

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: ME352

Course Name: COMPREHENSIVE EXAM (ME)

Max. Marks: 50

Duration: 1 Hour

Instructions

- (1) Each question carries one mark. No negative marks for wrong answers*
- (2) Total number of questions: 50*
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- (4) If more than one option is chosen, it will not be considered for valuation.*
- (5) Calculators are not permitted*

- 1 The radius and height of a circular cone are measured with errors of at most 2% and 4% respectively. Find the maximum percentage error in the volume.
(a) 4% (b) 6% (c) 8% (d) 2%
- 2 If $y=x$ is a solution of $x^2y''+xy'-y=0$, then the second linearly independent solution is
(a) x^2 (b) x^{-1} (c) x^{-2} (d) x^n
- 3 What is the minimum velocity attained by a ball thrown with velocity of 20 m/s at an angle of 40° with the horizontal?
(a) 15.32 m/s (b) 12.85 m/s (c) 16.78 m/s (d) None of the above
- 4 If a body in equilibrium condition is acted by three forces at three points, then the line of action of these forces should be _____
(a) always concurrent (b) always parallel
(c) concurrent or parallel (d) none of the above
- 5 Pencils used for engineering drawing work are?
(a) 2B to HB (b) 3H to 6H (c) 4B to 6H (d) HB to 2H
- 6 The title block is made on the drawing sheet at the
(a) upper left corner (b) lower left corner (c) upper right corner (d) lower right corner
- 7 Which ISO standard corresponds to Environmental management systems?
(a) ISO 9001 (b) ISO 14001 (c) ISO 22000 (d) ISO 18001
- 8 Which *one* of the following gases is not included in the category 'greenhouse gases'?
(a) Hydrogen (b) Methane (c) Carbon dioxide (d) Nitrous oxide
- 9 Identify the design constrains of a ladder from the following.
(a) It is the selling price of the product (b) It must have good stability

- (c) It must have good look (d) The cost of ladder should not exceed Rs 500
- 10 Ergonomics of design means
(a) Efficiency of the product (b) Convenience of using the product
(c) Outlook of the product (d) Weight of the product
- 11 A solid bar of circular cross section of diameter d has a hole of diameter $d/4$ drilled laterally through the centre of the bar. The allowable average tensile stress on the net cross section of the bar is σ_{allow} . The allowable load on the net cross section of the bar is
(a) $0.27d^2 \times \sigma_{\text{allow}}$ (b) $0.54d \times \sigma_{\text{allow}}$ (c) $0.675d^2 \times \sigma_{\text{allow}}$ (d) $0.54d^2 \times \sigma_{\text{allow}}$
- 12 An element in plane stress is subjected to $\sigma_x = 3100$ kPa, $\sigma_y = 8700$ kPa and $\tau_{xy} = -4500$ kPa. The maximum shear stress is
(a) $\tau_{\text{max}} = 5300$ kPa (b) $\tau_{\text{max}} = -5300$ kPa (c) $\tau_{\text{max}} = 8300$ kPa (d) $\tau_{\text{max}} = 5800$ kPa
- 13 A material is said to be isotropic if the material property is
(a) Same in all directions and same at all points (b) Same in all directions
(c) Same in perpendicular directions (d) Same at all points
- 14 A 15 mm diameter rod is subjected to a 3.5 kN axial tensile force. An elongation of 11 mm and a decrease of 0.62 mm are observed in a 120 mm gage length. The Poisson's ratio and Modulus of rigidity of the material respectively are
(a) 0.15, 93.125 MPa (b) 0.9, 36.75 MPa (c) 0.6, 55.8 MPa (d) 0.45, 74.5 MPa
- 15 The torque that can be applied to a solid shaft of 90 mm diameter without exceeding an allowable shear stress of 75 MPa is
(a) 21.6 kN m (b) 16.3 kN m (c) 10.8 kN m (d) 5, 4 kN m
- 16 The bending moment on the section of a beam is maximum where the shear force is
(a) Zero (b) Zero or Minimum (c) Changing sign (d) Infinity
- 17 A cantilever beam of length 2 m and $MI = 7.2 \times 10^5 \text{ mm}^4$ fails when subjected to a load of 2 kN at its free end. The stress at the point of failure is
(a) 205.3 N/mm^2 (b) 196.8 N/mm^2 (c) 146.67 N/mm^2 (d) 166.67 N/mm^2
- 18 In an open system, for maximum work, the process must be entirely
(a) irreversible (b) reversible (c) adiabatic (d) none of the mentioned
- 19 In a constant volume process, internal energy change is equal to
(a) zero (b) work done (c) heat transferred (d) none of the mentioned

- 20 Efficiency of a heat engine is defined as
(a) total heat output / net work input (b) total heat input / net work output
(c) net work output / total heat input (d) net work input / total heat output
- 21 When humidity ratio of air _____ air is said to be dehumidified.
(a) decreases (b) increases
(c) remains constant (d) none of the mentioned
- 22 The work done by a closed system in a reversible process is always _____ that done in an irreversible process.
(a) less than or more than (b) equal to (c) less than (d) more than.
- 23 The value of universal gas constant is
(a) 8.5123 (b) 8.3143 (c) 8.2353 (d) none of the mentioned
- 24 The temperature on Celsius is 30°C. What is the corresponding temperature on the Fahrenheit scale?
(a) 80° F (b) 75° F (c) 86° F (d) 76° F
- 25 The materials in which atoms are arranged regularly in some directions are called
(a) Single crystal (b) Crystalline material (c) Amorphous materials (d) All of these
- 26 Brass is an example of
(a) Substitutional solid solution (b) Interstitial solid solution
(c) Intermettalic compound (d) All of the above
- 27 BCC structure is found in
(a) Zinc, magnesium, cobalt, cadmium, antimony, bismuth
(b) Gamma iron, aluminium, copper, lead, silver, nickel
(c) Alpha iron, tungsten, chromium, molybdenum
(d) None of the above
- 28 Which of the following element results in presence of free graphite in cast iron?
(a) Carbon (b) Silicon (c) Sulphur (d) Manganese
- 29 The ability of a material to absorb energy in the plastic range is called
(a) Plasticity (b) Toughness (c) Hardness (d) Yield strength
- 30 The coordination number of a FCC structure
(a) six (b) eight (c) twelve (d) four

- 31 The unit speed of the turbine runner is
(a) N/\sqrt{H} (b) N/H (c) $N/H^{3/2}$ (d) N/H^2
- 32 Motion of a liquid in a volute casing of a centrifugal pump is an example of
(a) Rotational flow (b) Radial (c) Forced spiral vortex flow (d) Spiral vortex flow
- 33 High 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
- 34 In order to avoid cavitation in centrifugal pumps
(a) The suction pressure should be high (b) The delivery pressure should be high
(c) The suction pressure should be low (d) The delivery pressure should be low
- 35 Impulse turbine is generally fitted
(a) At the level of tail race (b) Slightly below the tail race
(c) About 2.5 m above the tail race (d) Little above the tail race
- 36 Kinematic similarity is said to exist between the model and the prototype, if both of them
(a) Have identical velocities (b) Are equal in size and shape
(c) Are identical in shape, but differ only in size (d) Have identical forces
- 37 The flow ratio of Francis turbine is defined as the ratio of the
(a) Velocity of runner at inlet to the velocity of flow at inlet
(b) Velocity of flow at inlet to the theoretical jet velocity
(c) Theoretical velocity of jet to the velocity of flow at inlet
(d) None of the above
- 38 Which of the following articles cannot be made from rolling?
(a) rails (b) helmets (c) bars (d) plates
- 39 Extrusion is a process of
(a) Pushing the heated billet of metal through an orifice
(b) Producing a hole by a punch
(c) Making cup shaped parts from the sheet metal
(d) None of the above
- 40 In circular drawing process, when the depth of drawing is more than the diameter of the die, then the process is called as
(a) forced drawing (b) hollow drawing (c) deep drawing (d) all of the above
- 41 An example of fusion welding is
(a) arc welding (b) gas welding (c) thermit welding (d) None of the above
- 42 In gas welding, which flame the ratio of oxygen is deficient?
(a) Carburizing flame (b) Oxidizing flame

- (c) Neutral flame (d) none of the mentioned
- 43 What does HAZ stand for?
(a) Helium Aerated Zone (b) Heat Affected Zone
(c) Heated Area Zone (d) Heat Allowed Zone
- 44 The method of joining metal surface by introducing a non ferrous alloy with melting point above 400° C is known as
(a) Soldering (b) Brazing (c) Welding (d) none of the above
- 45 Which motion of follower is best for high speed cams?
(a) SHM follower motion
(b) Uniform acceleration and retardation of follower motion
(c) Cycloidal motion follower
(d) all of the above
- 46 Negative acceleration is termed as
(a) ceasing (b) retardation (c) inertia (d) opposite velocity
- 47 The size of a gear is usually specified by
(a) pressure angle (b) circular pitch
(c) diametral pitch (d) pitch circle diameter
- 48 Driving gear of two mating gear which is generally small is known as
(a) Rack (b) Pitch line (c) Pinion (d) Line of centre
- 49 Which of the following statements is not correct?
a) Hooke's joint is used to connect two rotating co-planar, non-intersecting shafts
b) Hooke's joint is used to connect two rotating co-planar, intersecting shafts
c) Oldham's coupling is used to connect two parallel rotating shafts
d) Hooke's joint is used in the steering mechanism for automobiles
- 50 Which type of gear box is used in automobiles?
(a) Sliding mesh gear box (b) Differential gear box
(c) Synchromesh gear box (d) All of the above

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SIXTH SEMESTER B.TECH DEGREE COMPREHENSIVE EXAMINATION, MAY 2019

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PART A- COMMON COURSES

- The slope of the surface $z = xe^{-y} + 5y$ in the x-direction at the point (4,0) is
 a) 0 b) -1 c) 1 d) 2
- The solution of $(D^2 + 1)y = 0$ is
 a) $c_1 \cos x + c_2 \sin x$ b) $c_1 e^x + c_2 e^{-x}$ c) $(c_1 + c_2 x)e^x$ d) $(c_1 + c_2 x)e^{-x}$
- A simple spring mass vibrating system has a natural frequency of N. if the spring stiffness is halved and the mass is doubled then the natural frequency will be
 a) N b) 0.5N c) 2N d) 0.25N
- The proportion of second moment of area about centroidal axis to second moment of area about base of a rectangle will be
 a) 0.3 b) 0.1 c) 0.25 d) 0.08333
- An algorithm for scheduling a set of project activities:
 a) Critical Path Method b) Crucial Practicing Method c) Centre Processing Method d) None
- The fundamental rethinking and radical redesign of the business process to achieve dramatic improvements in critical contemporary measures of performances such as cost, quality, service and speed:
 a) Recycling b) Quality engineering c) Contemporary design d) Re - engineering
- Composting is
 a) anaerobic degradation b) anaerobic treatment c) aerobic treatment d) an aerobic degradation process

process for solid
waste treatment

for sullage

for sewage

for solid waste
treatment

8. The rating system of India which is focussed on conservation and efficient energy use is
- a) GRIHA b) LEED India c) IGBC d) BEE
9. In orthographic projection, each projection view represents how many dimensions of an object?
- a) 1 b) 2 c) 3 d) 0
10. The front view, side view and top view of a cylinder standing on horizontal plane base on horizontal plane.
- a) circle, rectangle and rectangle b) rectangle, rectangle and circle c) rectangle, circle and rectangle d) circle, triangle and triangle

PART B- CORE COURSES

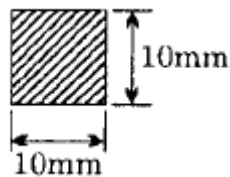
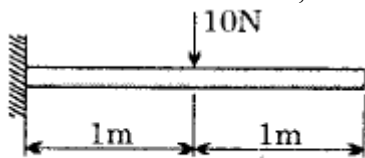
11. Attractive forces between metal ions and delocalized electrons can be weakened or overcome by
- a) hammer b) high temperature c) water d) All of above
12. Crystalline solids can be recognized by their
- a) low boiling point b) sharp melting point c) colour d) moderate melting point
13. Annealing of steel is done to impart which of the following properties to steel?
- a) Hardness b) Toughness c) Ductility d) None of the mentioned
14. Major constituent of the gun metal alloy is
- a) Copper b) Nickel c) Iron d) Zinc
15. Which ferrous material doesn't show fatigue limit?
- a) Cast iron b) Wrought iron c) Austenitic stainless steel d) Low carbon steel
16. Which of the following methods of melting is not used for melting titanium metal?
- a) Induction method b) Vacuum arc method c) Electron beam melting d) Cupola furnace melting
17. A turbine is called impulse if at the inlet of the turbine
- a) Total energy is only pressure energy b) Total energy is only kinetic energy c) Total energy is the sum of kinetic energy and pressure energy d) None of the above

18. Find the overall efficiency of a turbine if the mechanical efficiency is 80% and hydraulic efficiency is 90%
- a) 88 b) 90 c) 72 d) 30
19. In a centrifugal pump casing, the flow of water leaving the impeller is
- a) Rectilinear flow b) Radial flow c) Forced vortex flow d) Free vortex flow
20. Hydraulic accumulator is a device used for
- a) Lifting heavy weights b) Storing the energy of a fluid in the form of pressure energy c) Increasing pressure intensity of a fluid d) Transmitting power from one shaft to another shaft
21. The most efficient method of compressing air is to compress it
- a) Isothermally b) Adiabatically c) Isentropically d) Isobarically
22. The ratio of outlet whirl velocity to blade velocity in case of centrifugal compressor is called
- a) Slip factor b) Velocity factor c) Velocity coefficient d) Blade effectiveness
23. A group of resistant bodies with rigid connection preventing their relative movement is called
- a) Kinematic pair b) Link c) Rigid body d) Kinematic chain
24. Angle between normal to the pitch curve at a point and direction of motion of the follower
- a) Pressure angle b) Angle of action c) Angle of ascent d) Angle of dwell
25. Which of the following displacement programme should be chosen for better dynamic performance of a cam and follower mechanism
- a) Cycloidal b) Simple harmonic motion c) Constant velocity d) Constant acceleration and deceleration
26. The axes of the first and last gears are coaxial in
- a) Simple gear train b) Compound gear train c) Reverted gear train d) Epicyclic gear train
27. In case of a worm and worm gear maximum efficiency is equal to
- a) $\frac{1 + \sin \phi}{1 - \sin \phi}$ b) $\frac{1 - \sin \phi}{1 + \sin \phi}$ c) $\frac{1 + \sin \phi}{\sin \phi}$ d) $\frac{\sin \phi}{1 - \sin \phi}$
28. A point on the coupler is to be guided along a prescribed path in
- a) Function generation b) Motion generation c) Path generation d) Overlay method
29. Work done in a quasi-static process
- a) depends on the path followed b) independent of the path followed c) depends only on the initial and final states d) none of the mentioned
30. Which of the following is true in regard to the energy of an isolated system?
- a) $dQ \neq 0$ b) $dW \neq 0$ c) $E = \text{constant}$ d) all of the mentioned
31. Entropy is a
- a) path function, intensive property b) path function, extensive property c) point function, intensive property d) point function, extensive property

32. The slope of the fusion curve for water is
 a) negative b) positive c) zero d) none of the mentioned
33. According to the Dalton's law of partial pressures, the total pressure of a mixture of ideal gases is equal to the
 a) difference of the highest and lowest pressure b) product of the partial pressures c) sum of the partial pressures d) none of the mentioned
34. When a gas undergoes continuous throttling process by a valve and its pressure and temperature are plotted, then we get a
 a) isotherm b) isenthalpic c) adiabatic d) isobar
35. If a material had a modulus of elasticity of 2.1×10^6 kgf/cm² and a modulus of rigidity of 0.8×10^6 kgf/cm², then the approximate value of the Poisson's ratio of the material
 a) 0.26 b) 0.31 c) 0.47 d) 0.5
36. The diameter of shaft A is twice the diameter of shaft B and both are made of the same material. Assuming both the shafts to rotate at the same speed, the maximum power that can be transmitted by B is
 a) The same as that of A b) Half of A c) 1/8th of A d) 1/4th of A
37. The given figure shows the shear force diagram for the beam ABCD. Bending moment in the portion BC of the beam

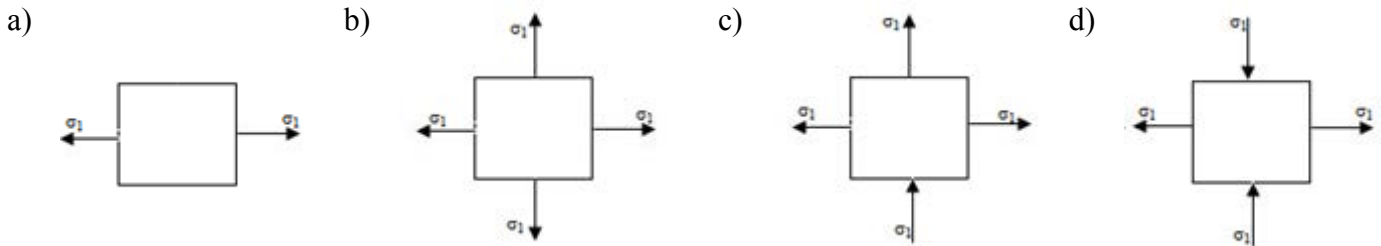


- a) Is a non-zero constant b) is zero c) Varies linearly from B to C d) Varies parabolically from B to C
38. A cantilever beam has the square cross section 10mm x 10 mm. It carries a transverse load of 10 N. Considering only the bottom fibers of the beam, the correct representation of the longitudinal variation of the bending stress is



- a) b) c) d)

39. A material element subjected to a plane state of stress such that the maximum shear stress is equal to the maximum tensile stress, would correspond to



40. If a solid shaft can resist a bending moment of 3.0 kNm and a twisting moment of 4.0 kNm together, the maximum torque that can be applied is
 a) 7.0kNm b) 3.5kNm c) 4.5kNm d) 5kNm
41. Among the three boxes used in moulding, the middle box is known as
 a) cope b) drag c) cheek d) flange
42. Which of the following articles cannot be made from rolling?
 a) rails b) plates c) bars d) helmets
43. Which of the following metal forming processes is best suitable for making the wires?
 a) Extrusion b) Drawing c) rolling d) forging
44. The following material is commonly used for making locating and clamping devices
 a) High carbon steel b) Low carbon steel c) High speed steel d) Die steel
45. What does HAZ stand for?
 a) Helium Aerated Zone b) Heat Affected Zone c) Heated Area Zone d) Heat Allowed Zone
46. The commonly used flux in brazing is
 a) Borax b) Lead sulphide c) Rosin d) Zinc chloride
47. What is the type of turbine used in Idukki hydel power project?
 a) Kaplan b) Francis c) Pelton d) None of the above
48. Insoluble impurities from solution during crystallization are removed by
 a) drying b) filtration c) heating d) cooling
49. The point on the cam with maximum pressure angle is called
 a) The pitch point b) The trace point c) Cam centre d) None of the above
50. ASTM stands for
 a) American standard for Testing Methods b) American standard for Testing and Materials c) American specification for Testing Methods d) None of the above

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMPREHENSIVE EXAMINATION(S), DECEMBER 2019

Course Code: ME352**Course name: COMPREHENSIVE EXAM**

Max. Marks: 50

Duration: 1Hour

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PART A- COMMON COURSES

1. The sum of the series $\sum_{k=0}^{\infty} \left(\frac{1}{3}\right)^k$ is
 - a) $\frac{1}{3}$
 - b) $\frac{2}{3}$
 - c) $\frac{1}{2}$
 - d) 1
2. The solution of the differential equation $y'' - 4y' + 4y = 0$ is
 - a) $y = (A + Bx)e^{2x}$
 - b) $y = (A + Bx)e^{-2x}$
 - c) $y = (A + Bx)e^x$
 - d) $y = (A + Bx)e^{-x}$
3. The resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is
 - a) 120°
 - b) 30°
 - c) 90°
 - d) 60°
4. Two bodies of masses m_1 and m_2 are dropped from the top of a tower of same height. When these bodies reach the ground, their kinetic energies will be in the ratio
 - a) 1 : 2
 - b) 1: $\sqrt{2}$
 - c) 1: 4
 - d) 1 : 1
5. The top view of a pentagonal prism with axis perpendicular to the vertical plane and parallel to horizontal plane will be a
 - a) Pentagon
 - b) Rectangle
 - c) Trapezoid
 - d) Straight line
6. In perspective projection the object is assumed to be kept on which of these planes.
 - a) Picture plane
 - b) Horizon plane
 - c) Ground plane
 - d) Central plane
7. Which is the most abundant element available in the atmosphere?
 - a) Oxygen
 - b) Nitrogen
 - c) Argon
 - d) Carbon di oxide
8. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide
 - a) Carbon Dating
 - b) Carbon Trading
 - c) Carbon Footprint
 - d) Carbon Factor

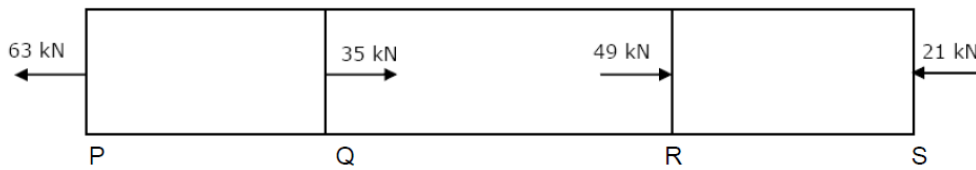
9. One of the pins in a 3 pin plug top is bigger than the rest. This is most closely related to design for 'X', where 'X' is
- a) Assembly b) Manufacturing c) Life cycle Cost d) Environment
10. Which of the following can be most appropriately associated with the design space of a ball?
- a) Speed b) Velocity c) Diameter d) Height

PART B- CORE COURSES

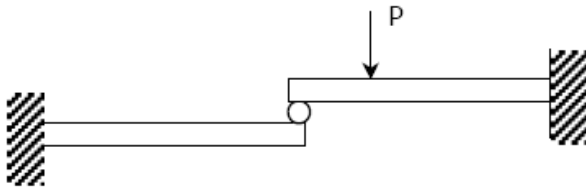
11. Match plate pattern is used in
- a) Green sand b) Bench moulding c) Machine moulding d) Pit moulding
moulding
12. External screw threads can be produced fastest by
- a) Rolling b) Milling c) Chasing d) Casting
13. Large size bolt heads are made by
- a) Swaging b) Roll forging c) Tumbling d) Upset forging
14. Number of degrees of freedom of a work piece in space is equal to
- a) 16 b) 10 c) 12 d) 14
15. What should be the appropriate thickness of the metal sheet when it is used as a raw material for the sheet metal operations?
- a) 10mm to 60mm b) 7.5mm to 15mm c) 0.4 mm to 6mm d) 60mm to 100 mm
16. TIG welding is best suited for welding
- a) Mild steel b) Stainless steel c) Aluminium d) Carbon steel
17. Impulse turbine is used for
- a) low head b) high head c) medium head d) static head
18. A hydraulic turbine power of 8000 kW while running a speed of 100 rpm, under a head of 40 m. Find the specific speed of the turbine
- a) 55 b) 88 c) 11 d) 22
19. Chances of occurrence of cavitation are high if the
- a) the pressure falls below the vapour pressure b) the temperature becomes very low c) the Thomas cavitation parameter becomes high d) pressure becomes very high
20. If two identical pumps connected in series the resulting head is
- a) 2H b) H c) 3H d) 4H
21. An ideal air compressor cycle with clearance volume on p-v diagram can be represented by the following processes
- a) One adiabatic, two isobaric and one isochoric b) Two adiabatic and two isobaric c) One adiabatic, one isobaric and two isochoric d) Two isobaric and two isochoric

22. The compressor performance at higher altitude compared to sea level will be
- a) Same b) Higher c) Lower d) Depend on other factors
23. Kinematics of machines deals with
- a) Forces acting on parts of machine b) Relative motion between parts neglecting the consideration of the force c) Number of interrelated parts d) All of the above
24. In which of the following mechanisms Corioli's component exists?
- a) Slider crank mechanism b) Scotch Yoke mechanism c) Double slider crank mechanism d) Oscillating cylinder mechanism
25. In a tangent cam and follower, base circle diameter is 60mm and follower diameter is 20mm. Cam rotates at 60° when roller just leaves contact with the flank. The lift of the follower at this moment is
- a) 40mm b) 60mm c) 80mm d) 20mm
26. Which of the following gear system have maximum axial thrust ?
- a) Spur gear b) Helical gear c) Double helical gear d) Bevel gear
27. A gear box in an automobile uses
- a) Simple gear train b) Compound gear train c) Epicyclic gear train d) Compound-epicyclic gear train
28. Dead center is that position of a mechanism in which the interior angle between coupler and follower links is
- a) 0° b) 90° c) 180° d) 270°
29. For a process in which $pV=C$, work done is
- a) zero b) $p*(V_2-V_1)$ c) $p_1*V_1*\ln(V_2/V_1)$ d) none of the above
30. An air-conditioner provides 1 kg/s of air at 15°C cooled from outside atmospheric air at 35°C . Estimate the amount of power needed to operate the air-conditioner.
- a) 1.09 kW b) 1.19 kW c) 1.29 kW d) 1.39 kW
31. Which of the following is known as the inequality of Clausius?
- a) cyclic integral of $dQ/T \leq 0$ b) cyclic integral of $dQ/T \geq 0$ c) cyclic integral of $dW/T \leq 0$ d) cyclic integral of $dW/T \geq 0$
32. Which law is used for exergy balance?
- a) first law b) second law c) first law and second law d) third law
33. When gases which are at equal pressure and temperature are mixed adiabatically without work, then

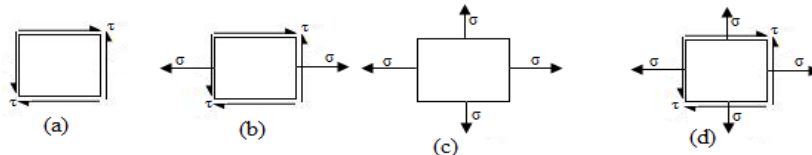
- a) internal energy of the gaseous system remains constant b) heat transfer of the gaseous system remains constant c) entropy of the gaseous system remains constant d) all of the above
34. For a system which undergoes an infinitesimal reversible process between two equilibrium states, the change in internal energy is
- a) $dU = pdV - TdS$ b) $dU = TdS + pdV$ c) $dU = TdS - pdV$ d) $dU = -TdS - pdV$
35. A bar having a cross-sectional area of 700 mm^2 is subjected to axial loads at the positions indicated. The value of stress in the segment QR is



- a) 40 MPa b) 50 MPa c) 60 MPa d) 120 MPa
36. The total area under the stress-strain curve of a mild steel specimen tested up to failure under tension is a measure of
- a) Ductility b) Ultimate strength c) Resilience d) Toughness
37. Two identical cantilever beams are supported as shown, with their free ends in contact through a rigid roller. After the load P is applied, the free ends will have



- a) Equal deflections but not equal slopes b) Equal slopes but not equal deflections c) Equal slopes as well as equal deflections d) Neither equal slopes nor equal deflections
38. On bending of a beam, which is the layer which is neither elongated nor shortened?
- a) Axis of load b) Neutral axis c) Center of gravity d) None of the above
39. For which one of the following two-dimensional states of stress will the Mohr's stress circle degenerate into a point?



- a) b) c) d)
40. If a solid shaft can resist a bending moment of 3.0 kNm and a twisting moment of 4.0 kNm together, the maximum torque that can be applied is
- a) 7.0 kNm b) 3.5 kNm c) 5.0 kNm d) 6.0 kNm

41. Which of the following casting methods utilises wax pattern ?
a) Shell moulding b) Investment casting c) Plaster moulding d) Slush casting
42. The thickness of a metallic sheet is reduced from an initial value of 16 mm to a final value 10 mm in one single pass rolling with a pair of cylindrical rollers each of diameter 400 mm. The true strain is
a) 5.936 b) 7.936 c) 8.936 d) 9.936
43. The process used to make different designs on each side of work piece is
a) embossing b) heading c) piercing d) coining
44. The 3-2-1 principle of locating is also known as
a) Fool proofing b) Six point locating principle c) datum d) Zero point location principle
45. Which of the following forming processes is suitable for making utensils and cup shaped objects?
a) Forging b) Rolling c) Deep drawing d) Wire drawing
46. The method of joining metal surface by introducing a non ferrous alloy with melting point above 400° C is known as
a) Soldering b) Brazing c) Welding d) None of the above
47. Which of the following is an extensive property?
a) Surface tension b) Heat capacity c) Refractive index d) Viscosity
48. The crystal structure of brass is
a) BCC b) FCC c) HCP d) Mixture of all of the above
49. For pumping highly viscous fluids the type of pump generally used is
a) Centrifugal b) Multistage centrifugal c) Sliding vane d) Screw pump
50. If J = number of binary joints in the kinematic chain, H = number of higher kinematic pairs, L = number of links, The equation for criterion of constraint is given by,
a) $J + \frac{H}{2} = \frac{3}{2}L - 2$ b) $J + H = \frac{3}{2}L - 1$ c) $J + H = \frac{3}{2}(L - 1)$ d) $J + H = \frac{3}{2}(L + 1)$
