

**Department of Mechanical Engineering
B.S. Abdur Rahman University**

Entrance Examination for Admission to Ph.D

**Time : 02.00 Hrs
Date : 16.06.2016**

Maximum Marks: 100

Answer all Questions

1. Hot working is done
(a) at re-crystallization temperature (b) above re-crystallization temperature
(c) below re-crystallization temperature (d) none of these

2. The transfer machines are employed when
(a) flexibility is high (b) production rate is high
(c) production rate is low (d) flexibility is low

3. Silicon when added to copper increases its
(a) machinability (b) brittleness
(c) electrical conductivity (d) hardness and strength

4. Materials exhibiting time bound behavior are called
(a) viscoelastic (b) anelastic (c) isentropic (d) resilient

5. Aspect ratio is
(a) major dimension / minor dimension (b) minimum dia. / maximum dia.
(c) maximum angle / minimum angle (d) minimum angle / maximum angle

6. During shearing failure of the key, the area under shear is
(a) length (b) width (c) both a and b (d) length and thickness

7. In hydro-static bearing the starting friction is
(a) very low (b) more (c) either more or less (d) uncertain

8. Deep groove ball bearings are used for
(a) heavy thrust load only (b) small angular displacement of shafts
(c) radial load at high speed (d) combined thrust and radial loads at high speed.

9. The bearing characteristic number in a hydrodynamic bearing depends on
(a) length, width and load (b) length, width and speed
(c) viscosity, speeds and load (d) Viscosity, speed and pressure

10. The most suitable bearing for carrying very heavy loads with slow speed is
(a) hydrodynamic bearing (b) ball bearing
(c) roller bearing (d) Hydrostatic bearing

11. A steel bar 100 mm long is subjected to a tensile stress. If the change in length of the bar is 0.05 mm. What is the value of stress if $E = 200 \text{ Gpa}$
(a) 200 Mpa (b) 100 Mpa (c) 20 Mpa (d) none of these
12. A bar of certain material is subjected to an axial load and produces tensile stress. What is the value of Poisson's ratio of the bar if the volumetric strain is zero?
(a) 0.5 (b) 0.4 (c) 0.333 (d) 0.25
13. A rectangular section of a beam is 12 cm wide and 20 cm deep. Section modulus of the beam is
(a) 800 cm^3 (b) 480 cm^3 (c) 400 cm^3 (d) 240 cm^3
14. A simply supported beam of rectangular cross section having length L carries a point load at its centre. The deflection under the load is Y. Now the depth of the beam is doubled, then the central deflection is
(a) Y (b) 0.5 Y (c) 0.25 Y (d) None of these
15. Rankine formulae is applicable for
(a) Long column (b) short column
(c) both long & short columns (d) None of these
16. Two shafts will have equal strength if
(a) diameter of both the shafts is same (b) angle of twist of both the shafts is same
(c) material for both the shafts is same (d) twisting moment of both the shafts is same
17. A string 2m long is tied to the ends of a uniform rod that weighs 60 N and is 1.6m long. The string passes over a nail so that the rod hangs vertically. The tension in the string will be
(a) 24 N (b) 30 N (c) 42 N (d) 50 N
18. Two cars are moving in the same direction with a speed of 45 km/hr and a distance of 10 km separates them. If a car coming from the opposite direction meets these two cars at an interval of 6 minutes, its speed would be
(a) 45 km/hr (b) 55 km/hr (c) 65 km/hr (d) 75 km/hr
19. A particle starts with a velocity 2 m/sec and moves on a straight line track with retardation of 0.1 m/sec^2 . The time at which the particle is 15 m from the starting point would be
a. 10 sec (b) 20 sec (c) 50 sec (d) 40 sec
20. A person on a moving elevator feels 20% heavier than when at rest. The elevator is accelerating upward at
(a) 2 m/s^2 (b) 12 m/s^2 (c) 4 m/s^2 (d) 6 m/s^2

21. A cube strikes a billiard ball, exerting an average force of 50 N over a time of 10 milliseconds. If the ball has mass of 0.2 kg, its speed after the impact will be
 (a) 0.5 m/s (b) 1.5 m/s (c) 2.5 m/s (d) 5.0 m/s

22. For perfectly elastic bodies, the value of coefficient of restitution is
 (a) 1 (b) 0.5 to 1 (c) 0 to 0.5 (d) zero

23. If the distance between CG of masses m_1 and m_2 is l , then the distance of CG of the composite system from m_1 will be

- (a) $\frac{ml}{m_1 + m_2}$ (b) $\frac{m_2 l}{m_1 + m_2}$ (c) $\frac{(m_1 - m_2)l}{m_1 + m_2}$ (d) $\frac{m_1}{(m_1 + m_2)l}$

24. A block resting on an inclined plane begins to slide down the plane when angle of inclination is gradually increased at 30° . Then the coefficient of friction between the block and the plane is
 (a) 0.38 (b) 0.578 (c) 0.72 (d) 0.866

25. A stone of mass 1 kg is tied to a string of 1 m length and whirled in a horizontal circle at a constant angular speed of 5 rad/sec. The tension (in Newtons) in the string will be
 (a) 5 (b) 10 (c) 25 (d) zero

26. Two bodies of mass M and m are moving in concentric orbits if radii R and r such that their periods are same. The ratio between their angular velocity is

- (a) $R:r$ (b) $mR : Mr$ (c) 1:1 (d) $\frac{\sqrt{R}}{r} : \frac{m}{M}$

27. With the increase in pressure

- (a) Boiling point of water increases and enthalpy of evaporation increases
 (b) Boiling point of water increases and enthalpy of evaporation decreases
 (c) Boiling point of water decreases and enthalpy of evaporation increases
 (d) None of these

28. Every substance in the universe radiates

- (a) at all temperature above 0 K (b) at all temperature above 0°C
 (c) only above room temp. (d) depending on environment temp.

29. The temperature inside a furnace is measured by

- (a) gas thermometer (b) optical pyrometer
 (c) mercury thermometer (d) none of these

30. A black body is one which

- (a) is black in colour (b) absorbs all incident radiations
 (c) reflects all incident radiations (d) absorbs most of the incident radiations

31. Load factor of a power plant is the ratio of
 (a) peak load to average load (b) peak load to minimum load
 (c) average load to peak load (d) average load to minimum load
32. For a steam condenser the best mode of operation is
 (a) Parallel flow (b) counter flow
 (c) cross flow (d) independent of direction of flow
33. The so called radiator of an automobile is a heat exchanger of
 (a) parallel flow type (b) counter flow type
 (c) cross flow type (d) open type
34. Cross flow heat exchangers are normally used for transfer of heat between
 (a) condensing fluid and liquid (b) evaporating fluid and liquid
 (c) liquid and liquid (d) liquid and gas (or) gas and gas
35. The widely used refrigerant in domestic refrigerator is
 (a) carbon dioxide (b) ammonia (c) Freon-12 (d) sulphur dioxide
36. The DDA algorithm is used to plot
 (a) point (b) line (c) surface (d) solid
37. A critical path has
 (a) zero slack (b) maximum slack (c) minimum slack (d) infinite slack
38. ABC Analysis is generally used in
 (a) CPM (b) PERT (c) inventory control (d) all of the above
39. CST is
 (a) constant strain triangle (b) continuous stress theorem
 (c) compact simulation technique (d) complete simulation testing
40. Numerical methods are useful for
 (a) developing algorithms for solving equations
 (b) for arriving at exact solutions to equations
 (c) for solving only simple equations
 (d) all the above
41. One of the physical meanings of eigen values of a 3 X 3 matrix is
 (a) the degrees of freedom of the system
 (b) the principle stresses of the system if the matrix represents the stress tensor
 (c) the shear stresses acting on the stress element
 (d) the direction cosines of the principle planes

42. A bicycle remains stable in running through a bend because of
 (a) Gyroscopic action (b) Coriolis' acceleration
 (c) Centrifugal action (d) Radius of curved path

43. The gear train usually employed in clocks is a

- (a) Reverted gear train (b) Simple gear train
 (c) Sun and planet gear train (d) Differential gear

44. Which of the following are inversions of a double slider crank chain?

- (1) Whitworth return motion 2. Scotch yoke 3. Oldham's coupling
 4. Rotary engine. Select the correct answer using the codes given below:
 (a) 1 and 2 (b) 1, 3 and 4 (c) 2 and 3 (d) 2, 3 and 4

45. The equation $m \frac{d^2x}{dt^2} + C \frac{dx}{dt} + Kx = 0$, represents

- (a) Free vibrations (b) Forced vibrations
 (c) Periodically forced vibrations (d) Free vibrations with viscous damping

46. Critical damping is a function of

- (a) Mass and stiffness (b) mass and damping coefficient
 (c) Stiffness and natural frequency (d) natural frequency and damping coefficient

47. When $\frac{\omega}{\omega_n} < \sqrt{2}$, then the transmissibility will be

- (a) > 1 (b) < 1 (c) $= 1$ (d) None of these

48. Whirling speed of a shaft coincides with the natural frequency of the

- (a) Longitudinal vibrations (b) Transverse vibration (c)
 Torsional vibration d. Coupled between torsional vibrations.

49. The equation for a motion for a damped viscous vibration is $3 \frac{d^2x}{dt^2} + 9 \frac{dx}{dt} + 27x = 0$, the damping factor will be

- (a) 0.25 (b) 0.5 (c) 0.75 (d) 1.00

50. A truck weighing 150 kN and travelling at 2 m/s impacts with a buffer spring which compresses 1.25 cm per 10 kN. The maximum compression of the spring will be

- (a) 26.6 cm (b) 27.6 cm (c) 28.6 cm (d) 30.6 cm

51. A simple spring – mass vibrating system has a natural frequency of N. If the spring stiffness is halved and mass is doubled, then the natural frequency will become

- (a) $N/2$ (b) $2N$ (c) $4N$ (d) $8N$

52. A mass of 1 kg is attached to the end of spring with stiffness 0.7 N/mm. The critical damping coefficient of this system is

- (a) 1.4 N.s/m (b) 18.522 Ns/m (c) 52.92 Ns/m (d) 529.2 Ns/m

53. -----gears will connect the shafts with their axes parallel

- (a) spur gear (b) helical (c) bevel (e) worm gear

54. For lightly damped heavy rotor systems, resonance occurs when the forcing ω is equal to

- (a) $2\omega_{cr}$ (b) $\sqrt{2}\omega_{cr}$ (c) ω_{cr} (d) $\frac{1}{2}\omega_{cr}$

55.. In a single degree of freedom vibration system, the undamped natural frequency is the damped natural frequency.

- (a) greater than (b) Equal to (c) less than (d) uncertain

56. Rankine's theory of failure is applicable for which of the following type of materials?

- (a) Brittle (b) Ductile (c) Elastic (d) Plastic

57. Stress concentration in static loading is more serious in

- (a) Ductile materials (b) brittle materials (c) equally serious in both cases (d) depends on other factors

58. To resist breaking of the plate in front of the rivet, we make the distance from the centre of the rivet to the edge of the plate at least

- (a) 1.5d (b) 2.5d (c) 2d (d) 3d

59. A stud bolts is

- (a) threaded on both ends (b) threaded on one end only
(c) screwed into a tapped hole (d) none of the above

60. Heat pipe is widely used now a days because it acts as

- (a) an insulator (b) conductor or insulator (c) a superconductor (d) a fin

61. Heat transfer takes place according to

- (a) zeroth law of thermodynamics (b) First law of thermodynamics
(c) Second law of thermodynamics (d) Third law of thermodynamics

62. Heat is mainly transferred by conduction, convection and radiation in

- (a) insulated pipes carrying hot water (b) refrigerator freezer oil
(c) Boiler furnace (d) Condensation of steam in condenser

63. For a given heat flow and for the same thickness, the temperature drop across the material will be maximum for

- (a) copper (b) Steel (c) glass-wool (d) refractory brick

64. What happens when the thickness of insulation on a pipe exceeds the critical value?
 (a) heat transfer rate increases (b) heat transfer rate decreases
 (c) Heat transfer rate remains constant (d) None of these
65. Transfer of heat by molecular collision is known as
 (a) conduction (b) convection (c) radiation (d) all of the above
66. Assumptions made in the Fourier's law is that the heat flow
 (a) is in steady state (b) through the solid in one dimensional
 (c) both a and b (d) None of the above
67. Highest thermal conductivity is of
 (a) solid ice (b) melting ice (c) water (d) steam
68. 1 micron is equal to
 (a) 10^{-4} meters (b) 10^{-6} meters (c) 10^{-8} meters (d) 10^{-12} meters
69. Temperatures near absolute zero are obtained using
 (a) Peltier effect (b) Thermionic emission (c) Azetropes (d) Magnetic cooling
70. Temperature of a sun can be measures using a
 (a) mercury thermometer (b) standard thermometer (c) Radiation pyrometer
 (d) none of these
71. _____ gear is used to convert motion at right angles.
 (a) spur (b) helical (c) bevel (d) worm gear
72. Laminated spring also called as _____ springs.
 (a) open coil (b) close coil (c) leaf (d) helical
73. Turning is done to reduce the _____
 (a) diameter (b) length (c) both (d) none of these
74. $\pi dN/1000$ is used to calculate
 (a) feed (b) power (c) velocity (d) none of the above
75. Welding is used to join _____ metal.
 (a) dissimilar (b) similar (c) both (d) none of the above
76. Entropy change depends on _____.
 (a) Heat transfer (b) temp change (c) mass transfer (d) state
77. Second law of thermodynamics defines
 (a) Enthalpy (b) entropy (c) temp (d) work

78. Unit of entropy.
 (a) KJ/K (b)K/KJ (c)J (d)N/mm²
79. Kelvin plank statement explain
 (a) First law (b)second law (c)Third law (d)None
80. Atmospheric pressure is equal to _____
 (a) 1.013bar (b) 101.3kN/mm² (c)760mm of Hg (d)All
81. RTD is _____ type of transducer.
 (a) active (b)passive (c)both (d)none
82. The principle behind the thermocouple is_____ effect.
 (a)seeback (b)paltier (c)pyroelectric (d)hall
83. Position and displacement may be sense by_____
 (a)LVDT (b)RTD (c)LDR (d)Thermister
84. Which temp trasducer having negative temp coefficient?
 (a) Thermister (b)Thermocouple (c)AD590 (d)RTD
85. Servo mechanism is a----- type of control system?
 (a)open loop (b)close loop (c)feed back (d)All
86. The force of resistance offered by a body against the deformation is called_____
 (a)stress (b)strain (c)resistance (d)resilience
87. The ratio of change in length and original length is called as _____
 (a)stress (b)strain (c)resistance (d)resilience
88. The plane in which no tangential stress occurs is called as____plane.
 (a)normal (b)tangential (c)principal (d)None
89. If a beam is fixed at both ends, it is called as_____ beam.
 (a)built-in beam (b)simply supported (c)over hanging (d)cantilever
90. Energy supplied by the falling load is equal to_____ energy stored.
 (a)stress (b)kinetic (c)potential (d)momentum
91. Fludity us greatly influenced by
 (a) melting temperature (b) tapping temperature
 (c) pouring temperature (d) solidification temperature
92. Parts of circular cross section which are symmetrical about the axis of the rotation are made by

(a) hot spinning (b) hot forging (c) hot extrusion (d) hot piercing

93. Process used for making seamless tube is

(a) extrusion (b) piercing (c) forging (d) casting

94. Process of shaping thin metal sheets by processing them against a form is called

(a) spinning (b) upsetting (c) drawing down (d) reaming

95. Metals like lead and tin are hot worked at temperature around

(a) 500 - 600°C (b) 200 - 300 °C (c) about 100 °C (d) room

temperature

96. A polished and etched surface of the cross section of a hot worked product will be having

(a) fibre like structure (b) grain field like structure
(c) carbon precipitated at boundaries (d) carbon in the form of flakes

97. Which of the following is the gear finishing operation?

(a) hobbing (b) shaping (c) milling (d) shaving or burnishing

98. Drawing process does not belong to the group of

(a) deep drawing (b) stamping (c) pressing (d) shallow drawing

99. Swaging is opposite of

(a) forging (b) extrusion (c) piercing (d) none of the above

100. In single V-butt welds, the angle between edges is kept about

(a) 40 to 50 ° (b) 50 to 60 ° (c) 60 to 70 ° (d) 70 to 80 °

***** All the best*****