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**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SIXTH SEMESTER B.TECH. DEGREE EXAMINATION(R,S), MAY 2024****Mechanical Engineering****(2020 SCHEME)****Course Code : 20MET308****Course Name : Comprehensive Course Work****Max. Marks : 50****Duration:75 Minutes****PART A***(Answer all questions. Each question carries 1 mark)*

- In which of the following conditions can the Bernoulli equation not be used.  
(A) Viscous flow (B) Incompressible fluid  
(C) Steady flow (D) Laminar flow
- Which one of the following is not a unit of dynamic viscosity?  
(A) Pa-s (B) N-s/m<sup>2</sup>  
(C) Poise (D) Stokes
- The ratio of inertia force to viscous force is known as  
(A) Grashof number (B) Reynolds number  
(C) Fourier number (D) Nusselt number
- The factor on which viscosity depends is  
(A) Area of contact of two adjacent layers (B) Velocity difference between two adjacent layers  
(C) The distance between two adjacent layers (D) All of the mentioned
- How can relatively denser object be made to float on the less dense fluid?  
(A) By altering the shape. (B) By altering the forces acting on the object.  
(C) By altering the shear forces acting on the object (D) None of the mentioned
- Which of the following is not a desirable characteristic of manometer fluid?  
(A) it should have high viscosity (B) it should be non - corrosive  
(C) it should be free from capillary effects (D) it should have negligible surface tension
- Which is not a characteristic of crystalline solids?  
(A) They undergo a clean cleavage (B) They are true solids  
(C) They are isotropic (D) They have sharp melting points
- In which of the following defect the density of the crystal is affected?  
(A) Schottky defect (B) Frenkel defect  
(C) Stone-Wales defect (D) Antisite defect
- Co-ordination number of a crystalline solid is:  
(A) Number of particles in the unit cell (B) Number of nearest neighbours of a particle  
(C) Number of octahedral voids in a unit cell (D) Number of tetrahedral voids in a unit cell

10. Which of the following is a property of ceramics?  
 (A) Low strength (B) Low melting point  
 (C) Resistant to corrosion (D) Bad insulation
11. Which of the following phase will be resulted when the transformation temperature of steel is in the range of 500 °C to 750 °C?  
 (A) Austenite (B) Pearlite  
 (C) Bainite (D) Martensite
12. Which of the following is not a name for time temperature transformation diagrams?  
 (A) S curve (B) C curve isothermal diagram  
 (C) D curve isothermal diagram (D) Bain's curve
13. What is a quasi-static process?  
 (A) Irreversible (B) Reversible  
 (C) In equilibrium at every state (D) Not involving friction
14. Which law of thermodynamics says that efficiency of a heat engine cannot be 1?  
 (A) Zeroth law of thermodynamics (B) First law of thermodynamics  
 (C) Second law of thermodynamics (D) Third law of thermodynamics
15. Clausius summarized the first and second laws of thermodynamics as  
 (A) the energy of the world is constant (B) the entropy of the world tends towards a maximum  
 (C) both of the mentioned (D) none of the mentioned
16. Work is a  
 (A) point function (B) path function  
 (C) depends on state (D) none of the above
17. When work is done on system or by a system there is a change in  
 (A) external energy (B) internal energy  
 (C) adiabatic energy (D) isothermal energy
18. The entropy of an isolated system always \_\_\_\_ and becomes a \_\_\_\_ at the state of equilibrium.  
 (A) decreases, minimum (B) increases, maximum  
 (C) increases, minimum (D) decreases, maximum
19. In a four high rolling mill, the diameter of backing up rolls is \_\_\_\_\_ the diameter of working rolls.  
 (A) equal to (B) smaller than  
 (C) larger than (D) none of these
20. In four high rolling mill the bigger rollers are called  
 (A) Guide rolls (B) Back up rolls  
 (C) Main rolls (D) Support rolls
21. Cogging, which is also called as drawing out, is basically  
 (A) Open die forging operation (B) Closed die forging operation  
 (C) Impression dies forging operation (D) Hold die forging operation
22. Forging is carried out at which temperature  
 (A) Below recrystallization temperature (B) Above recrystallization temperature  
 (C) Below or above recrystallization temperature (D) Above melting point
23. \_\_\_\_\_ is used to protect the eyes and face of a welder from arc radiation and spark during arc welding ?  
 (A) safety shoes (B) chipping goggles  
 (C) welding helmet (D) apron

24. In resistance welding, heat is generated due to resistance between  
 (A) electrode and workpiece (B) asperities between touching plates  
 (C) two dissimilar metals being in contact (D) interatomic forces
25. When the motion of a body is confined to only one plane, the motion is said to be  
 (A) plane motion (B) rectilinear motion  
 (C) curvilinear Motion (D) none of the mentioned
26. In a radial cam, the follower moves  
 (A) in a direction perpendicular to the cam axis (B) in a direction parallel to the cam axis  
 (C) in any direction irrespective of the cam axis (D) along the cam axis
27. The coriolis component of acceleration leads the sliding velocity by  
 (A) 45° (B) 90°  
 (C) 135° (D) 180°
28. The coriolis component of acceleration depends upon  
 (A) velocity of slider (B) angular velocity of the link  
 (C) all of the mentioned (D) none of the mentioned
29. Offset is provided to a cam follower mechanism to  
 (A) minimise the side thrust (B) accelerate  
 (C) avoid jerk (D) none of the mentioned
30. If the number of links in a mechanism are equal to L, then the number of possible inversions are equal to  
 (A) L-1 (B) L-2  
 (C) L (D) L+1

### PART B

*(Answer all questions. Each question carries 2 marks)*

31. Newton's law of viscosity states that,  
 (A) the shear stress between adjacent layers is inversely proportional to the velocity gradients between the two layers  
 (B) the shear stress between adjacent fluid layers is proportional to the velocity gradients between the two layers  
 (C) the shear stress between adjacent fluid layers is inversely proportional to the dynamic viscosity of fluid between the two layers  
 (D) none of the above
32. Which of the following equations is a result of momentum conservation for inviscid steady flows?  
 (A) Bernoulli's equation (B) Navier-Stokes equation  
 (C) First law of thermodynamics (D) Euler's equation
33. Which physical property is normally measured to determine a CCT diagram?  
 (A) Hardness (B) Magnetic permeability  
 (C) Pressure (D) Ductility
34. Stacking sequence in hexagonal close packed (HCP) structure is?  
 (A) AAAAA (B) ABABAB  
 (C) ABCABC (D) AABBA
35. The temperature of an object increases slowly, then the energy of that object  
 (A) increases slowly (B) decreases slowly  
 (C) increases quickly (D) decreases quickly
36. For the expression  $\int PdV$  to represent work, which of the following conditions should apply  
 (A) The system is closed one and the process takes place in non-flow system  
 (B) The process is non-quasi-static

(C) The boundary of the system should not move in order that work may be transferred. (D) If the system is open one, it should be non-reversible.

37. According to Chvorinov's equation, the solidification time of a casting is proportional to (where  $v$  = volume of the casting)

- (A)  $v^2$  (B)  $v$   
(C)  $1/v$  (D)  $1/v^2$

38. Applying the back tension on workpiece will shift the neutral point towards

- (A) exit of roll (B) entrance of roll  
(C) does not shift (D) depends upon the magnitude of the force

39. Which of the following motion is not suitable from a practical point of view?

- (A) Simple harmonic (B) Uniform acceleration and retardation  
(C) Uniform velocity (D) none of the mentioned

40. A car starts from rest and accelerates uniformly to a speed of 72 km/hr over a distance of 500 m. Calculate the acceleration.

- (A)  $0.3 \text{ m/s}^2$  (B)  $0.4 \text{ m/s}^2$   
(C)  $0.5 \text{ m/s}^2$  (D)  $0.6 \text{ m/s}^2$

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