Mechanical

1. Enriched uranium is required as a fuel in a nuclear reactor, if light water is used as moderator and coolant, because light water has
(A) High neutron absorption cross-section
(B) Low moderating efficiency
(C) High neutron scatter cross-section
(D) Low neutron absorption cross-section

2. The efficiency of a nuclear power plant in comparison to conventional and nuclear consideration is
(A) Higher cost of nuclear fuel
(B) High initial cost
(C) High heat rejection in condenser
(D) Lower temperature and pressure conditions

3. The control rods in the control system of nuclear reactors are used to
(A) Absorb excess neutrons
(B) Control fuel consumption
(C) Control temperature
(D) All of these

4. Electron volt is the unit of
(A) Atomic power
(B) Energy
(C) Voltage
(D) Radio activity

5. A moderator, in nuclear power plants, is a medium introduced into the fuel mass in order to
(A) Slow down the speed of fast moving neutrons
(B) Control the reaction
(C) Reduce the temperature
(D) Extracts heat from nuclear reaction

6. When a gas is heated, change takes place in
(A) Temperature
(B) Pressure
(C) Volume
(D) All of these

7. One molecule of oxygen consists of _____ atoms of oxygen.
(A) 2
(B) 4
(C) 8

(D) 16

8. Which of the following variables controls the physical properties of a perfect gas?
(A) Pressure
(B) Temperature
(C) Volume
(D) All of the above

9. The distillation carried out in such a way that the liquid with the lowest boiling point is first evaporated and re-condensed, then the liquid with the next higher boiling point is then evaporated and re-condensed, and so on until all the available liquid fuels are separately recovered in the sequence of their boiling points. Such a process is called
(A) Cracking
(B) Fractional distillation
(C) Full distillation
(D) Carbonisation

10. Work done in a free expansion process is
(A) Zero
(B) Maximum
(C) Minimum
(D) Positive

11. Which one of the following metals would work-harden more quickly than the others?
(A) Copper
(B) Brass
(C) Lead
(D) Silver

12. Iron-carbon alloys containing carbon _____ 4.3% are known as hyper-eutectic cast irons.
(A) Equal to
(B) Less than
(C) More than
(D) None of these

13. Bell metal contains
(A) 70% copper and 30% zinc
(B) 90% copper and 10% tin
(C) 85 - 92% copper and rest tin with little lead and nickel
(D) 70 - 75% copper and rest tin

14. The temperature required for full annealing in hypereutectoid steel is
(A) 30° C to 50° C above upper critical temperature
(B) 30° C to 50° C below upper critical temperature
(C) 30° C to 50° C above lower critical temperature
(D) 30° C to 50° C below lower critical temperature

15. The composition of silver solder is
(A) Silver, copper, zinc
(B) Silver, tin, nickel
(C) Silver, lead, zinc
(D) Silver, copper, aluminium

16. If the flow of air through the compressor is perpendicular to its axis, then it is a
(A) Reciprocating compressor
(B) Centrifugal compressor
(C) Axial flow compressor
(D) Turbo compressor

17. Gas turbines use following type of air compressor
(A) Centrifugal type
(B) Reciprocating type
(C) Lobe type
(D) Axial flow type

18. The gas in cooling chamber of a closed cycle gas turbine is cooled at
(A) Constant volume
(B) Constant temperature
(C) Constant pressure
(D) None of these

19. The maximum combustion pressure in gas turbine as compared to I.C. engine is
(A) More
(B) Less
(C) Same
(D) Depends on other factors

20. In a closed cycle gas turbine, the air is compressed
(A) Isothermally
(B) Polytropically
(C) Isentropically
(D) None of these

21. A body of mass 'm' moving with a constant velocity 'v' strikes another body of same mass moving with same velocity but in opposite direction. The common velocity of both the bodies after collision is
(A) v
(B) 2v
(C) 4v
(D) 8v

22. The centre of percussion of the homogeneous rod of length 'L' suspended at the top will be
(A) L/2
(B) L/3
(C) 3L/4
(D) 2L/3

23. The angle of inclination of the plane at which the body begins to move down the plane, is called
(A) Angle of friction
(B) Angle of repose
(C) Angle of projection
(D) None of these

24. Pick up wrong statement about friction force for dry surfaces. Friction force is
(A) Proportional to normal load between the surfaces
(B) Dependent on the materials of contact surface
(C) Proportional to velocity of sliding
(D) Independent of the area of contact surfaces

25. Low specific speed of a pump implies it is
(A) Centrifugal pump
(B) Mixed flow pump
(C) Axial flow pump
(D) None of the above

26. Head developed by a centrifugal pump is
(A) Proportional to diameter of impeller
(B) Proportional to speed of impeller
(C) Proportional to diameter and speed of impeller
(D) None of the above

27. In centrifugal pumps, maximum efficiency is obtained when the blades are
(A) Straight
(B) Bent forward

(C) Bent backward
(D) Radial

28. A double overhung Pelton wheel has
(A) Two jets
(B) Two runners
(C) Four jets
(D) Four runners

29. Medium specific speed of a pump implies it is
(A) Centrifugal pump
(B) Mixed flow pump
(C) Axial flow pump
(D) Any one of the above

30. The motion between a pair which takes place in _____ is known as incompletely constrained motion.
(A) One direction only
(B) Two directions only
(C) More than one direction
(D) None of these

31. The frictional torque transmitted in a flat pivot bearing, considering uniform pressure, is
(where μ = Coefficient of friction, W = Load over the bearing, and R = Radius of bearing surface)
(A) (1/2) μ W R
(B) (2/3) μ W R
(C) (3/4) μ W R
(D) μ W R

32. A typewriter mechanism has 7 numbers of binary joints, six links and none of higher pairs. The mechanism is
(A) Kinematically sound
(B) Not sound
(C) Soundness would depend upon which link is kept fixed
(D) Data is not sufficient to determine same

33. The magnitude of velocities of the points on a rigid link is
(A) Directly proportional to the distance from the points to the instantaneous center and is parallel to the line joining the point to the instantaneous center
(B) Directly proportional to the distance from the points to the instantaneous center and is perpendicular to the line joining the point to the instantaneous center

(C) Inversely proportional to the distance from the points to the instantaneous center and is parallel to the line joining the point to the instantaneous center

(D) Inversely proportional to the distance from the points to the instantaneous center and is perpendicular to the line joining the point to the instantaneous center

34. A cube subjected to three mutually perpendicular stress of equal intensity p expenses a volumetric strain
(A) $3p/ E \times (2/m - 1)$
(B) $3p/ E \times (2 - m)$
(C) $3p/ E \times (1 - 2/m)$
(D) $E/ 3p \times (2/m - 1)$

35. The strain energy stored in a solid circular shaft subjected to shear stress (τ), is:
    (Where, G = Modulus of rigidity for the shaft material)
(A) $τ²/ 2G \times$ Volume of shaft
(B) $τ/ 2G \times$ Volume of shaft
(C) $τ²/ 4G \times$ Volume of shaft
(D) $τ/ 4G \times$ Volume of shaft

36. The strain energy stored in a solid circular shaft in torsion, subjected to shear stress (τ), is:
    (Where, G = Modulus of rigidity for the shaft material)
(A) $τ²/ 2G \times$ Volume of shaft
(B) $τ/ 2G \times$ Volume of shaft
(C) $τ²/ 4G \times$ Volume of shaft
(D) $τ/ 4G \times$ Volume of shaft

37. The stress induced in a body, when suddenly loaded, is _____ the stress induced when the same load is applied gradually.
(A) Equal to
(B) One-half
(C) Twice
(D) Four times

38. A material obeys hook's law up to
(A) Plastic limit
(B) Elastic limit
(C) Yield point
(D) Limit of proportionality

39. If a gas metal arc process uses a low arc voltage and the arc is continuously interrupted as the molten electrode metal fills up the arc gap is known as
(A) ARC

(B) Short ARC
(C) ARC length
(D) ARC blow

40. Which one among the following welding processes uses non-consumable electrode?
(A) Gas metal arc welding
(B) Submerged arc welding
(C) Gas tungsten arc welding
(D) Flux coated arc welding

41. What type of fusion welding process is used for welding sheet metals of all engineering metals (except Cu, Ag) in automobile and air craft industries, pipe and tubing production?
(A) Thermit welding
(B) Electroslag welding
(C) Resistance welding
(D) Submerged arc Welding

42. When two main plates are kept in alignment butting each other and riveted with cover plate on both sides of the main plates with two rows of rivets in each main plate, the joint is known as _____ double cover butt joint.
(A) Single riveted
(B) Double riveted
(C) Both (A) and (B)
(D) None of these

43. In a metal arc welding process, a gas metal arc welding with magnetized flux is used and can be done in all the positions i.e. flat position, vertical position or inclined position.
(A) Globular transfer
(B) Spray transfer
(C) GMAW practice
(D) Dip transfer

44. The ratio of belt tensions (p1/p2) considering centrifugal force in flat belt is given by
    Where m = mass of belt per meter (kg/m)
        v = belt velocity (m/s)
        f = coefficient of friction
        a = angle of wrap (radians)
(A) $(P1 - mv^2)/ (P2 - mv^2) = e^{fα}$
(B) $P1 / P2 = e^{fα}$
(C) $P1 / P2 = e^{-fα}$
(D) $(P1 - mv^2)/ (P2 - mv^2) = e^{-fα}$

45. The ultimate strength of steel in tension in comparison to shear is in the ratio of
(A) 1: 1
(B) 2:1
(C) 3: 2
(D) 2: 3

46. In radial cams, the follower moves
(A) In a direction parallel to the cam axis
(B) In a direction perpendicular to the cam axis
(C) In any direction irrespective of cam axis
(D) Along the cam axis

47. The permissible stress for carbon steel under static loading is generally taken as
(A) 2000-3000 kg/m²
(B) 3000-4000 kg/cm²
(C) 4000-4500 kg/cm²
(D) 7500-10,000 kg/cm²

48. The property of a material which enables it to resist fracture due to high impact loads is known as
(A) Elasticity
(B) Endurance
(C) Strength
(D) Toughness