diagram show and explain eutectic, peretectic and eutectoid transformation. Also mention the significance of these transformations. **[5]**

(B) Enlist the properties of pure copper and mention the composition, properties and application of phosphorus bronze. **[5]**

(C) Explain allotropic transformation of iron. **[5]**

OR

(C) Give composition properties and uses of malleable cast iron **[5]**

Q-5 Answer the following questions.

(A) State different types of corrosion and explain their probable causes of occurrence. Enlist common methods to protect corrosion. **[5]**

(B) Explain Cathodic protection against corrosion. **[5]**

OR

(A) How will you classify brasses based on the composition of zinc Explain the properties & application of the main type of brasses. **[5]**

(B) Explain flame-hardening process in brief **[5]**

Q-6 Answer the following questions.

(A) What is powder metallurgy? Describe various steps involved in powder metallurgy with each step controlling properties of final sintered component. **[5]**

(B) Which are merits, demerits and application of powder metallurgy? **[5]**

OR

(A) Explain Ultrasonic testing with advantages and limitations. **[5]**

(B) What is non destructive test? Explain X ray Radiography. **[5]**

ALL THE BEST

KADI SARVA VISHVAVIDHYALAYA
B.E. SEM III

Subject Code: ME-304 **Subject Name: Material Science & Metallurgy**

Date: 28/04/2014 **Time: 10.30a.m.-1.30p.m.** **Total Marks: 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. Use of Scientific calculator is permitted.
3. All questions are **compulsory.**
4. Indicate **clearly**, the options you attempt along with its respective question number.

Section - I

Q 1	(A)	Define 1) Toughness 2) Hardness 3) Hardenability 4) Malleability 5) Creep	**[5]**
	(B)	Explain selection criteria for engineering materials.	**[5]**
	(C)	Draw neat sketch of metallurgical microscope. Explain its construction.	**[5]**
		OR	
	(C)	Explain properties and application of Wrought iron.	
Q 2	(A)	Define Allotropy. Explain allotropy of Iron.	**[5]**
	(B)	State composition, specific properties and applications of White Cast Iron.	**[5]**
		OR	
Q 2	(A)	What is metallography? What useful information can be obtained from it?	**[5]**
	(B)	Which are advantages and limitations of powder metallurgy?	**[5]**
Q 3	(A)	Specify, with reasons alloy suitable for the manufacture of: Bolts and Nuts; Lathe Bed ; Milling Cutter.	**[5]**
	(B)	What is solid solution? Explain types of solid solution.	**[5]**
		OR	
Q 3	(A)	What is phase diagram? Explain Lever rule.	**[5]**
	(B)	Explain the difference between Annealing and Normalizing.	**[5]**

Section - II

Q 4	(A)	Draw Iron-Carbon Diagram and explain eutectic reaction in it.	**[5]**
	(B)	Explain the effects on steel by alloying elements Silicon, Sulphur and Phosphorous.	**[5]**
	(C)	Explain cathodic protection against corrosion.	**[5]**
		OR	
	(C)	Explain any two methods for production of metal powders.	**[5]**
Q 5	(A)	Explain Ultrasonic testing with advantages and limitations.	**[5]**
	(B)	Which are various Surface Hardening processes? Explain Induction Hardening process with sketch.	**[5]**
		OR	
Q 5	A)	Write short note on Metallic coatings.	**[5]**
	(B)	Compare and Contrast: Destructive test with Non Destructive test	**[5]**
Q 6	(A)	State various methods of prevention of corrosion and briefly explain any two.	**[5]**
	(B)	Define "corrosion". Explain different types of corrosion.	
		OR	
Q 6	(A)	Explain TTT diagram indetail.	**[5]**
	(B)	Explain the method of Sulphur Printing for steels and state the inferences that could be drawn out by the technique.	**[5]**

----ALL THE BEST----

KADI SARVA VISHWAVIDHYALAYA

B.E. SEM III

Subject Code: ME-304 **Subject Name: Material Science & Metallurgy**

Date: 17/11/2014 **Time: 10.30a.m.-1.30p.m.** **Total Marks: 70**

Instructions:

1. Answer each section in separate Answer Sheet.
2. All questions are **compulsory.**
3. Indicate **clearly**, the options you attempt along with its respective question number.
4. Use the last page of main supplementary of **rough work**.

Section - I

Q 1 (A) Define utmost applicable mechanical property for any five components mentioned below : **[5]**

1. Milling Cutter 2. Forging Die 3. Spring 4. Boiler Tube 5. Telephone wire 6. Lathe machine Bed 7. Fasteners 8. Machine Structure

(B) Describe method used for finding the Sulfur Percentage in Steel. **[5]**

(C) What is micro examination of metal? What are the various steps required for such an examination. **[5]**

OR

(C) Differentiate between white cast iron and grey cast iron.

Q 2 (A) What are limitations of Phase Diagram? Explain Lever Rule. **[5]**

(B) Explain process of Nucleation in Solidification of metal. **[5]**

OR

Q 2 (A) Describe Ductile fracture. **[5]**

(B) Explain with neat sketches the arrangement of atoms in B.C.C., F.C.C. and H.C.P. lattice. Define Unit Cell. **[5]**

Q 3 (A) Specify, with reasons alloy suitable for the manufacture of: Cutting Tool of Lathe, Gear, Jaw Crusher. **[5]**

(B) State the types of solid solution and explain Hume Rothery's rule for the formation of solid solution. **[5]**

OR

Q 3 (A) Discuss and differentiate between Austempering and Martempering. **[5]**

(B) What are the methods of carburizing? Explain Pack carburizing in brief. **[5]**

Section - II

Q 4 (A) Draw and Explain Time Temperature Transformation diagram. **[5]**

(B) Explain the effects on steel by alloying elements Tungsten, Cobalt and Molybdenum. **[5]**

(C) Describe: 1) Pearlite 2) Austenite 3) Cementite 4) Ledeburite 5) Bainite. **[5]**

OR

(C) Explain any two methods for production of metal powders. **[5]**

Q 5 (A) Explain ultrasonic testing with advantage, limitations and applications. **[5]**

(B) What is Critical Cooling Rate? Explain Cooling curves with respect to TTT diagram. **[5]**

OR

Q 5 A) Draw Iron-Carbon Diagram and explain eutectic reaction in it. **[5]**

(B) What is nondestructive test? Explain X ray Radiography. **[5]**

Q 6 (A) State various methods of prevention of corrosion and briefly explain any two. **[5]**

(B) Define "corrosion". Explain different types of corrosion.

OR

Q 6 (A) Explain Bearing Materials along with its properties and types. **[5]**

(B) Describe method for manufacturing of Self Lubricating Bearing. **[5]**

----ALL THE BEST----