

ALPHA COLLEGE OF ENGG & TECH
ODD SEM 2018

ASSIGNMENT 1

SUB : MSM (2131904) 3RD ME A

CH -1 INTRODUCTION OF MSM

CH -2 CRYSTAL GEOMETRY

CH -13 POWDER METALLURGY

| NO | QUESTION | YEAR | MARKS |
|----|--|--|-------|
| 1 | Give differences between metals and non metals. | D09,JN13 | 4 |
| 2 | Draw the three most commonly observed space lattices in Metals. | D10,JN14 | 3 |
| 3 | Explain selection criteria for engineering materials. | D09,D11, JN15,MAY11 | 7 |
| 4 | Name one application of following engineering properties of material. (i) Hardness (ii) Toughness (iii) Creep Strength (iv) Plasticity (v) Stiffness | D10 | 5 |
| 5 | Define Powder metallurgy. List advantages, disadvantages & applications of powder metallurgy? | D09, D10,JA13,15,JN14 ,15, MR10,MAY11,MAY 12 | 4,6,7 |
| 6 | Define 1) Toughness 2) Hardness 3) Hardenability 4) Malleability 5) Creep 6) Elasticity 7) Ductility | D11,D13,JN14 | 3,7 |
| 7 | Explain any two methods for production of metal powders | D09,JN15,MAY12 | 5,7 |
| 8 | Define Material science. Explain the requirement of engineering materials. | D15, JA15,JA16,JN15,M AY11 | 3,7 |
| 9 | How can we produce porous self lubricating bearings through powder metallurgy? Explain the process steps and process limitations for manufacturing the same. | D13 | 7 |
| 10 | Explain the requirements of metal powders used in powder metallurgy. Also explain various methods of powder production. | JN15 | 7 |
| 11 | Differentiate & explain Edge dislocation Screw dislocation with sketch. | JA15,JN14 | 3,7 |
| 12 | 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. | MY12 | 5 |
| 13 | Explain the process steps involved in making of a powder metallurgical product. As regards to powder metallurgy, explain the role of process parameters, positive features and limitations of this method. | JN13 | 7 |
| 14 | Correlate the property of thermal conductivity and hardness with internal structure of the material. | JN13 | 3 |
| 15 | State the four major materials groups for materials classification, bring out the basis of its classification and mention the important characteristics of each group. | D13 | 5 |
| 16 | State the importance of study of "Material Science" and briefly explain "Engineering Requirements" of materials. | JA15,MA10,JA16 | 5,7 |

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| 17 | Explain in brief: Sintering Process | D10,JN14 | 4 |
| 18 | Explain imperfections in crystal with neat sketches. | D15 | 4 |
| 19 | State utmost required engineering properties for following applications: 1. Bolt 2. Gear 3. Helical Spring 4. Shaft 5. Cutting Tool 6. Cylinder of I.C. Engine 7. Gas Turbine Blade | JA13 | 7 |
| 20 | How can we produce cemented carbide tools through powder metallurgy? Explain the process steps and process limitations for manufacturing the same. | D13 | 7 |

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ASSIGNMENT 2

SUB : MSM (2131904) 3RD ME A

CH -3 PLASTIC DEFORMATIONS
CH -5 SOLIDIFICATION OF METALS
CH -6 PHASE DIAGRAMS

| NO | QUESTION | YEAR | MARKS |
|----|--|------------|-------|
| 1 | What is strain hardening ? Explain how the effect of strain hardening can be eliminated by recrystallization? | JN15 | 7 |
| 2 | What is coring? Why it is observed? | D10 | 4 |
| 3 | Explain in brief: Factors affecting formation of solid solution | D10 | 4 |
| 4 | Explain the thermal equilibrium diagram for a case wherein two metals are completely soluble in liquid and solid state forming an isomorphous alloy system. | D13 | 4 |
| 5 | What is phase diagram? Explain Lever rule. | D11,JA15 | 7 |
| 6 | With neat sketches, explain Solidification of Metal. | JA13 | 7 |
| 7 | What is critical nucleus? In case of crystallization of metals, what is the difference between an embryo and a nucleus. What is the significance of critical radius of a solidifying particle? | JA15 | 7 |
| 8 | Differentiate under-cooling and constitutional super-cooling in context of solidification and its effect on final structure. | JN15 | 7 |
| 9 | What are the various levels of structure? Explain in detail. | JN15 | 7 |
| 10 | Explain homogenous and heterogeneous nucleation with neat sketches. | JN15 | 7 |
| 11 | Explain the three basic zones formed after solidification of alloys. | JN15 | 7 |
| 12 | What are slip bands and slip lines? Draw required sketches. What causes the formation of such bands on a metal surface. | JA15 | 4 |
| 13 | What is cooling curve? Explain and differentiate time temperature cooling curve of an alloy of eutectic composition and pure metal. | JA15,MAY12 | 7,4 |
| 14 | Compare cooling curves for pure metal, isomorphous & non-isomorphous alloys. State the information revealed by these cooling curves. | JA16,JN13 | 7 |
| 15 | Using Gibb's phase rule, explain unary phase diagram with sketch. | JA15, D12, | 7,5 |
| 16 | What is solid solution? What are the types? Explain them with neat sketch. Under which condition interstitial solid solution is feasible? | JN14,MAY12 | 5,7 |
| 17 | What is Gibb's phase rule? Define system, phase and degree of freedom. Show that the degree of freedom at eutectic point in a binary phase diagram is zero. | MA10,MAY11 | 7 |
| 18 | Explain thermal equilibrium diagram of binary alloys. | JN15 | 7 |
| 19 | What is solid solution? Explain types of solid solution. Also give Hume Rothery's Rules. | D09 | 7 |
| 20 | What are the various methods of controlling grain structure during solidification? Explain in detail. | JN15 | 7 |

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ASSIGNMENT 3

SUB : MSM (2131904) 3RD ME A

CH -7 ALLOTROPY OF IRON
CH -8 HEAT TREATMENT OF STEELS

| NO | QUESTION | YEAR | MARKS |
|----|--|---------------------------------------|-------|
| 1 | Define Allotropy. Explain allotropy of Iron. | D09,15,JN15,MA Y12 | 3,5,7 |
| 2 | Give difference between Annealing and Normalising. | D09,10,11,15 JA15,JA16,JN14 -15 | 4,6,7 |
| 3 | State Critical Reactions of Iron Carbon Phase diagram. | D10, JA15,JN13 | 6 |
| 4 | Draw microstructure of eutectoid steel. | D10,D15 | 4 |
| 5 | Write the procedure for Jominy end quench practical and discuss its 07 conclusion. | D11,JA15,JN15, MAY12 | 7 |
| 6 | Draw iron – iron carbide equilibrium diagram. Explain important phases in it. Discuss the phase transformation takes place for the 0.6 % carbon steel from liquid to room temperature | D09,D11,D13, JA15,JA16,JN13 | 7 |
| 7 | Define Heat treatment of metals. Explain with neat sketch TTT diagram for heat treatment of steel & importance of TTT | D15,JA13,JN15 | 7 |
| 8 | With Neat Sketch Draw Iron-Carbon(Fe-C) Equilibrium Diagram & Explain briefly various microconstituents of the Diagram. | D09,D11,D13, JA15,JA16,JN13 | 7 |
| 9 | With the aid of an iron-iron carbide equilibrium diagram show and explain eutectic, peritectic and eutectoid transformation. Also mention the significance of these transformations. | D09,D11,D13, JA15,JA16,JN13 | 7 |
| 10 | Draw iron – iron carbide equilibrium diagram. Show important phases in it. Discuss the phase transformation takes place for the 0.6 % carbon steel from liquid to room temperature. Explain Structure properties relationship of 0.6 % steel at room temperature. | JN14,15 | 10 |
| 11 | State Surface Hardening processes and explain any one | D15,JA13,JA15 | 5,7 |
| 12 | Describe and compare Austempering and Martempering. | JA15,JN13,JN14 ,MAY12 | 4,7 |
| 13 | With the aid of steel portion of an iron-iron carbide equilibrium diagram, showing solid state transformations compare the transformations during cooling under equilibrium conditions from solidus to room temperature of typical hypereutectoid steel and hypoeutectoid steels. Compare the resulting microstructure at room temperature and related properties. | MA10 | 7 |
| 14 | State Case Hardening processes and explain any one in detail. | JA13,JA16 | 7 |
| 15 | Draw iron – iron carbide equilibrium diagram with all necessary details. Briefly explain cooling of 1.2 % carbon steel from liquid state to room temperature. | MY12 | 4 |
| 16 | Define critical cooling rate of steel. Discuss the TTT diagram with complete labeling. | JN14,MR10,MA Y11 | 7 |
| 17 | Discuss mechanisms of quenching of steel. State the advantages and | MR10 | 7 |

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| | drawbacks of water & oil as quenching media. | | |
| 18 | Which are various surface hardening processes? Explain induction hardening process with sketch | MY11 | 7 |
| 19 | What is the purpose of Heat Treatment? Differential between Annealing and normalizing. | JN14,MR10,MA Y11 | 7 |
| 20 | Explain the steps to obtain the TTT-diagram for eutectoid steel and show on it the cooling curve representing annealing and hardening process. | JA15 | 7 |

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ASSIGNMENT 4

SUB : MSM (2131904) 3RD ME A

CH -9 ALLOY STEELS

CH -10 CAST IRON

CH -12 NON FERROUS METALS

| NO | QUESTION | YEAR | MARKS |
|----|---|--|-------|
| 1 | State the difference between impurities and alloying elements. State importance of alloying.State function of Nickel in steel | D10,15,JA15 | 4 |
| 2 | Specify, with reasons alloy suitable for the manufacture of : Bolts and Nuts ; Lathe Bed ; Milling Cutter | D10 | 4 |
| 3 | State function of following alloying elements in steel : Molybdenum Vanadium,Sulphur;Nickel;Chromium;Boron,Silicon,Magnesium & Phosphorous. | D10,D11,D13,J A16,JN15 | 7 |
| 4 | On the basis of microstructure and chemical composition explain the properties obtained in high speed steel and stainless steel. | D13 | 7 |
| 5 | State composition, specific properties and applications of high carbon steel. | JA13 | 7 |
| 6 | What are the purpose of Alloying ? Give effects of nickel as an alloy. | JA15 | 7 |
| 7 | What is plain carbon steel? Also explain all type of plain carbon steel with the composition and specific application. | JN15 | 7 |
| 8 | Explain & List properties & Applications of Wrought Iron With microstructure | D09,11,13 JA15,JA16,JN1 3,MR10,MAY11 | 3,4,7 |
| 9 | Give composition, properties and uses of malleable cast iron. | D09,D11,JA16, MAY11 | 7 |
| 10 | Differentiate between white cast iron and grey cast iron. | D11,D15,JA15 | 7,4 |
| 11 | Compare and Contrast: Spheroidal Graphite Iron and Malleable Cast Iron | D13,JN13 | 7 |
| 12 | Classify different types of cast iron.Why silicon is added to it ? Explain the effects of any four alloying elements on the properties of cast iron | D15 | 7 |
| 13 | State the Qualities Required in Bearing Metals. State composition, specific properties and applications of Babbit Metal. | JA13 | 7 |
| 14 | Enlist the properties of pure aluminum and mention the composition, properties and application of any one aluminum alloy. | JA15,JA16,JN1 3 | 7 |
| 15 | Discuss the properties of pure Copper. Enlist Copper alloys; explain any one Copper alloy in detail with composition, properties and applications. | JA16,JN14 | 7 |
| 16 | Give composition and uses of Monel metal and Nichrome. | D09 | 7 |
| 17 | State composition and specific applications of : Muntz metal ; German silver ; Naval brass | D10 | 6 |
| 18 | How will you classify brasses based on the composition of zinc Explain the properties & application of the main type of brasses. | MY12 | 4 |
| 19 | State the Qualities Required in Bearing Metals. State composition, specific properties and applications of Babbit Metal. | JA13 | 7 |
| 20 | Differentiate between gray cast iron & spheroidal cast iron in terms of microstructure, properties, composition & applications. | MR10 | 7 |

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ASSIGNMENT 5

SUB : MSM (2131904) ASSIGNMENT/FAQ'S 3RD ME A

CH -14 NDT, CH -15 METALLOGRAPHY

| NO | QUESTION | YEAR | MARKS |
|----|--|----------------------------|-------|
| 1 | What is non destructive test? List various non destructive tests. Explain X ray Radiography. | D09, JA15,JA16,MAY 11 | 7 |
| 2 | Explain Ultrasonic testing with advantages and limitations | D09,11,15,JA15, MR10,MAY11 | 7 |
| 3 | Explain the method of Sulphur Printing for steels and state the inferences that could be drawn out by the technique. | D13 | 3 |
| 4 | What is micro examination of metal? What are the various steps required for such an examination? | D10 | 4 |
| 5 | Which non-destructive test is used for finding defects on welded joints? | D11,JA13,JA15 | 7 |
| 6 | Compare and Contrast: Destructive test with Non Destructive test | D13,D15 | 4,7 |
| 7 | Explain the Spark Test and Magnetic test for metallic materials | D11,JA16 | 7 |
| 8 | What is nondestructive test? List various nondestructive tests. Explain advantages and Disadvantages of non-destructive tests. | D15 | 7 |
| 9 | Explain Dye penetrant testing. | D15,JN15 | 7 |
| 10 | Compare Macrostructure and Microstructure Examination. | D13,D15,JN13 | 4 |
| 11 | How would you determine internal flaws in a cast engineering component made of ferrous alloy without damaging the part? | JA13 | 7 |
| 12 | What is metallography? What useful information can be obtained from it? | D15,JA13,JA15 | 7 |
| 13 | Explain process to be followed for preparation of metallic specimen to see the microstructure under optical microscope. Name only commonly used etchant. | JN14,MAY12 | 7 |
| 14 | Suggest and explain NDT method to determine minute surface defects in large size component. | JA16 | 7 |
| 15 | Compare and contrast ultrasonic testing with radiographic testing as regards to flaw detection capabilities, operational safety, process features and parametric control. | JN13 | 7 |
| 16 | It is required to find out surface defects for the cast product. Which NDT process you will use? Explain basic principle and limitations of the test you have selected | JN14 | 7 |
| 17 | It is required to find the surface defects of a metal, which nondestructive test method you will select? Explain the method with neat sketch. | JN15 | 7 |
| 18 | "On the basis of colour and pattern of spark, material identity can be established to an extent." – Evaluate. | JN13 | 4 |
| 19 | State the advantages or importance of nondestructive testing over destructive testing of materials. Differentiate between X-ray radiography & γ-ray radiography of materials | MR10 | 7 |
| 20 | Evaluate: "After etching the micro specimen structure is visible". Also write a short note on "Macro-examination". | MR10,MAY11 | 7 |

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