1. The stress which a material fractures under large number of reversal of stresses is called
   (a) Endurance limit
   (b) Creep
   (c) Ultimate strength
   (d) Residual stress

2. Hartnell governor could be classified under the head of
   (a) Inertia type governor
   (b) Pendulum type governor
   (c) Centrifugal type governor
   (d) Dead weight type governor

3. Sensitivity of an isochronous governor is
   (a) Zero
   (b) One
   (c) Two
   (d) Infinity

4. How many links would the simplest cam mechanism have?
   (a) 1
   (b) 2
   (c) 3
   (d) 4

5. The kinetic energy of a flywheel having moment of inertia ‘I’ and angular speed ‘w’ is given by
   (a) $Iw^2$
   (b) $Io^2$
   (c) $\frac{1}{2}Io^2$
   (d) None of the above

6. The flywheel of moment of Inertia 9.8 kg.m$^2$ fluctuates by 30 rpm for a fluctuation in energy of 1936 joules. The mean speed of the flywheel, in rpm is:
   (a) 600
   (b) 900
   (c) 968
   (d) 2940

7. Which of the following is called antifriction bearing?
   (a) Slide contact bearing
   (b) Collar bearing
   (c) Rolling contact bearing
   (d) all of the above
8. Whenever velocity ratio required is to be very exact between two shafts at very small distance, and then it is transmitted by
   (a) Belts  (b) Gears  (c) Leaves  (d) Chain

9. In a slider crank chain used in reciprocating steam engine cross-head and guides from a
   (a) Turning pair  (b) Sliding pair  (c) Rolling pair  (d) Spherical pair

10. The gear train in which the first and last gear have the same axis, is called a/an
    (a) Epicycle gear train  (b) Reverted gear train  (c) Simple gear train  (d) Compound gear train

11. A solid shaft of diameter D carries a twisting moment that develop maximum shear stress. If the shaft is replaced by a hollow one of OD = D and ID = 3/4 D; then the maximum shear stress will be
    (a) $\frac{16}{15} \tau$  (b) $\frac{15}{16} \tau$  (c) $\frac{256}{175} \tau$  (d) $\frac{175}{256} \tau$

12. With the increase of slenderness ratio, the compressive strength of the column is
    (a) Increased  (b) Decreased  (c) Unchanged  (d) May increase or decrease

13. A simply supported beam of length ‘L’ carries a concentrated load W at its center. If EI is the flexural rigidity of the beam, strain energy due to bending is
    (a) $\frac{W^3L^3}{12EI}$  (b) $\frac{W^3L^3}{24EI}$  (c) $\frac{W^3L^3}{48EI}$  (d) $\frac{W^3L^3}{96EI}$

14. When a rectangular bar of length l, breadth b and thickness t is subjected to an axial pull of P, the linear strain is given by (where E = modulus of elasticity)
    (a) $\frac{btE}{P}$  (b) $\frac{bt}{PE}$  (c) $\frac{P}{btE}$  (d) $PE/bt$
15. A simply supported beam of span \( l \) carries a distributed load that varies linearly from zero at either of the ends, to \( w \) kg/m at the mid-span. The shear force will be zero at (a) Supported ends (b) Mid span (c) A distance \( l/4 \) from either end (d) Nowhere in the entire span

16. The variation of bending moment in a simply-supported beam carrying a uniformly distributed load is (a) Linear (b) Parabolic (c) Hyperbolic (d) None of the above

17. During adiabatic process, essentially (a) Entropy remains constant (b) Enthalpy remains constant (c) No work transfer takes place (d) No heat transfer takes place

18. The product of tangential force acting on a shaft and its radius is known as (a) Bending moment (b) Twisting moment (c) Torsional rigidity (d) Flexural rigidity

19. Maximum shear stress obtained from Mohr’s circle is (a) Equal to the radius of the Mohr’s circle (b) Greater than the radius of the Mohr’s circle (c) Less than the radius of the Mohr’s circle (d) None of the above

20. An engine receives 278 kJ/s of heat at a fixed temperature of 283°C and rejects heat at the rate of 208 kJ/s to a sink maintained at 5°C. The cycle on which the engine works may be classified as (a) Reversible (b) Irreversible (c) Impossible (d) Unpredictable

21. According to Kelvin Planck statement, a perpetual motion machine (a) Of first kind is possible (b) Of first kind is impossible (c) Of second kind is impossible (d) Of second kind is possible

22. A certain engine at full load delivers 80 kW. It requires 20 kW to rotate it without load. The mechanical efficiency at full load condition will be (a) 60 % (b) 70 % (c) 80 % (d) 90 %
23. For polytropic process \( pV^n = c \) for a perfect gas, change in entropy is given by the expression

(a) \( \frac{\gamma - n}{\gamma - 1} \left( \frac{V_2}{V_1} \right)\ln \left( \frac{V_1}{V_2} \right) \)
(b) \( \frac{\gamma - n}{\gamma - 1} \left( \frac{P_2}{P_1} \right)\ln \left( \frac{P_1}{P_2} \right) \)
(c) \( \frac{n-1}{n} \left( \frac{V_2}{V_1} \right)\ln \left( \frac{V_1}{V_2} \right) \)
(d) \( C_v \left( \frac{\gamma - n}{\gamma - 1} \right) \left( \frac{T_2}{T_1} \right) \)

24. In a four-stroke cycle I.C. engine, the minimum temperature inside the engine cylinder occurs at the
(a) Beginning of suction stroke
(b) End of suction stroke
(c) Beginning of exhaust stroke
(d) End of exhaust stroke

25. For testing of I.C. engine, dynamometer is used to find the
(a) Indicated power
(b) Brake power
(c) Fuel power
(d) Friction power

26. The boiler accessory installed to recover heat from exhaust flue gas for feed water heating is called
(a) Superheater
(b) Economiser
(c) Air preheater
(d) Reheater

27. Efficiency of diesel engine can be increased by
(a) Decreasing the compression ratio
(b) Decreasing the cut-off ratio
(c) Increasing the cut-off ratio
(d) Increasing the clearance volume

28. In a four-stroke cycle of an I.C. engine, the operations are, in sequence
(a) Suction, compression, expansion and exhaust
(b) Suction, expansion, compression and exhaust
(c) Expansion, compression, Suction and exhaust
(d) Compression, Expansion, Suction and exhaust

29. The continuity equation
(a) Requires that Newton's second law to be valid
(b) Relates mass rate of flow along a stream tube
(c) States that velocity at the boundary should be zero
(d) Relates rate of change of momentum

30. In an impulse reaction turbine, the pressure drops
(a) Only in the nozzles
(b) Only in the moving blades
(c) Only in the fixed blades
(d) Both in fixed and in moving blades
31. When starting a centrifugal pump, the delivery valve is kept
(a) Fully open  (b) Fully closed
(c) Half open   (d) Less than half open

32. Cavitation may occur in a fluid flow if
(a) Its enthalpy suddenly increases
(b) Its enthalpy suddenly decreases
(c) Its velocity suddenly reduces to zero
(d) Its pressure reduces to the level of vapour pressure

33. A device in which some portion of waste heat of flue gases is recovered to heat the air before it passes into the furnace for combustion purpose, is known as
(a) Superheater (b) Air preheater
(c) Reheater     (d) Economiser

34. Which aspect is not valid for a fire tube locomotive boiler?
(a)Externally fired  (b) Horizontal placement
(c) Multi-tubular   (d) Mobile unit

35. An ideal fluid
(a) Has no velocity
(b) Is compressive
(c) Obeys Newton’s law of velocity
(d) In both incompressible and non-viscous

36. Refer to the figure:- $P_A - P_B$ is

\[ h\left(\rho_m/\rho_i\right)\delta \]  
\[ h\left(\rho_m - \rho_i\right)\delta \]  
\[ h\left(\rho_m + \rho_i\right)\delta \]  
\[ h\left(\rho_m/\rho_i\right)\delta \]

37. For a body placed in water, the resultant hydrostatic force at its:
(a) center of gravity  (b) Metacenter
(c) Center of pressure (d) Center of buoyancy

38. Flux used in brazing is
(a) Aluminium  (b) Borax
(c) Zinc chloride (d) Calcium carbide
39. A Rota meter is used to measure
(a) Flow rate of fluids  (b) Viscosity of fluids
(c) Density of fluids  (d) Rotational energy of fluids

40. In pressure welding, the pressure required to consummate the weld is
(a) Mechanical  (b) Hydraulic
(c) Spring  (d) Air

41. Carburising heat treatment is used for
(a) Softening the metal  (b) Refining grain structure
(c) Hardening outer surface  (d) Relieving internal stress

42. Molten steel is poured into water cooled vertical copper moulds is
(a) Centrifugal casting  (b) Continuous casting
(c) Die casting  (d) Permanent mould casting

43. Cast iron steel pipes are produced by
(a) Slush casting  (b) Investment casting
(c) True centrifugal casting  (d) Die casting

44. Weld spatter defect in welding is due to:
(a) Low voltage  (b) High voltage
(c) Too high welding current  (d) Too low welding current

45. Tool signature comprises of
(a) 5 elements  (b) 6 elements
(c) 7 elements  (d) 8 elements

46. Single point thread cutting tool should ideally have
(a) Positive rake angle  (b) Negative rake angle
(c) Zero rake angle  (d) Normal rake angle

47. Investment casting uses pattern of
(a) Wax  (b) Clay
(c) Wood  (d) Metal
48. The undercutting defect in welding is due to
   (a) Faulty electrode manipulation
   (b) Faulty electrode usage
   (c) Current too high
   (d) All of the above reasons

49. Crater wear is predominant in
   (a) Carbon tool steel  (b) Tungsten carbide tools
   (c) H.S.S. tools      (d) Ceramic tools

50. Which of the following is not a casting defect?
   (a) Scar            (b) Hot tear
   (c) Hot cracking    (d) Cold shut

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48. वेल्डन में कम करने का दोष किस कारण हो जाता है?
   (a) दोषपूर्ण इलेक्ट्रोड का हेलपर
   (b) दोषपूर्ण इलेक्ट्रोड का प्रयोग
   (c) बारा अयमान रहने पर
   (d) उपयुक्त सभी कारणों से

49. क्रेटर निर्गमन किसमें सबसे ज्यादा होता है?
   (a) कार्बन आयार इस्पात    (b) टंगस्टन कार्बाइड आयार
   (c) H.S.S. आयार          (d) सेरैमिक आयार

50. निम्न में से कौन-सा दोष धालेई का दोष नहीं है?
   (a) निष्कासन      (b) गर्म विद्युतरण
   (c) गर्म दरार       (d) ठंडा विद्युतरण