

053/2016

Maximum : 100 marks

Time : 1 hour and 15 minutes

1. A steel bar 10 mm × 10 mm cross section is subjected to an axial tensile load of 20 kN. If the length of bar is 1 m and  $E = 200$  GPa, then elongation of the bar is :  
(A) 1 mm (B) 0.5 mm  
(C) 0.75 mm (D) 1.5 mm
2. The modulus of rigidity and poisson's ratio of a material are 80GPa and 0.3 respectively, Its youngs modulus will be :  
(A) 160 GPa (B) 208 GPa  
(C) 120 GPa (D) 104 GPa
3. The equivalent torque on a shaft, when it is subjected to bending moment  $M$  and torque  $T$  is :  
(A)  $M + T$  (B)  $(M^2 + T^2)^{1/2}$   
(C)  $0.5(M^2 + T^2)^{1/2}$  (D)  $0.5[M + (M^2 + T^2)^{1/2}]$
4. If the value of poisson's ratio is zero, then it means that :  
(A) the lateral strain is high  
(B) the material is perfectly plastic  
(C) there is no linear strain in the material  
(D) none of these
5. The outside diameter of a hollow shaft is twice its inside diameter. The ratio of its torque carrying capacity to that of solid shaft of same material and same outside diameter is :  
(A) 3/4 (B) 1/2  
(C) 15/16 (D) 1/16
6. Two shafts are made of the same material. The diameter of first is twice that of second. The ratio of power which can be transmitted by first shaft and second is  
(A) 1/2 (B) 1/4  
(C) 1/8 (D) 1/16
7. A solid shaft is subjected to a bending moment and twisting moment of 3 kNm and 4 kNm respectively. The equivalent bending moment is :  
(A) 4 kNm (B) 3 kNm  
(C) 3.5 kNm (D) 4.5 kNm

8. The buckling load is maximum for a column if :
- (A) one end of the column is fixed and the other end is free
  - (B) both ends of the column are hinged
  - (C) both ends of the column are fixed
  - (D) one end of the column is hinged and other end is free
9. The buckling load for a column hinged at both ends is 15 kN. If the ends are fixed, the buckling load changes to :
- (A) 60 kN
  - (B) 30 kN
  - (C) 45 kN
  - (D) 3.75 kN
10. The Euler's load for a column is 1 MN and crushing load is 1.5 MN. The Rankine load is :
- (A) 1 MN
  - (B) 0.6 MN
  - (C) 1.5 MN
  - (D) 2.5 MN
11. The shape of bending moment diagram for a uniform cantilever beam carrying uniformly distributed load over its length is
- (A) a hyperbola
  - (B) a straight line
  - (C) an ellipse
  - (D) a parabola
12. Steady flow occurs when :
- (A) velocity does not change
  - (B) pressure does not change
  - (C) conditions change gradually with time
  - (D) conditions do not change with time at any point
13. The depth of centre of pressure in rectangular lamina of 3m deep fully immersed in a liquid having one side in line with free surface is :
- (A) 1m
  - (B) 1.5m
  - (C) 2m
  - (D) 2.5m
14. The pressure in metres of oil (specific gravity 0.85) equivalent to 85 metres of water is :
- (A) 100 m
  - (B) 85 m
  - (C) 8.5 m
  - (D) none of the above
15. Pressure in Pascal at a depth of 1 m below the free surface of water will be :
- (A) 1 pa
  - (B) 9810 Pa
  - (C) 98.1 Pa
  - (D) 981 Pa

16. Rain drops are spherical because of :
- (A) viscosity (B) air resistance  
(C) surface tension (D) atmospheric pressure
17. In a multiple disc clutch, if  $n_1$  and  $n_2$  are number of discs on driving and driven shafts respectively, then number of pairs of contact surface will be :
- (A)  $n_1 + n_2 - 1$  (B)  $n_1 + n_2 + 1$   
(C)  $n_1 + n_2$  (D)  $(n_1 + n_2)/2$
18. A Flywheel of moment of inertia  $9.8 \text{ kgm}^2$  fluctuates by 30 rpm for a fluctuation in energy of 1936 joules. The mean speed of the flywheel is :
- (A) 900 rpm (B) 600 rpm  
(C) 936 rpm (D) 1200 rpm
19. The stud bolt is :
- (A) thread on both ends (B) thread on one end without head  
(C) thread on one end with head (D) none of the above
20. The product of moment of inertia and angular velocity is known as :
- (A) angular torque (B) kinetic energy  
(C) angular momentum (D) none of the above
21. In the case of flat pivot bearing the rubbing velocity is :
- (A) maximum at the centre of the contact area  
(B) zero at the centre and maximum at the outer radius  
(C) uniform throughout the contact area  
(D) zero at the outer radius
22. The frictional torque transmitted in the case of flat pivot bearing for uniform pressure is :
- (A)  $\mu WR$  (B)  $1/3 \mu WR$   
(C)  $2/3 \mu WR$  (D)  $1/2 \mu WR$
23. Which of the following is an example of friction clutch?
- (A) disc (B) cone  
(C) plate (D) all of the above
24. The module is defined as the ratio of :
- (A) number of teeth to the pitch circle diameter  
(B) pitch circle diameter to number of teeth  
(C) circumference of the pitch circle to number of teeth  
(D) none of the above

25. The product of module and diametral pitch is equal to :
- (A)  $\pi$  (B)  $\pi/2$   
 (C) 1.0 (D)  $2\pi$
26. The locus of a point on the circumference of a circle, which rolls without slipping on a fixed straight line is known as :
- (A) cycloid (B) involute  
 (C) epicycloid (D) hypocycloid
27. When the axes of the first and last wheels of a compound gear train are co axial, then the train is known as :
- (A) non reverted gear train (B) epicyclic gear train  
 (C) reverted gear train (D) none of the above
28. The follower of a cam has :
- (A) uniform acceleration and retardation (B) cycloidal motion  
 (C) simple harmonic motion (D) any one of the above
29. Which one the following is a spring loaded governor?
- (A) Proell governor (B) Porter governor  
 (C) Watt governor (D) Hartnell governor
30. If the rotating mass of a rim type flywheel is distributed on another rim type flywheel whose mean radius is half mean radius of the former, the energy stored in the latter at the same speed will be :
- (A) 4 times the first (B) same as the first  
 (C) one-fourth of the first (D) half of the first.
31. What is the tearing strength of a plate of a riveted joint whose pitch is 50 mm and rivet diameter is 20 mm? The plate thickness is 10 mm and permissible tensile stress is  $120 \text{ N/mm}^2$ ?
- (A) 36 kN (B) 24 kN  
 (C) 12 kN (D) none of the above
32. For a single v but weld joint the effective throat thickness is 10 mm and length of weld is 100 mm. If the safe stress is  $120 \text{ N/mm}^2$ , the permissible load is equal to :
- (A) 100 kN (B) 120 kN  
 (C) 60 kN (D) none of the above

33. The tendency of knocking in CI Engines is reduced by :
- (A) high self-ignition temperature of fuel
  - (B) injection of fuel just before TDC
  - (C) decrease in injection pressure
  - (D) decrease in cooling water temperature
34. Pelton wheel is used in those places where :
- (A) high head and low discharge are available
  - (B) low head and high discharge are available
  - (C) high head and high discharge are available
  - (D) none of the above
35. Francis turbine is a :
- (A) radial flow turbine
  - (B) axial flow turbine
  - (C) mixed flow turbine
  - (D) inward flow radial turbine
36. Diesel cycle consists of :
- (A) two adiabatic and two constant volume processes
  - (B) two adiabatic and two constant pressure processes
  - (C) two adiabatic, one constant volume and one constant pressure processes
  - (D) two isothermal, one constant pressure and one constant volume processes
37. One ton refrigeration is equal to :
- (A) 210 kJ/min
  - (B) 110 kJ/min
  - (C) 50kJ/min
  - (D) none of the above
38. In sensible cooling process the relative humidity :
- (A) decreases
  - (B) increases
  - (C) remains constant
  - (D) none of the above
39. In psychrometric chart, dew point temperature lines are :
- (A) horizontal
  - (B) vertical
  - (C) curved
  - (D) straight lines slopping downwards to the right
40. The basic law of heat conduction is :
- (A) Fourier's law
  - (B) Newton's law
  - (C) Stefan' law
  - (D) First law of thermodynamics

41. If a body reflects all radiations incident on it, then it is known as :  
(A) black body (B) grey body  
(C) white body (D) opaque body
42. A steel ball of mass 1 kg and specific heat 0.4 KJ/kg is at a temperature of 60° C. It is dropped into 1 kg of water at 20° C. The final steady state temperature of water is :  
(A) 23.5° C (B) 35° C  
(C) 32.5° C (D) 40° C
43. The ratio of actual mass water vapour in a unit mass of dry air to the mass of water vapour in the same mass of dry air when it is saturated at the same temperature and pressure is called :  
(A) humidity ratio (B) relative humidity  
(C) absolute humidity (D) degree of saturation
44. In psychrometric chart, specific humidity lines are :  
(A) Vertical (B) Horizontal  
(C) Inclined (D) Curved lines
45. The octane number of petrol generally available is :  
(A) 20 to 40 (B) 40 to 60  
(C) 80 to 100 (D) 100 to 120
46. The specific fuel consumption is defined as :  
(A) fuel consumption per brake power  
(B) fuel consumption per hour  
(C) fuel consumption per hour per brake power  
(D) fuel consumption per indicated power
47. For a four cylinder in line internal combustion engine, the most popular firing order is :  
(A) 1-4-3-2 (B) 1-2-3-4  
(C) 1-2-4-3 (D) 1-3-4-2
48. The brake power of an IC Engine having speed 1200 rpm with torque 15 Nm is :  
(A)  $300 \pi$  watts (B)  $450 \pi$  watts  
(C)  $150 \pi$  watts (D)  $600 \pi$  watts
49. Property of materials due to which they can be drawn into wires is called :  
(A) elasticity (B) plasticity  
(C) ductility (D) stiffness

50. Property of cast iron is :  
(A) good wear resistance (B) good casting characteristic  
(C) good machinability (D) all of these
51. Iron carbon equilibrium diagram :  
(A) indicates the phase changes occurring during heating and cooling  
(B) correlates the microstructure and properties of steel and cast iron  
(C) is made by plotting carbon percentage and temperature  
(D) all of these
52. A space lattice found in  $\alpha$  - iron is called :  
(A) body centered cubic space lattice  
(B) face centered cubic space lattice.  
(C) close packed hexagonal space lattice  
(D) none of these
53. In a unit cell of face centered cubic space lattice the total number of atoms :  
(A) 9 (B) 14  
(C) 6 (D) 24
54. Draft on pattern for casting is :  
(A) shrinkage allowance  
(B) identification number  
(C) for machining allowance  
(D) taper to facilitate its removal from mould
55. Cores are used to :  
(A) make desired recess in castings (B) strengthen moulding sand  
(C) support loose pieces (D) remove pattern easily
56. The purpose of chaplets is to :  
(A) induce directional solidification (B) compensate shrinkage  
(C) provide bending (D) support the core
57. Seam welding is a :  
(A) arc welding process (B) multi spot welding process  
(C) continuous spot welding process (D) process used for joining round bars

58. The consumable electrode is used in :  
(A) carbon arc welding (B) MIG welding  
(C) TIG welding (D) thermit welding
59. The algebraic difference between the maximum limit and basic size is called :  
(A) upper deviation (B) lower deviation  
(C) actual deviation (D) mean deviation
60. Phosphor bronze has :  
(A) high resistance to corrosion  
(B) good wearing qualities and high elasticity  
(C) valuable cold working property  
(D) all the above
61. The drawing down is a process of :  
(A) increasing the cross section of a bar  
(B) reducing the cross section of a bar  
(C) joining the two surfaces of metal under pressure after heating  
(D) bending of a bar
62. In orthogonal cutting system the :  
(A) cutting tool prepares a surface parallel to the work face  
(B) chip flows over the tool face and direction of the chip flow velocity is normal to the cutting edge  
(C) maximum chip thickness occurs at the middle  
(D) all of these
63. Continuous chips are formed during machining of :  
(A) cast iron (B) aluminium  
(C) mild steel (D) none of these
64. The surface finish is improved by the increase in :  
(A) cutting speed (B) nose radius  
(C) true rake angle (D) all of these
65. In break even analysis, total cost consists of :  
(A) fixed cost + sales revenue (B) variable cost + sales revenue  
(C) fixed cost + variable cost (D) fixed cost + variable cost + profit