Question: A single-cylinder diesel engine has a stroke volume of 800 c(c) During operation, its compression ratio is 21. The clearance volume of this engine cylinder is:

(a) 80 cc

(b) 38.1 cc

(c) 76.2 cc

(d) 40 cc

Answer: d

Question: The continuity equation for a fluid flowing through the pipe at all the cross-section is based on the principle of :

(a) conservation of mass

(b) conservation of kinetic energy

(c) conservation of potential energy

(d) conservation of momentum

Answer: a

Question: The solidification time, Ts, required for casting during cooling, is proportional to:

(a) $(\text{surface area/volume})^2$

(b) $(\text{volume/surface area})^2$

(c) surface area

(d) $(\text{surface area})^2$

Answer: b

Question: A refrigeration system based on the Carnot cycle operates between the two temperatures

$-3℃$ and $+6℃$. The coefficient of performance of the refrigeration is:

(a) 30

(b) 90

(c) 1

(d) 3

Answer: a

Question: The 'thermal arrest' a part of the cooling curve in the casting process is:

(a) the solidification of metal using latent heat of fusion

(b) the immediate cooling of sand mould

(c) the blocking of cooling of metal by the riser

(d) the blocking of cooling of metal by the sand mould

Answer: a

Question: A frame that is made up of members just sufficient to keep it in equilibrium is known as:

(a) perfect frame

(b) redundant frame

(c) deficient frame

(d) imperfect frame

Answer: a

Question: In the equation of motion of fluids , the force due to compressibility is negligible .Such equation of motion is known as:

(a) Reynold's equations of motion

(b) Naviers-Stokes Equation of Motion

(c) Gant's Equation of Motion

(d) Euler's equation of Motion

Answer: a

Question: Two bodies at different temperatures communicate thermally with a finite temperature difference between them. The process of heat transfer is :

(a) irreversible

(b) cyclic and reversible

(c) reversible

(d) cyclic

Answer: a

Question: The endurance limit for a given stress range R can be determined by using the endurance limit for completely reversed stresses with the equation:

(a) $\sigma_e' = \frac{\sigma_e}{2-R}$

(b) $\sigma_e' = \frac{3\sigma_e}{2-R}V$

(c) $\sigma_e' = \frac{\sigma_e}{3-R}$

(d) $\sigma_e' = \frac{2\sigma_e}{3-R}$

Answer: b

Question: A steel bar of thickness 8 mm is bent into a circular arc of radius 5m. The bending stress induced in this bar having E = 200 GPa is :

(a) 80 GPa

(b) 160 MPa

(c) 50 MPa

(d) 80 MPa

Answer: b

Question: Two different metallic walls of the same thickness and cross-sectional area have thermal conductivities in the ratio 1:3. If the ratio of temperature drop across the walls is 3:5, what is the ratio of heat flow in these walls?

(a) 3:5

(b) 5:5

(c) 5:1

(d) 1:5

Answer: d

Question: The coefficient of velocity is the ratio between the actual velocity of a jet of liquid and the theoretical velocity of a jet. The actual velocity of the liquid is measured at:

(a) vena-contracta

(b) exit of the orifice

(c) mid of the orifice

(d) entrance of the orifice

Answer: a

Question: The shear force in a cantilever beam subjected to a load P at its free end is :

(a) constant throughout the beam and is equal to P

(b) constant throughout the beam and is equal to –P

(c) –P at the fixed end and zero at the free end

(d) zero at the fixed end and –P at the free end

Answer: b

Question: The radiation transfer occurs efficiently in:

(a) gas

(b) solid

(c) vacuum

(d) liquid

Answer: c

Question: The temperature at which the transformation of ice into water and steam at constant pressure occurs is called:

(a) vapourisation temperature

(b) latent heat temperature

(c) saturation temperature

(d) melting temperature

Answer: c

Question: 'It is impossible for any system to operate in such a way that the sole result would be an energy transfer by heat from a cooler to a hotter body'. This statement is known as:

(a) Entropy statement

(b) Clausius statement

(c) Clarian statement

(d) Kelvin-Planck statement

Answer: b

Question: Thermodynamics intensive properties are those values are:

(a) dependent on the flow

(b) dependent on the size

(c) independent of the flow

(d) independent of the size

Answer: d

Question: A body is subjected to the mutually perpendicular strains ε_x and ε_y; then the centre of the Mohr's circle for the strain from the origin is:

(a) $(\varepsilon_x - \varepsilon_y)$

(b) $(\varepsilon_x - \varepsilon_y)/2$

(c) $(\varepsilon_x + \varepsilon_y)$

(d) $(\varepsilon_x + \varepsilon_y)/2$

Answer: d

Question: The ratio of the maximum displacement of vibrating system in the forced vibration situation to its deflection due to the static force is called:

(a) dynamic magnifier

(b) damping factor

(c) stiffness

(d) logarithmic decrement factor

Answer: a

Question: The resistance per unit area to the deformation set up by the body for external forces is called:

(a) stress

(b) resilience

(c) modulus

(d) stiffness

Answer: a

Question: The minimum and maximum speed values , respectively of a flywheel are 200 rpm and 400 rpm. Then the coefficient of fluctuation of speed is:

(a) 0.66

(b) 2.0

(c) 0.5

(d) 1.0

Answer: a

Question: The efficiency of a Rankine cycle can be improved by :

(a) increasing the pressure of the steam

(b) decreasing the pressure of the steam

(c) increasing the wetness of the steam

(d) decreasing the temperature of the steam

Answer: a

Question: The instantaneous value of stress required to continue deforming the material in metal forming is known as :

(a) bulk stress

(b) ultimate stress

(c) engineering stress

(d) flow stress

Answer: d

Question: A circular shaft of diameter 20 mm is used to transmit power and the shear stress in the materials is limited to 40 MPa. This shaft can transmit a torque of:

(a) 20π kNmm

(b) 40π kNmm

(c) 20π kNmm

(d) 40π kNmm

Answer: a

Question: "If a force acts at any point on a rigid body, it may also be considered to act at any other point on its line of action, provided this point is rigidly connected with the body". This is the principle of:

(a) composition of forces

(b) transmissibility of forces

(c) parallelogram law of forces

(d) physical independence of forces

Answer: b

Question: In a thermodynamic system, the work done on the system is 10 kJ, while the internal energy has increased by 40 kJ. Then the heat supplied to the system is :

(a) 60 kJ

(b) 40 kJ

(c) 30 kJ

(d) 50 kJ

Answer: c

Question: The ability of a material to conduct thermal energy relative to its ability to store thermal energy is called:

(a) thermal capacity

(b) thermal diffusivity

(c) thermal resistivity

(d) thermal conductivity

Answer: b

Question: The approximate value of modulus of elasticity for a brass material is :

(a) 200 GPa

(b) 150 GPa

(c) 80 GPa

(d) 240 GPa

Answer: c

Question: A bar of cross-sectional area of 25 mm^2 and length 50 mm is subject to tensile loading. The initial slope of the load-extension curve is 110 kN/mm. Then the modulus of elasticity of the bar material is :

(a) 55 kN//mm^2

(b) 22000 kN/mm^2

(c) 11000 kN/mm^2

(d) 220 kN/mm^2

Answer: d

Question: A piezometer is used for measuring the gauge pressure inside a pipe carrying water. If the rise in the column of the meter is 30 cm, the fluid pressure inside the pipe is:

(a) 30 kN/m^2

(b) 0.293 kN/m^2

(c) 333 kN/m^2

(d) 2.943 kN/m^2

Answer: d

Question: Offset yield stress is determined by setting a line parallel to its initial linear region by a standard strain of:

(a) 0.02 percent

(b) 2 percent

(c) 0.2 percent

(d) 1 percent

Answer: c

Question: A shaft is vibrating under the free vibration condition. The stresses developed in this shaft are in bending stresses. Which type of vibrations the shaft is subjected to?

(a) Torsional vibrations

(b) Longitudinal free vibrations

(c) Transverse vibrations

(d) Forced Longitudinal vibrations

Answer: c

Question: The actual capacity of an air compressor is expressed as:

(a) compressed air delivery by the pump per hour

(b) swept volume of cylinder per minute

(c) actual free air delivered per minute

(d) clearance volume of the pump per minute

Answer: c

Question: What are the dimensions of surface tension ?

(a) M^0LT^{-2}

(b) ML^0T^{-2}

(c) ML^0T^{-1}

(d) MLT^{-1}

Answer: b

Question: An inward flow reaction turbine has a tangential velocity of runner as 24 m/s and velocity of a whirl as 9.81 m/s. The hydraulic efficiency of this turbine for a total head of water of 40 m is :

(a) 60 percent

(b) 24.53 percent

(c) 30 percent

(d) 40.88 percent

Answer: a

Question: A thin cylinder of diameter 0.5mm and thickness of 5mm is subjected to an internal pressure of 2 MP(a) The circumferential and longitudinal stresses , respectively, in the cylinder are:

(a) 100 kPa, 50 kPa

(b) 25 kPa, 50 kPa

(c) 50 kPa, 100 kPa

(d) 50 kPa, 25 kPa

Answer: a

Question: The Liquid Shrinkage Allowance used while designing casting pattern on reduction in volume changes:

(a) in the mold upon cooling

(b) from liquid state to solid state of metal

(c) due to ramming

(d) in the riser volume

Answer: b

Question: A gas in a container under a pressure of 15 Pa, temperature 20℃ and a volume of 5 litres is compressed with the hyperbolic process to 3 litres. The final pressure of the gas is :

(a) 15 Pa

(b) 25 Pa

(c) 125 Pa

(d) 100 Pa

Answer: b

Question: The strength of a single transverse fillet weld joint per unit length for the thickness of plate t and allowable stress σ_t for the weld material is :

(a) P = 0.9σ_t

(b) $P = 1.414\ t\sigma_t$

(c) $P = 0.707 t\sigma_t$

(d) $P = 0.45\ t\sigma_t$

Answer: c

Question: The failure or yield of a component occurs at a point when the maximum shear stress in the biaxial stress system reaches a value equal to the shear stress at the yield point in a simple tension test. This theory is known as.

(a) Rankine's theory

(b) Guest's Theory

(c) Haigh's theory

(d) Saint Venant's Theory

Answer: b

Question: The line of action of a tensile load is away from the centroidal axis of the component. Then this load will produce:

(a) tensile and shear stresses

(b) bending and shear stresses

(c) shear and bending stresses

(d) tensile and bending stresses

Answer: d

Question: Cast iron pipes of length many times larger than the diameter are manufactured by the casting process. Which method is preferred?

(a) Sand Casting method

b . Die casting method

(c) Centrifugal casting method

(d) Lost wax method

Answer: c

Question: In a centrifugal compressor, the work done by an impeller per kg of air is given by the product of tangential force and distance travelle(d) This work is known as :

(a) isentropic work

(b) euler work

(c) actual work

(d) static work

Answer: b

Question: In the gyroscopic actions of rotating bodies, the plane of spinning and plane of precision are:

(a) perpendicular to each other

(b) inclined to each other

(c) parallel and distinct

(d) same

Answer: a

Question: The critical speed of a rotating shaft can be determined from the natural frequency of the same shaft vibrating in :

(a) forced torsional vibrations

(b) transverse free vibrations

(c) longitudinal free vibrations

(d) torsional free vibrations

Answer: b

Question: The air standard efficiency of a constant volume air cycle depends on:

(a) compression ratio

(b) sink temperature only

(c) source temperature only

(d) average cycle pressure

Answer: a

Question: A real fluid is the one that is different from the ideal fluid in respect of:

(a) mass

(b) density

(c) gravity

(d) viscosity

Answer: d

Question: Which material has the highest value of Young's Modulus among the following?

(a) Glass ceramic

(b) Silicon Carbide

(c) Boron Carbide

(d) Tungsten Carbide

Answer: d

Question: The power –specific speed N_{sp} of an impulse turbine is in the range of:

(a) 1-10

(b) 101-150

(c) 151-200

(d) 11-100

Answer: a

Question: A type of bond that makes a material very strong such as diamond or very weak such as bismuth is called:

(a) Metallic bond

(b) Covalent bond

(c) Vander Walls bond

(d) Ionic bond

Answer: b

Question: The forces whose lines of action lie on the same line are known as :

(a) non-coplanar forces

(b) concurrent forces

(c) collinear forces

(d) non-concurrent forces

Answer: c

Question: The functions of a draft tube connected to a turbine is to:

(a) physically hold and support the turbine

(b) convert pressure energy into kinetic energy in the tube

(c) convert kinetic energy into pressure energy in the tube

(d) decrease the total pressure head

Answer: c

Question: If two forces F_1 and F_2 acting simultaneously on a particle at an angle θ are represented in magnitude and direction by the two adjacent sides of a parallelogram, then the direction of resultant with force F_1 is given by:

(a) $\tan^{-1}(F_1 cos\,\theta/(F_1 + F_2 cos\theta)$

(b) $\tan^{-1}(F_2 sin\,\theta/(F_2 + F_1 cos\theta)$

(c) $\tan^{-1}(F_2 sin\,\theta/(F_1 + F_2 cos\theta)$

(d) $\tan^{-1}(F_1 sin\,\theta/(F_1 + F_2 cos\theta)$

Answer: c

Question: A simply supported beam AB carries a vertical load at a point C such that lengths AC < C(B) The maximum deflection of the beam occurs at:

(a) between points A and C

(b) Point C

(c) Point B

(d) between points C and B

Answer: d

Question: A disc that consists of a mixture of filler metal and base metal that have completely melted in the welding is called:

(a) Radial friction clutch

(b) Self-disengage clutch

(c) centrifugal clutch

(d) axial friction clutch

Answer: d

Question: A zone that consists of a mixture of filler metal and base metal that have completely melted in the welding is called:

(a) fusion zone

(b) weld interface

(c) hot zone

(d) heat-affected zone

Answer: a

Question: A hydrodynamic boundary layer thickness is the distance from the surface to where the velocity is :

(a) equal to local external velocity

(b) equal to 99 percent of the local external velocity

(c) more than local external velocity

(d) equal to zero local external velocity

Answer: b

Question: The cutting conditions identified in the machining process for a single –point tool operation are

(a) tool temperature, coolant and tool material

(b) speed of work, feed and depth of cut

(c) speed of work , feed and cutting tool material

(d) work and tool material and coolant used

Answer: b

Question: A wall of a furnace 150 mm thick and area 100 sq.m has a thermal conductivity of 1.5 W/mK. The heat loss through the wall for a temperature difference of 50 K is :

(a) 5 kW

(b) 500 W

(c) 0.5 W

(d) 50 kW

Answer: d

Question: According to Euler's theory for buckling of columns, the value of the end fixity coefficient for the case-both ends fixed in the Crippling load equation is:

(a) 4

(b) 2

(c) 0.25

(d) 1

Answer: a

Question: The isothermal compressibility of a substance is given by the expression:

(a) $K_T = \left[\frac{dv}{dp}\right]_T$

(b) $K_T = \frac{1}{v}\left[\frac{dv}{dp}\right]_T$

(c) $K_T = -\frac{1}{v}\left[\frac{dv}{dp}\right]_T$

(d) $K_T = -\left[\frac{dv}{dp}\right]_T$

Answer: c

Question: According to Wein's law of radiation , the wavelength corresponding to the maximum energy is :

(a) inversely proportional to the absolute temperature of hot body

(b) directly proportional to the absolute temperature of hot body

(c) directly proportional to temperature difference in the body

(d) inversely proportional to temperature difference in the body

Answer: a

Question: The kinetic energy of a body of mass (m) and velocity (v) is equal to:

(a) mv/2

(b) mv^2

(c) mv

(d) $mv^2/2$

Answer: d

Question: According to maximum shear stress theory, the maximum shear stress for a case of combined bending and torsion for shafts is :

(a) $\tau_{max} = \frac{1}{E}\sqrt{\sigma_b^2 + 4\tau^2}$

(b) $\tau_{max} = \frac{1}{2}\sqrt{\sigma_b^2 + \tau^2}$

(c) $\tau_{max} = \frac{1}{2}\sqrt{\sigma_b^2 + 4\tau^2}$

(d) $\tau_{max} = \frac{E}{2v}\sqrt{2\sigma_b^2 + \tau^2}$

Answer: c

Question: A rectangular plate is submerged vertically in a flui(d) The centre of pressure of the fluid on the surface of the plate is :

(a) at the centre of gravity of the plate

(b) below the centre of gravity of the plate

(c) above the centre of gravity of the plate

(d) at the bottom of the plate

Answer: b

Question: One of the significant advantages of cold forming compared to hot working is :

(a) better accuracy achieved

(b) more preheating needed

(c) less work required for the process

(d) less strength due to strain hardening

Answer: a

Question: In the electro-polishing process, the surface material is removed by the mechanism of:

(a) erosion

(b) corrosion

(c) abrasion

(d) diffusion

Answer: d

Question: Which standard cycle is referred to evaluate the performance of a steam power cycle?

(a) Air standard cycle

(b) Carnot cycle

(c) Rankine cycle

(d) Constant pressure cycle

Answer: c

Question: Which spiral casing of a Francis reaction turbine has:

(a) uniformly varying cross-sectional area and is maximum at the exit.

(b) uniformly varying cross-sectional area and is maximum at the entrance

(c) uniformly varying cross-sectional

(d) non-varying cross-sectional area and is constant throughout

Answer: b

Question: The initial tension in bolts P_i for making the joint fluid tight , using bolts of diameter d, is :

(a) $P_i = 2840\ d$

(b) $P_i = 4120\ d$

(c) $P_i = 8240\ d$

(d) $P_i = 1420\ d$

Answer: a

Question: A component is accelerated at the rate of 2 m/s^2 from the rest. The distance covered by the component in 10 sec is:

(a) 200 m

(b) 10 m

(c) 100 m

(d) 20 m

Answer: c

Question: The LMTD of a parallel flow heat exchanger unit, compared to counter flow heat exchanger , is:

(a) same

(b) high

(c) low

(d) not comparable

Answer: c

Question: The bending moment at the centre of a simply supported beam of span L and subjected to a uniformly distributed load W is:

(a) $\frac{WL^2}{4}$

(b) $\frac{W^2L}{2}$

(c) WL

(d) $\frac{WL^2}{8}$

Answer: d

Question: The perpendicular distance between the centre lines of successive rows of rivets is known as:

(a) diagonal pitch

(b) rivet pitch

(c) back pitch

(d) marginal pitch

Answer: c

Question: In the vibration isolation system, if $\frac{\omega}{\omega_n} > 1$, then the phase difference between the transmitted force and the disturbing force is :

(a) 90^0

(b) 0^0

(c) 180^0

(d) 270^0

Answer: c

Question: To regulate the mean speed of an engine against the variation of external loads, the device used is :

(a) speedometer

(b) governor

(c) brake drum

(d) flywheel

Answer: b

Question: An aluminium bar coefficient of thermal expansion $25 \times 10^{-6}/K$ and $E = 40$ GPa is fixed between the two rigid supports and is heated through 50 K. The stress developed in this bar is:

(a) 20 kPa

(b) 80 MPa

(c) 50 kPa

(d) 50 MPa

Answer: d

Question: In a composite or concentric spring, the ratio of loads shared by each spring is equal to:

(a) (ratio of solid strength)^2

(b) (ratio of wire diameter)^2

(c) (ratio of wire stiffness)^2

(d) (ratio of spring stiffness)^2

Answer: b

Question: The value of modulus of elasticity of metals under tension:

(a) decreases with the temperature

(b) increases with the temperature

(c) increases squarely with the temperature

(d) is not dependent on the temperature

Answer: d

Question: In toothed gearing, an imaginary circle that provides a pure rolling action of two gears is called:

(a) pitch circle

(b) dedendum circle

(c) clearance circle

(d) addendum circle

Answer: a

Question: In a reciprocating engine, the length of connecting rod and radius of the crank are equal. In this configuration, the ratio of maximum primary and secondary unbalanced reciprocating forces is :

(a) 1

(b) 4

(c) 2

(d) 0.5

Answer: a

Question: In Mohr's circle, the maximum shear stress occurs on a plane and is indicated with an angle 2θ. What is the value of that stress?

(a) $45^0 or\ 135^0$

(b) $90^0 or\ 270^0$

(c) $45^0 or -45^0$

(d) $0^0 or\ 180^0$

Answer: b

Question: " It is impossible for any system to operate in a way that entropy is destroyed'. This statement is from:

(a) Planck statement of the second law of thermodynamics

(b) Clarian statement of thermodynamics

(c) Entropy statement of the second law of thermodynamics

(d) Entropy statement of the third law of thermodynamics

Answer: c

Question: While stopping a vehicle moving the down the hill, the brakes must absorb:

(a) potential energy of the vehicle

(b) kinetic energy of the vehicle

(c) kinetic and potential energy of the vehicle

(d) rotational energy of wheels

Answer: c

Question: The first law of thermodynamics has a concern with the conservation of :

(a) energy

(b) pressure

(c) momentum

(d) mass

Answer: a