

UTO Mechanical – MCQ Question Bank (Set 2)

Total: 100 Questions

1. In a four-stroke diesel engine, the power stroke occurs during which stroke?

- A. Suction
- B. Compression
- C. Expansion
- D. Exhaust

Answer: C

Explanation: Power is produced when combustion gases expand during the expansion stroke.

2. The unit of entropy is:

- A. J/kg
- B. J
- C. J/kg·K
- D. K

Answer: C

Explanation: Entropy is energy per unit temperature per unit mass.

3. Reynolds number is used to determine:

- A. Heat transfer
- B. Flow regime
- C. Work done

D. Pressure rise

Answer: B

Explanation: Reynolds number identifies laminar, transitional, or turbulent flow.

4. The ratio of actual COP to maximum COP is known as:

A. Effectiveness

B. Thermal efficiency

C. Relative COP

D. Refrigeration efficiency

Answer: C

Explanation: Relative COP compares actual cycle to ideal Carnot performance.

5. In a boiler, the function of the fusible plug is to:

A. Stop feedwater

B. Prevent boiler explosion

C. Control pressure

D. Remove air

Answer: B

Explanation: Fusible plug melts in overheating to release pressure and prevent accidents.

6. The device used to measure low pressures is:

A. Bourdon gauge

B. Manometer

C. Pirani gauge

D. Diaphragm gauge

Answer: C

Explanation: Pirani gauge measures very low vacuum levels.

7. The first law of thermodynamics is a statement of:

- A. Conservation of mass
- B. Conservation of energy
- C. Increase of entropy
- D. Thermal equilibrium

Answer: B

Explanation: Energy cannot be created or destroyed.

8. The cam profile shape that gives minimum jerk is:

- A. Cycloidal
- B. Square
- C. Drop
- D. Tangential

Answer: A

Explanation: Cycloidal motion curves minimize jerk and vibration.

9. In gas turbines, the Brayton cycle efficiency increases by:

- A. Decreasing pressure ratio
- B. Increasing pressure ratio
- C. Decreasing turbine inlet temperature
- D. Using simple cycle

Answer: B

Explanation: Higher pressure ratio yields higher cycle efficiency.

10. Hardness of water is mainly due to:

- A. Sodium salts
- B. Potassium salts
- C. Calcium and magnesium salts
- D. Iron salts

Answer: C

Explanation: Ca and Mg ions cause permanent and temporary hardness.

11. The coefficient of discharge for an orifice is defined as the ratio of:

- A. Actual discharge to theoretical discharge
- B. Velocity head to pressure head
- C. Pressure energy to kinetic energy
- D. Actual head to theoretical head

Answer: A

Explanation: C_d accounts for losses due to friction and contraction.

12. The law governing dry friction is known as:

- A. Hooke's law
- B. Coulomb's law
- C. Pascal's law
- D. Newton's law

Answer: B

Explanation: Coulomb established the principles of sliding friction.

13. The efficiency of a simple screw jack depends on:

- A. Square pitch
- B. Helix angle
- C. Friction angle
- D. Both B and C

Answer: D

Explanation: Efficiency varies with helix and friction angles.

14. For isothermal expansion of an ideal gas, the value of work done is:

- A. Zero
- B. pV
- C. $mRT \ln(V_2/V_1)$
- D. C_p/C_v

Answer: C

Explanation: For isothermal processes, $W = mRT \ln(V_2/V_1)$.

15. The instrument used for measuring humidity is:

- A. Hydrometer
- B. Hygrometer
- C. Pyrometer
- D. Manometer

Answer: B

Explanation: Hygrometer measures moisture content in air.

16. Cavitation in pumps is caused by:

- A. Low discharge

- B. High suction pressure
- C. Low pressure at pump inlet
- D. High friction

Answer: C

Explanation: When inlet pressure falls below vapour pressure, cavitation occurs.

17. Latent heat of fusion refers to heat required to:

- A. Raise temperature
- B. Melt solid to liquid
- C. Vaporize liquid
- D. Solidify gas

Answer: B

Explanation: Fusion converts solid to liquid at constant temperature.

18. The purpose of a governor is to control:

- A. Pressure
- B. Speed
- C. Temperature
- D. Torque

Answer: B

Explanation: Governor maintains constant speed under varying loads.

19. Euler's formula applies to:

- A. Short columns
- B. Medium columns
- C. Long columns

D. Any column

Answer: C

Explanation: Euler's buckling theory is valid for long, slender columns.

20. The chemical symbol for refrigerant R134a is:

A. CCl_2F_2

B. $\text{C}_2\text{H}_2\text{F}_4$

C. CHClF_2

D. $\text{C}_2\text{H}_3\text{F}_3$

Answer: B

Explanation: R134a is tetrafluoroethane ($\text{C}_2\text{H}_2\text{F}_4$).

21. A belt drive transmits power by:

A. Direct contact

B. Friction

C. Lubrication

D. Adhesion

Answer: B

Explanation: Power is transmitted due to friction between belt and pulley.

22. Heat transfer by conduction takes place through:

A. Fluids only

B. Solids only

C. Vacuum

D. Only in solid medium

Answer: B

Explanation: Conduction primarily occurs in solids.

23. The efficiency of a Carnot engine depends on:

A. Pressure ratio

B. Volume ratio

C. Temperature ratio

D. Fuel quality

Answer: C

Explanation: Carnot efficiency = $1 - (T_2/T_1)$.

24. The draft produced in a chimney is due to:

A. Temperature difference

B. Pressure difference

C. Fuel type

D. Air quality

Answer: A

Explanation: Hot flue gases rise due to density difference.

25. In a reciprocating compressor, clearance volume:

A. Increases mass flow rate

B. Reduces volumetric efficiency

C. Has no effect

D. Increases pressure

Answer: B

Explanation: Larger clearance reduces the effective intake volume.

26. For laminar flow in a pipe, the velocity profile is:

- A. Uniform
- B. Parabolic
- C. Linear
- D. Circular

Answer: B

Explanation: Laminar flow has a parabolic velocity distribution.

27. A gear ratio greater than 1 means:

- A. Speed increases
- B. Speed decreases
- C. No change
- D. Reverse motion

Answer: B

Explanation: Higher gear ratio reduces output speed and increases torque.

28. Bernoulli's equation is based on:

- A. Law of conservation of energy
- B. Newton's law
- C. Coulomb's law

D. Hooke's law

Answer: A

Explanation: Derived from energy conservation for incompressible flow.

29. The purpose of a baffle in heat exchangers is to:

A. Increase mixing

B. Reduce heat transfer

C. Support tubes

D. Both A and C

Answer: D

Explanation: Baffles both support tubes and increase turbulence.

30. The hardness number of mild steel is around:

A. 50 BHN

B. 100 BHN

C. 150 BHN

D. 300 BHN

Answer: C

Explanation: Mild steel typically has 130–180 BHN.

31. Refrigeration effect is expressed in:

A. Watts

B. TR (Tons of Refrigeration)

C. Joules

D. Kelvin

Answer: B

Explanation: TR indicates refrigeration capacity.

32. Welding flux is used to:

A. Increase heat

B. Remove oxides

C. Reduce current

D. Prevent distortion

Answer: B

Explanation: Flux cleans the weld pool.

33. The pressure at the throat of a venturimeter is:

A. Maximum

B. Minimum

C. Constant

D. Zero

Answer: B

Explanation: Flow accelerates, causing low pressure.

34. A cantilever beam has:

A. Both ends fixed

B. Both ends free

C. One end fixed, one free

D. One end hinged

Answer: C

Explanation: Cantilever is fixed at one end.

35. The phenomenon of strain hardening occurs in:

- A. Brittle materials
- B. Elastic zone
- C. Plastic zone
- D. At fracture point

Answer: C

Explanation: Plastic deformation strengthens material.

36. A turbocharger in engines improves:

- A. Fuel quality
- B. Fuel efficiency
- C. Power output
- D. Engine cooling

Answer: C

Explanation: Turbo uses exhaust gases to raise air pressure.

37. Prandtl number is the ratio of:

- A. Thermal diffusivity to momentum diffusivity
- B. Momentum diffusivity to thermal diffusivity
- C. Viscosity to thermal conductivity

D. Density to viscosity

Answer: B

Explanation: $Pr = \nu/\alpha$.

38. The number of independent stress components in 3D is:

A. 1

B. 3

C. 6

D. 9

Answer: C

Explanation: Three normal and three shear stresses.

39. The purpose of annealing is to:

A. Harden

B. Soften

C. Temper

D. Strengthen

Answer: B

Explanation: Annealing reduces hardness and increases ductility.

40. The most common refrigerant leak detector gas is:

A. Helium

B. Nitrogen

C. Ammonia

D. Hydrogen

Answer: A

Explanation: Helium is used due to its small molecular size.

41. Heat transfer by radiation does not require:

- A. Fluid
- B. Medium
- C. Solids
- D. Vacuum

Answer: B

Explanation: Radiation can occur through vacuum.

42. Kinematic viscosity is measured by:

- A. Viscometer
- B. Monometer
- C. Orifice meter
- D. Tachometer

Answer: A

Explanation: Viscometers determine viscosity of fluids.

43. Hydraulics operates on:

- A. Newton's law
- B. Pascal's law
- C. Hooke's law
- D. Bernoulli's law

Answer: B

Explanation: Pressure applied is transmitted equally.

44. The ductility of a material is measured by:

- A. Impact test
- B. Hardness test
- C. Tensile test
- D. Creep test

Answer: C

Explanation: Tensile test determines elongation.

45. A flywheel controls:

- A. Speed fluctuations
- B. Pressure
- C. Temperature
- D. Torque

Answer: A

Explanation: Flywheel stores kinetic energy to smooth speed.

46. The main function of a condenser in steam power plant is to:

- A. Increase temperature
- B. Reduce pressure
- C. Convert steam to water

D. Raise enthalpy

Answer: C

Explanation: Condenser converts exhaust steam into water.

47. Droplet formation in atomizers depends on:

A. Air pressure

B. Fuel temperature

C. Nozzle design

D. All of the above

Answer: D

Explanation: All factors influence spray characteristics.

48. A free vortex has:

A. Constant velocity

B. Constant circulation

C. Zero circulation

D. Constant radius

Answer: C

Explanation: Free vortex has zero external torque.

49. A multistage compressor increases:

A. Temperature

B. Pressure

C. Velocity

D. No effect

Answer: B

Explanation: Multiple stages raise the final pressure.

50. Sensible heat refers to:

- A. Phase change
- B. Temperature change
- C. Chemical reaction
- D. No heat transfer

Answer: B

Explanation: Sensible heat changes temperature without phase change.

Questions 51–100 continue below

51. Superheating of steam increases:

- A. Moisture content
- B. Turbine erosion
- C. Efficiency
- D. Pump work

Answer: C

52. In rolling, reduction is defined as:

- A. Increase in width
- B. Decrease in thickness
- C. Increase in volume

D. Plastic strain

Answer: B

53. The universal gas constant R has units of:

A. J/kg·K

B. J/mol·K

C. K/kg

D. m³/kg

Answer: B

54. Specific speed of a pump is used to:

A. Classify pumps

B. Increase efficiency

C. Reduce cavitation

D. Find discharge

Answer: A

55. A fin is used to:

A. Reduce conduction

B. Improve convection

C. Reduce radiation

D. Control temperature

Answer: B

56. The stress at which a material begins to deform plastically is:

- A. Yield stress
- B. Ultimate stress
- C. Breaking stress
- D. Fatigue stress

Answer: A

57. Welding process using non-consumable electrode:

- A. MIG
- B. TIG
- C. SAW
- D. Arc welding

Answer: B

58. Cast iron has high:

- A. Ductility
- B. Brittleness
- C. Malleability
- D. Tensile strength

Answer: B

59. The calorific value of fuel depends on:

- A. Pressure
- B. Temperature
- C. Chemical composition
- D. Volume

Answer: C

60. The most efficient nozzle shape for high velocity gas flow is:

- A. Convergent
- B. Divergent
- C. Convergent-divergent
- D. Cylindrical

Answer: C

61. Ideal gas equation fails at:

- A. Low temperature and low pressure
- B. High temperature and high pressure
- C. Low temperature and high pressure
- D. All temperatures

Answer: C

62. Pitot tube measures:

- A. Static pressure
- B. Dynamic pressure
- C. Total pressure
- D. Vapour pressure

Answer: C

63. A highly viscous fluid has:

- A. Low resistance to flow
- B. High resistance to flow
- C. High compressibility
- D. Low density

Answer: B

64. Newton's law of viscosity relates shear stress with:

- A. Density
- B. Temperature
- C. Velocity gradient
- D. Pressure

Answer: C

65. Stability of a floating body depends on:

- A. Buoyant force
- B. Metacentric height
- C. Fluid density
- D. Pressure

Answer: B

66. A diesel cycle has:

- A. Constant volume heat addition

B. Constant pressure heat addition

C. No heat addition

D. Polytropic heat addition

Answer: B

67. The flash point of fuel is:

A. Ignition temperature

B. Boiling point

C. Temperature at which vapour ignites

D. Melting point

Answer: C

68. In a power screw, self-locking occurs when:

A. Friction angle $<$ helix angle

B. Friction angle $>$ helix angle

C. Both equal

D. No relation

Answer: B

69. Diffusion occurs due to:

A. External force

B. Pressure gradient

C. Concentration gradient

D. Temperature gradient

Answer: C

70. The maximum efficiency of a nozzle occurs when:

- A. Friction increases
- B. Exit pressure equals atmospheric
- C. Throat pressure increases
- D. Velocity decreases

Answer: B

71. Creep occurs at:

- A. Low temperature
- B. High temperature
- C. Both
- D. No relation with temperature

Answer: B

72. Torsional rigidity is:

- A. GJ
- B. EI
- C. GA
- D. EA

Answer: A

73. The main purpose of a clutch is to:

- A. Cool engine
- B. Transmit torque
- C. Increase speed
- D. Reduce friction

Answer: B

74. Natural frequency depends on:

- A. Mass and stiffness
- B. Length only
- C. Mass only
- D. Temperature

Answer: A

75. The p–V diagram area represents:

- A. Pressure
- B. Temperature
- C. Work done
- D. Volume

Answer: C

76. A vortex flow has:

- A. Zero vorticity
- B. Circular motion

C. Turbulent flow

D. Straight flow

Answer: B

77. Coefficient of performance is high when:

A. Temperature difference is high

B. Temperature difference is low

C. Heat rejection increases

D. Compressor work increases

Answer: B

78. The knock in SI engines is controlled by:

A. Compression ratio

B. Octane number

C. Air–fuel ratio

D. All of the above

Answer: D

79. The unit of thermal conductivity is:

A. $W/m \cdot K$

B. $W/m^2 \cdot K$

C. J/kg

D. J

Answer: A

80. Bernoulli's theorem does not apply to:

- A. Steady flow
- B. Rotational flow
- C. Inviscid flow
- D. Incompressible flow

Answer: B

81. The purpose of a strainer in pipelines is to:

- A. Reduce pressure
- B. Filter particles
- C. Store fluid
- D. Increase temperature

Answer: B

82. The neutral axis of a beam is:

- A. Maximum stress line
- B. Zero stress line
- C. Minimum stress line
- D. Bending axis

Answer: B

83. The purpose of a capacitor in motors is to:

- A. Reduce current

- B. Improve starting torque
- C. Control temperature
- D. Protect winding

Answer: B

84. The material used for bearings is generally:

- A. Cast iron
- B. Brass
- C. Babbitt metal
- D. Tool steel

Answer: C

85. Volumetric efficiency of an engine is the ratio of:

- A. Indicated power to brake power
- B. Actual air intake to theoretical air intake
- C. Fuel mass to air mass
- D. Compression to expansion

Answer: B

86. The highest heat transfer coefficient occurs in:

- A. Conduction
- B. Natural convection
- C. Radiation

D. Forced convection

Answer: D

87. The safest method of joining pressure vessels is:

A. Bolting

B. Riveting

C. Welding

D. Adhesives

Answer: C

88. The function of a surge tank is to:

A. Increase pressure

B. Absorb water hammer

C. Reduce velocity

D. Store water

Answer: B

89. The major component of stainless steel is:

A. Copper

B. Chromium

C. Nickel

D. Carbon

Answer: B

90. A manometer measures:

- A. Temperature
- B. Pressure
- C. Velocity
- D. Flow rate

Answer: B

91. The Mach number is the ratio of:

- A. Static pressure to stagnation pressure
- B. Velocity of body to local speed of sound
- C. Temperature to pressure
- D. Velocity to density

Answer: B

92. A stiff spring has:

- A. Low spring constant
- B. High spring constant
- C. Zero stiffness
- D. Variable stiffness

Answer: B

93. Euler number is associated with:

- A. Pressure forces
- B. Viscous forces

- C. Inertial forces
- D. Gravitational forces

Answer: A

94. Thermal efficiency of an engine is the ratio of:

- A. Work output to heat supplied
- B. Heat supplied to work output
- C. Work to mass
- D. Heat rejected to heat supplied

Answer: A

95. In gear trains, idler gears change:

- A. Speed
- B. Torque
- C. Direction of rotation
- D. Gear ratio

Answer: C

96. In a boiler, economizer improves:

- A. Temperature of flue gas
- B. Boiler efficiency
- C. Steam pressure
- D. Fuel quality

Answer: B

97. The unit of dynamic viscosity is:

- A. Poise
- B. Pascal
- C. Newton
- D. Kelvin

Answer: A

98. The area moment of inertia is used to calculate:

- A. Heat transfer
- B. Stress
- C. Bending stiffness
- D. Mass

Answer: C

99. Fatigue failure occurs due to:

- A. Static load
- B. Sudden load
- C. Repeated loading
- D. No load

Answer: C

100. Brayton cycle is used in:

- A. Petrol engines

B. Diesel engines

C. Gas turbines

D. Steam engines

Answer: C