

Model Question Paper ❄️❄️ Mechanical, Automobile and Aeronautical

1. In an Oldham coupling, the numbers of revolute pairs and sliding pairs are, respectively
 (1) 1 and 3 (2) 1 and 2
 (3) 2 and 2 (4) 3 and 1
2. The best transmission angle in linkage mechanisms and the worst pressure angle in cam mechanisms are, respectively
 (1) 0° and 0° (2) 0° and 90°
 (3) 90° and 0° (4) 90° and 90°
3. Minimum number of teeth in a pinion to avoid interference in a $14\frac{1}{2}^\circ$ pressure angle rack and pinion arrangement is
 (1) 23 (2) 32
 (3) 16 (4) 18
4. In a rotating link with angular velocity, ω , a slider is sliding with linear velocity, v , the Coriolis component of acceleration is
 (1) $\frac{2v}{\omega}$ (2) $\frac{2\omega}{v}$
 (3) $\frac{v}{2\omega}$ (4) $2v\omega$
5. The best follower motion curve for high speed applications of cam mechanism is
 (1) Uniform velocity
 (2) Cycloidal
 (3) Simple Harmonic
 (4) Uniform acceleration and retardation
6. The value of $\sum dQ/T$ for reversible process is
 (1) + ve (2) - ve
 (3) zero (4) unity
7. The value of Joule-Thomson co-efficient for an ideal gas is
 (1) 1 (2) zero
 (3) greater than 1 (4) less than 1
8. Expansion in a nozzle is an
 (1) isobaric process (2) isentropic process
 (3) adiabatic process (4) isochoric process
9. Following relationship defines Helmholtz function as
 (1) $F = H + TS$ (2) $F = U + TS$
 (3) $F = H - TS$ (4) $F = U - TS$
10. It is not possible to liquefy hydrogen at room temperature by application of pressure because
 (1) its critical temperature is lower than room temperature
 (2) it has low density
 (3) it has three isotopes
 (4) it has high thermal conductivity
11. The vapour compression cycle employs the following cycle
 (1) Ranking (2) Carnot
 (3) Brayton (4) Reversed Carnot
12. Air refrigeration operates on
 (1) Brayton cycle (2) Reversed Carnot cycle
 (3) Rankine cycle (4) Carnot cycle
13. The COP of a vapour compression plant in comparison to vapour absorption plant is
 (1) more (2) less
 (3) same (4) unpredictable
14. If ice in a plant is made at -6°C and if temperature difference between ice and refrigerant is 5°C , then refrigerant temperature is
 (1) -1°C (2) -11°C
 (3) 6°C (4) 0°C
15. During the sensible cooling process
 (1) specific humidity remains constant
 (2) specific humidity increases
 (3) specific humidity decreases
 (4) specific humidity is unpredictable
16. Plug weld joint is used
 (1) where longitudinal shear is present
 (2) where severe loading is encountered and the upper surfaces of both pieces must be in the same plane
 (3) to join two pieces of metal in the same manner as rivet joint metals
 (4) for electrical work

17. The temperature range for soldering process is
(1) 40°C to 100°C (2) 180°C to 250°C
(3) 300°C to 500°C (4) 600°C to 900°C
18. The chief advantage of die-casting is
(1) possibility of incorporating thick sections in small castings
(2) casting of inserts is possible
(3) wide tolerances are possible
(4) high production rates are possible
19. Cemented carbide tools are poor in
(1) compression (2) tension
(3) shear (4) tension and shear
20. The following is the process used for producing fine surface finish
(1) shot peening (2) sintering
(3) broaching (4) tumbling
21. When the choke is applied the fuel come out from the
(1) main jet (2) idle jet
(3) transfer port (4) progression hole
22. The example of a variable venturi type carburetor is the
(1) Carter carburetor (2) Solex carburetor
(3) S.U. carburetor (4) Zenith carburetor
23. Aneroid is a
(1) cold starting device
(2) emission control device
(3) decompression device
(4) device for timing injection
24. The cylinder temperature after compression in a diesel engine is approximately
(1) 600°C (2) 250°C
(3) 800°C (4) 1000°C
25. The fuel injection timing in a distribution type pump is controlled by
(1) changing plunger stroke
(2) changing speed of rotor
(3) rotating the cam ring
(4) changing the number of cams on the ring
26. The purpose of transmission in an automobile is
(1) to vary the steering effort
(2) to vary the torque
(3) to vary the power
(4) to increase the efficiency
27. By using synchronizing device, the two involved adjacent gears have their speeds
(1) increased (2) decreased
(3) equalized (4) unchanged
28. The central gear of an epicyclic gear set is called a
(1) ring gear (2) sun gear
(3) planet gear (4) internal gear
29. The component of the torque converter that drives the oil is the
(1) turbine (2) impeller
(3) freewheel (4) internal gear
30. The maximum torque multiplication ratio in a torque converter is about
(1) 2.5 (2) 10
(3) 25 (4) 100
31. Aerodynamics of a spinning cricket ball is related to
(1) Bernoulli's principle
(2) Magnus effect
(3) Kutta condition
(4) Newton's second law
32. Streamlined body is one for which
(1) Pressure drag is more than skin friction drag
(2) Induced drag is more than profile drag
(3) Skin friction drag is more than pressure drag
(4) None of the above
33. NACA 4412 implies the maximum camber of airfoil occurs at
(1) 40 % of chord (2) 4 % of chord
(3) 12 % of chord (4) 20 % of chord
34. The critical Mach number can be increased by
(1) increasing aspect ratio
(2) increasing thickness to chord ratio
(3) increasing sweep back
(4) decreasing sweep back
35. Service ceiling of an airplane is the altitude at which maximum rate of climb is
(1) 180 ft/min (2) 100 ft/min
(3) 30 m/s (4) 80 ft/s
36. The operational range of Mach number for a ramjet engine is between
(1) 2 and 5 (3) 0.3 and 0.8
(3) 0.1 and 0.3 (4) 1.2 and 2.0

37. The following type of engine is widely used for civil transportation by airplanes
 (1) turbojet (2) turboprop
 (3) turbofan (4) piston type
38. The aircraft powered by the following engine required the longest runway
 (1) piston type (2) turbojet
 (3) turboprop (4) turbofan
39. The following engine is inherently not self starting
 (1) piston type engine
 (2) twin spool turbojet
 (3) single spool turbojet
 (4) ramjet
40. In the critical operation of supersonic inlets the normal shock position is
 (1) at the lip of the inlet
 (2) inside the inlet
 (3) outside the inlet
 (4) at the exit section of the inlet
41. A cantilever of length $2L$ is subjected to a tip load P . The transverse deflection at the midpoint of the cantilever is
 (1) $5PL^3/6EI$ (2) $5PL^2/6EI$
 (3) $6PL^3/EI$ (4) $6PL^2/5EI$
42. The state of stress at a point is given by $\sigma_{xx} = \sigma_{yy} = \sigma_{xy} = 50\text{MPa}$. The ratio between the maximum principal stress and maximum shear stress is
 (1) 1 : 2 (2) 2 : 1
 (3) 1 : 3 (4) 3 : 1
43. A column of dimension $3\text{ cm} \times 2\text{ cm}$ (cross section) and 100 cm length is subjected to axial compressive load. The Euler critical load is
 (1) $2\pi^2 E/L^2$ (2) $4.5\pi^2 E/L^2$
 (3) $5.4\pi^2 E/L^2$ (4) $\pi^2 E/L^2$
44. The torsional rigidity of a shaft is expressed by the
 (1) maximum torque it can transmit
 (2) number of cycles it undergoes before failure
 (3) elastic limit upto which it resists torsion, shear and bending stresses
 (4) maximum torque required to produce a twist of one radian per unit length of the shaft.
45. A boiler shell 200 cm diameter and plate thickness 1.5 cm is subjected to internal pressure of 1.5 MN/m^2 . Then the hoop stress will be
 (1) 30 MN/m^2 (2) 50 MN/m^2
 (3) 100 MN/m^2 (4) 200 MN/m^2

Answers

1. 3	16. 3	31. 3
2. 4	17. 1	32. 3
3. 2	18. 4	33. 3
4. 4	19. 3	34. 1
5. 2	20. 1	35. 3
6. 3	21. 1	36. 1
7. 2	22. 3	37. 1
8. 3	23. 3	38. 2
9. 4	24. 3	39. 4
10. 1	25. 3	40. 4
11. 4	26. 2	41. 1
12. 2	27. 3	42. 2
13. 1	28. 2	43. 1
14. 1	29. 2	44. 4
15. 1	30. 1	45. 3