

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY
DEPARTMENT OF MATERIALS AND METALLURGICAL ENGINEERING
RAIN SEMESTER 2019/2020 EXAMINATIONS

COURSE: ENG 208 – INTRODUCTION TO ENGINEERING MATERIALS II

DATE: 01/07/2021

TIME ALLOWED: 80 MINUTES

Instruction: (i) Use HB pencil to SHADE CLEARLY the correct answers in the boxes provided. (ii) Answer all questions

NAME	REG. NUMBER	DEPT					
1	A B C D	16	A B C D	31	A B C D	46	A B C D
2	A B C D	17	A B C D	32	A B C D	47	A B C D
3	A B C D	18	A B C D	33	A B C D	48	A B C D
4	A B C D	19	A B C D	34	A B C D	49	A B C D
5	A B C D	20	A B C D	35	A B C D	50	A B C D
6	A B C D	21	A B C D	36	A B C D	51	A B C D
7	A B C D	22	A B C D	37	A B C D	52	A B C D
8	A B C D	23	A B C D	38	A B C D	53	A B C D
9	A B C D	24	A B C D	39	A B C D	54	A B C D
10	A B C D	25	A B C D	40	A B C D	55	A B C D
11	A B C D	26	A B C D	41	A B C D	56	A B C D
12	A B C D	27	A B C D	42	A B C D	57	A B C D
13	A B C D	28	A B C D	43	A B C D	58	A B C D
14	A B C D	29	A B C D	44	A B C D	59	A B C D
15	A B C D	30	A B C D	45	A B C D	60	A B C D

1. Mathematically, engineering stress is given as (A) P/A_0 (B) P/A_i (C) P/A_f (D) A_f/P
2. A nylon string having a diameter of 2 mm is pulled by a load of 10 N. Determine its engineering stress. (A) 20.86 Pa (B) 21.82 Pa (C) 31.83 Pa (D) 41.83 Pa
3. Which of the following creep stage has rapid and accelerated creep rate respectively? (A) Primary and secondary creep (B) Primary and tertiary creep (C) Secondary and Primary (D) Tertiary and secondary creep
4. A wire 2m long and 2mm in diameter, when stretched by weight of 8k, has its length increased by 0.24mm. Find the stress ($g = 9.8m/s^2$ and take $\pi = 3.142$). (A) 2.10 N/m² (B) 2.5×10^2 N/m² (C) 1.2×10^4 N/m² (D) 2.50×10^7 N/m²
5. A material that has a strain hardening exponent of $n = 0$ is said to be: (A) A perfectly plastic solid material (B) 100% elastic solid material (C) Ceramic material (D) Elastic-Plastic solid material
6. The ability of a material to undergo a large amount of plastic deformation prior to failure is known as: (A) hardness (B) brittleness (C) stiffness (D) ductility
7. The ability of a material to absorb energy in the elastic region is known as: (a) Toughness (b) Strength (c) Resilience (d) Creep
8. Destructive tests include all except (A) tensile tests (B) Dye penetrant test (C) fatigue tests (D) Impact test
9. An NDT testing method that uses an electric current or/and magnetic field which is passed through a conductive part is called the _____ test. (A) Electromagnetic (B) Acoustic Emission (C) Ultrasonic (D) Magnetic Particle Testing
10. The tensile test specimen is machined to ASTM standard of _____ shape. A. hexagonal B. Straight C. Dumbbell D. Slim
11. In single crystals, plastic deformation corresponds to the motion of _____ in response to an externally applied shear stress (A) Dislocations (B) Motifs (C) Bases (D) Lattices
12. Which amongst the following planes is slip possible in a zinc single crystal? (A) (110) (B) (101) (C) (0001) (D) (1210)
13. Which amongst the following kinds of shear in the plastic deformation of a single crystal takes time to occur? (A) Twin (B) Solidification (C) Fracture (D) Slip
14. What is the critical resolved shear stress of a single crystal that is undergoing plastic deformation if: $F=55N$; $A_0=1.2m$; $\phi=16^\circ$; $\lambda=20^\circ$? (A) $41.4N.m^{-2}$ (B) $78.6N.m^{-2}$ (C) $49.68N.m^{-2}$ (D) $47.8N.m^{-2}$
15. Schmid's law stipulates that the critical resolved shear stress is proportional to the following except ____ (A) $\cos \phi$ (B) $\cos \lambda$ (C) A_0 (D) $F (A_0)$
16. The combination of slip direction and slip plane is known as ____ (A) Slip glide (B) Crystallography (C) Slip system (D) Twinning
17. In Muntz metal, if 1% of tin is added it forms (A) admiralty brass (B) naval brass (C) Duralumin (D) Gun metal
18. Which of the following alloy is widely used in thermo couples? (A) Brass (B) Bronze (C) Duralium (D) Nichrome
19. What is the approximate percentage of Lead in soft solder? (A) 50 (B) 60 (C) 70 (D) 80

ANNOUCEMENT: REMEMBER TO SUBMIT THE ENG 208 LAB MANUAL FOR GRADING. DUE DATE IS FROM MONDAY 28TH OF JUNE TO FRIDAY 16TH OF JULY 2021.

20. Which of the following alloys is used in making aircraft structures? (A) Brass (B) Duralumin (C) Bronze (D) Manganin
21. An alloy is a (A) Pure metal (B) Mixture of metals in any proportion (C) Mixture of metals in fixed proportion (D) Mixture of two non metals
22. Bronze is an alloy of (A) Copper and Nickel (B) Copper and Iron (C) Copper and zinc (D) Copper and Tin
23. One of these is not a property of ceramics (A) high melting point (B) high thermal conductivity (C) brittleness (D) good thermal stability.
24. In a CsCl crystal structure, each Cs ion is surrounded by _____ Cl ion (A) 2 (B) 4 (C) 6 (D) 8.
25. When two silicate tetrahedra combine _____ is formed (A) $Si_2O_7^{6-}$ (B) SiO_4^{4-} (C) $(Si_2O_5)^{2-}$ (D) SiO_3^{2-}
26. The sharing of the four corners of the silica tetrahedra with other silica tetrahedra gives rise to (A) silicate compounds (B) ring structures (C) sheet structures (D) silica
27. The Ti ion in the $BaTiO_3$ structure is located at the _____ (A) corner (B) side (C) center (D) edge.
28. _____ is not a forming technique in the production of glass products (A) rolling (B) pressing (C) forging (D) drawing.
29. One of these is not an inorganic cement (A) cement (B) alumina (C) plaster of Paris (D) lime.
30. Traditionally, iron and steel are used for fabrication of mechanical units under stress. But recently, the following plastics are most frequently used for such applications except (A) Nylons (B) Acetals (C) Polyethylenes (D) Polycarbonates.
31. Some plastics are suitable for electrical and electronics applications due to the following properties except (A) Good chemical reaction (B) Good electrical resistance (C) Good dimensional stability (D) Good tensile strength.
32. Which of the following plastics could be used in the manufacture of a body armour? (A) High Density Polyethylene (B) Polyisoprene (C) Ultra High Molecular Weight Polyethylene (D) Poly(Vinyl Chloride).
33. Engineering plastics products with complex geometries could easily be produced by (A) Compression moulding process (B) Blow moulding process (C) Extrusion process (D) Injection moulding process.
34. Because of its optical clarity and low gas permeability, _____ is the most widely used for packaging of beverage drinks and water (A) Poly(Vinyl Chloride) (B) Polypropylene (C) Poly(ethylene terephthalate) (D) Polystyrene.
35. Protective helmets could be manufactured by one of the following plastics (A) Polyethylene (B) Polyamide (C) Polypropylene (D) Polycarbonate
36. The major load carrier in dispersion-strengthened composites is _____ (A) matrix (B) metal (C) fibre (D) ceramic
37. Al-alloys for engine and automobile parts are reinforced to increase their _____ (A) strength (B) wear resistance (C) elastic modulus (D) density
38. Epoxy based PMCs found wide applications in aircraft, automobile and military systems due to the following except (A) light weight (B) corrosion resistance (C) high melting point (D) good strength
39. In woods used for engineering applications, the cellulose provides (A) strength (B) conductivity (C) corrosion resistance (D) wear resistance
40. Which of the following is not an example for laminar composite? (A) Paints (B) bimetallic (C) coatings (D) wood
41. Longitudinal strength of fibre reinforced composite is mainly influenced by (A) fibre strength (B) fibre orientation (C) fibre volume fraction (D) fibre length
42. Magnetic behaviours of materials can be modified by taking into account the followings except. (A) Composition (B) Processing (C) Types (D) Microstructure
43. The reason for magnetism of a material is primarily because of their, (A) Unpaired 3d energy shells (B) Atomic number (C) Magnetic field strength (D) Permeability
44. A pentavalent type of semiconductor is also known as _____ (A) P- type semiconductor (B) B-type semiconductor (C) n-type semiconductor (D) C-type semiconductor
45. Applications of semi-conductors includes the following except. (A) Thermistors (B) Transducers (C) Rectifiers (D) Solenoids
46. What property of Aluminum gives it a designing edge over Copper in the designing of High tension cable lines? (A) High corrosion resistance B. High strength-to-weight ratio C. high resistivity D. high malleability
47. These are examples of soft magnetic materials for electrical application except; (A) 45 permalloy (B) supermalloy (C) 99.95% Iron (D) $AlNiCo$
48. The electrical behavior of a material is influenced by the following except; (A) Structure (B) Processing (C) Current (D) Environment in service
49. Study of Corrosion can be useful through the following ways except _____ (A) Classification of corrosion (B) Improved safety (C) Cost reduction (D) Product purity
50. Considering the mechanism of corrosion, we have two types of corrosion namely (A) General and wet (B) Direct solution and wet corrosion (C) localized and aqueous (D) Dry and chemical
51. Which of the following is a factor affecting the rate of corrosion? (A) Design (B) Materials selection (C) Electrolyte concentration (D) Inhibitors
52. Conditions necessary for corrosion to occur include the following except _____ (A) Environment modification (B) Voltage source (C) Electrolyte (D) Presence of anode and cathode
53. The avoidance of unscheduled shutdowns can be achieved by _____ (A) Material selection (B) Product purity (C) Design (D) Environment modification
54. Corrosion can be measured through all the following except _____ (A) Weight loss (B) Hydrogen evolution (C) Electronic methods (E) Visual examination
55. Which of the following is not a metallic coating process? (A) chromating (B) hot dipping (C) Cladding (D) Cementation
56. We can reduce rate of corrosion as total corrosion prevention is impossible through _____ (A) Optical methods (B) Pigging (C) weight loss (D) Direct solution
57. Which of the following is not true about grain boundary? (A) Arrangement of atoms are exactly identical (B) Atoms are not properly arranged (C) atoms may be compressed (D) atoms may be under tension.
58. For magnifications other than 100, the ASTM grain size number is calculated using the equation (A) $N = 2^{n-1}$ (B) $N = 2^{2n-1}$ (C) $N_m \left(\frac{M}{100}\right)^2 = 2^{n-1}$ (D) $N_m \left(\frac{M}{100}\right)^2 = 2^{2n-1}$
59. Increasing the ASTM grain size number lead to the following except (A) increase in grain diameter (B) decrease in grain diameter (C) increase in strength (D) increase in grain boundaries
60. The Hall-Petch equation is expressed as (A) $\sigma_y = \sigma_0 + \frac{k}{d^2}$ (B) $\sigma_y = \sigma_0 + kd^{\frac{1}{2}}$ (C) $\sigma_y = \sigma_0 + \frac{d^{-1/2}}{k}$ (D) $\sigma_y = \sigma_0 + kd^{-\frac{1}{2}}$