



ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ

PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90

Time: 90 Mins.

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- Fill all the information in various columns, in capital letters, with blue/black ball point pen.
- Use of calculators is not allowed.
- All questions are compulsory. No negative marking for wrong answers.
- Each question has only one right answer.
- Questions attempted with two or more options/answers will not be evaluated.

Stream (Engg./Arch./Pharm./Mgmt./App.Sci./Life Sci.)

ENGINEERING

Discipline / Branch

MECHANICAL ENGINEERING

Name

Father's Name

Roll No.

Date: **19-11-2011**

Signature of Candidate

Signature of Invigilator

Q. 1 If a bar of length, l , cross-sectional area, A , weighing, W is fixed vertically at its upper end, its elongation is equal to

- (a) $\frac{Wl}{2AE}$
- (b) $\frac{Wl}{AE}$
- (c) $\frac{2AE}{2Wl}$
- (d) $\frac{AE}{Wl}$

Q. 2 An open ended thin cylinder shell, subjected to uniform internal pressure will be subjected to

- (a) Hoop stress only
- (b) Longitudinal stress only
- (c) Both hoop and Longitudinal stress
- (d) None of the above

Q. 3 In a cantilever, the bending moment is maximum at the

- (a) Free end
- (b) Mid span
- (c) Fixed end
- (d) None of the above

Q. 4 if w is the uniformly distributed load per unit length on a cantilever, the maximum bending moment on the cantilever of length l is equal to

- (a) Wl
- (b) $\frac{Wl}{2}$
- (c) $\frac{W^2l}{2}$

(d) $\frac{Wl^2}{2}$

Q. 5 A shaft is subjected to torsion when

- (a) Torque is applied at its one end
- (b) Equal torques are applied at its two ends
- (c) Equal and opposite torques applied at its two ends
- (d) None of the above

Q. 6 which one of the following welding processes uses non consumable electrode

- (a) Gas metal arc welding
- (b) Submerged arc welding
- (c) Gas Tungsten arc welding
- (d) Flux coated arc welding

Q. 7 Streamlines, pathlines and streaklines are virtually identical for

- (a) Uniform flow
- (b) Flow for ideal fluids
- (c) Steady flow
- (d) Non uniform flow

Q. 8 The bending stress at the neutral axis is

- (a) Tensile
- (b) Compressive
- (c) Shear
- (d) Zero

Q. 9 In involute gears, the pressure angle

- (a) Dependent on the size of teeth
- (b) Dependent on the size of gears

- (c) Always constant
- (d) Always variable

- (c) Pig Iron
- (d) Steel

Q. 10 A link must be a

- (a) Rigid body
- (b) Resistant body
- (c) Rigid as well as resistant body
- (d) None of the above

Q. 17 Carbon steel is

- (a) Extremely hard
- (b) Refined form of cast iron
- (c) Made by adding carbon in steel
- (d) An alloy of iron and carbon

Q. 11 In a slider crank chain, the number of possible inversions are

- (a) Three
- (b) Four
- (c) Five
- (d) Six

Q. 18 Eutectic reaction for iron- carbon system occurs at

- (a) 600 °C
- (b) 723 °C
- (c) 1147 °C
- (d) 1490 °C

Q. 12 The gears having teeth parallel to the axis of the shaft are known as

- (a) Bevel gears
- (b) Helical gears
- (c) Worm and worm wheels
- (d) Spur gears

Q. 19 The crystal structure of α iron is

- (a) Simple Cubic
- (b) Face centered cubic
- (c) Body centered cubic
- (d) Close packed hexagonal

Q. 13 The mean kinetic energy of a flywheel is equal to

- (a) $I\omega^2$
- (b) $\frac{I\omega^2}{2g}$
- (c) $\frac{I\omega^2}{2}$
- (d) $\frac{I\omega^2}{4}$

Q. 20 To show the internal parts of machine components, the section lines are drawn at angle of

- (a) 45°
- (b) 0°
- (c) 60°
- (d) 90°

Q. 14 Annealing improves

- (a) Grain size
- (b) Mechanical properties
- (c) Electrical properties
- (d) All of above

Q. 21 In which quadrant, the point lies in-front of V.P. and above H.P.

- (a) Second
- (b) Forth
- (c) Third
- (d) First

Q. 15 The product from blast furnace is called

- (a) Cast Iron
- (b) Wrought Iron
- (c) Pig Iron
- (d) Steel

Q. 22 If T_1 and T_2 be the highest and lowest absolute temperatures encountered in a heat pump operating on the reversed Carnot cycle, then COP is equal to

- (a) $\frac{T_1 - T_2}{T_1}$
- (b) $\frac{T_1 - T_2}{T_2}$
- (c) $\frac{T_2}{T_1 - T_2}$
- (d) $\frac{T_1}{T_1 - T_2}$

Q. 16 Which is closest to the purest form of the iron

- (a) Cast Iron
- (b) Wrought Iron

Q. 23 The compression ratio for practically diesel engine lies usually in the range of

- (a) 3-5
- (b) 6-8

(c) 10-15

(d) 16-22

Q. 24 A four stroke petrol engine theoretically operates on

(a) Otto cycle

(b) Brayton cycle

(c) Joule cycle

(d) Bell Coleman cycle

Q. 25 The propulsive efficiency of the jet engine is the ratio of the

(a) Propulsive power to the thrust power

(b) Thrust power to the propulsive power

(c) Propulsive power to the heat supplied

(d) Thrust power to the heat supplied

Q. 26 The efficiency of the combustion chamber of an open cycle gas turbine is in the range of

(a) 30-40%

(b) 40-60%

(c) 60-90%

(d) 95-99%

Q. 27 BHP of an engine is determined by a formula

(a) $\frac{2\pi NT}{4500}$

(b) $\frac{4\pi NT}{4500}$

(c) $\frac{\pi NT}{4500}$

(d) $\frac{2\pi RNT}{4500}$

Q. 28 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

Q. 29 In a machining operation, doubling the cutting speed reduces the tool life to 1/8 of the original value. The exponent n in Taylor

(a) 1/8

(b) 1/4

(c) 1/3

(d) 1/2

Q. 30 The operation of cutting a cylindrical hole in a sheet of metal by the punch and the die is called

(a) Shearing

(b) Piercing

(c) Punching

(d) Blanking

Q. 31 As the shear angle increases, the plastic deformation of chip

(a) Increases

(b) Decreases

(c) Remains same

(d) None of the above

Q. 32 Cutting forces at the cutting tool can be measured by

(a) A dynamometer

(b) A viscosity meter

(c) A sine bar

(d) A combination set

Q. 33 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

Q. 34 Which of the following statements are FALSE about the buoyancy of an object?

(a) The force of buoyancy on a ship is equal to the weight of the water displaced by the ship and its cargo.

(b) Buoyancy explains why it is easier to lift an object in water than it is in air.

(c) An object only has buoyancy in air.

(d) An object only has buoyancy in liquids.

Q. 35 An unknown piece of metal weighing 2 kg's is found to have a volume of 0.15 cubic meters. Its density is

(a) 0.30 kg/m³

(b) 17.4 kg/m³

(c) 13.3 kg/m³

(d) 18.6 kg/m³

(d) (Kf +1) (Kt +1)

Q. 36 Cavitations in centrifugal pumps can be reduced by

- (a) Reducing the discharge
- (b) Reducing the suction head
- (c) Throttling the discharge
- (d) Increasing the flow velocity

Q. 42 The type of threads used to transmit power in one direction only is

- (a) Acme
- (b) Trapezoidal
- (c) Buttress
- (d) V thread

Q. 37 The Weber number in dimensionless system is expressed as

- (a) $\frac{V}{\sqrt{\sigma / \rho L}}$
- (b) $\frac{V}{\sigma \sqrt{\rho L}}$
- (c) $\frac{\sigma V}{\sqrt{\rho L}}$
- (d) $\frac{\sqrt{\sigma / \rho L}}{V}$

Q. 43 The number of arms in the pulley should not be less than

- (a) 2
- (b) 3
- (c) 4
- (d) 6

Where σ is surface tension per unit length.

Q. 44 For general industrial machinery, the value of ' l/d ' ratio of bearing lies between

- (a) 1 and 2
- (b) 2 and 3
- (c) 0.5 and 0.8
- (d) 0.8 and 1.0

Q. 38 The Darcy equation is expressed as

- (a) $h_f = \frac{fl}{d} \cdot \frac{v^2}{2g}$
- (b) $h_f = \frac{4fl}{d} \cdot \frac{v^2}{2g}$
- (c) $h_f = \frac{4fl}{d} \cdot \frac{3v^2}{2g}$
- (d) $h_f = \frac{fl}{d} \cdot \frac{v}{2g}$

Where ' l ' is length and ' d ' is diameter.

Q. 39 Which one is an impulse turbine

- (a) Kaplan turbine
- (b) Francis turbine
- (c) Pelton wheel
- (d) Fourneyron

Q. 45 The heat is absorbed by

- (a) Condenser
- (b) Evaporator
- (c) Compressor
- (d) Thermostat

Q. 40 According to distortion-energy criterion, yielding occurs when

- (a) Distortion energy reaches a critical value
- (b) Second invariant of the stress deviator exceeded some critical value
- (c) Octahedral shear stress reaches a critical value
- (d) All of the above

Q. 46 The Stefan Boltzman law states that

- (a) $E \propto T$
- (b) $E \propto T^2$
- (c) $E \propto T^3$
- (d) $E \propto T^4$

Q. 41 In terms of theoretical stress concentration factor (Kt) and fatigue stress concentration factor (Kf), the notch sensitivity 'q' is expressed as

- (a) (Kf -1) (Kt -1)
- (b) (Kf -1) (Kt +1)
- (c) (Kt -1) (Kf -1)

Q. 47 The fins on the condenser tubes will be useful, if the Biot number is

- (a) Less than one
- (b) Equal to one
- (c) More than one
- (d) None of the above

Q. 48 The body which absorbs all radiations incident upon it, is called as

- (a) Black body
- (b) White body
- (c) Opaque body

(d) Transparent body

(c) After every 100cycles

(d) After every 60cycles

Q. 49 If the body is at thermal equilibrium, then the

(a) Emissivity = absorptivity

(b) Emissivity > absorptivity

(c) Emissivity < absorptivity

(d) None of the above

Q. 57 In PERT analysis a critical activity has

(a) Maximum Float

(b) Zero Float

(c) Maximum cost

(d) Minimum cost

Q. 50 The chart showing relationship between man time and machine time is known as

(a) Multiple activity chart

(b) Flow process chart

(c) Process chart

(d) All of the above

Q. 58 Which of the following refrigerant has lowest freezing temperature

(a) Carbon dioxide

(b) Ammonia

(c) Freon-12

(d) Freon-22

Q. 51 The formula used to find out the target quantity to have desired profit is

(a) Fixed cost - target profit

(b) Fixed cost + target profit

(c) (Fixed cost + target profit)/Contribution per unit

(d) (Fixed cost + variable cost)/ target profit

Q. 59 The working fluid in Bell Coleman cycle is

(a) Freon-12

(b) Carbon dioxide

(c) Ammonia

(d) Air

Q. 52 Work study includes

(a) Method study

(b) Motion study

(c) Time study

(d) All of the above

Q. 60 In a vapour compression system, the compression of refrigerant follows the law

(a) $PV^{\gamma} = C$

(b) $PV = C$

(c) $PV^n = C$

(d) None of the above

Q. 53 At break even point

(a) Fixed costs are recovered

(b) Variable costs are recovered

(c) Total costs are recovered

(d) Some costs are recovered

Q. 61 The dry bulb temperature lines of psychrometric chart are

(a) Vertical

(b) Horizontal

(c) Inclined

(d) Curved

Q. 54 Cost reduction

(a) is carried out by top management

(b) is carried out by workers

(c) involves slightly lower quality of the product

(d) starts with product design

Q. 62 The dehumidification of air will change its

(a) Dry bulb temperature

(b) Wet bulb temperature

(c) Humidity ratio

(d) All of the above

Q. 55 Productivity is expressed as

(a) Output/input

(b) Growth/capital employed

(c) Gross income/Gross expenditure

(d) All of the above

Q. 63 The limiting frictional force is

(a) Equal to the applied force

(b) More than that of the applied force

(c) Less than that of the applied force

(d) Unpredictable

Q. 56 The amplitude of a body under damped vibrations changes

(a) During every cycle

(b) After every 50 cycles

Q. 64 The time period of a simple pendulum is given by the relation

(a) $T = 2\pi\sqrt{\frac{l}{g}}$

(b) $T = \pi\sqrt{\frac{l}{g}}$

(c) $T = 2\pi\sqrt{\frac{g}{l}}$

(d) $T = \frac{\pi}{2}\sqrt{\frac{l}{g}}$

Q. 65 In SI system, the unit of momentum is

- (a) Kg/cm²
- (b) Kg m/sec²
- (c) Kg m/sec
- (d) Kg. force

Q. 66 The efficiency of an ideal machine is

- (a) *Mechanical Advantage* × *Velocity Ratio*
- (b) $\frac{\text{Mechanical Advantage}}{\text{Velocity Ratio}}$
- (c) $\frac{\text{Velocity Ratio}}{\text{Mechanical Advantage}}$
- (d) $1 + \frac{\text{Mechanical Advantage}}{\text{Velocity Ratio}}$

Q. 67 The equivalent length of a column with both ends fixed is equal to

- (a) L
- (b) L/2
- (c) 2L
- (d) $\frac{L}{\sqrt{2}}$

Q. 68 The measurement of the speed of the rotating shaft by means of an electric tachometer is a

- (a) Direct measurement
- (b) Non contact type measurement
- (c) Secondary measurement
- (d) Tertiary measurement

Q. 69 The LVDT is an inductive transducer which functions based on the principle of

- (a) Change in the air gap
- (b) Change in the amount of core material
- (c) Variation in the position of core
- (d) Movement of the coil within the field of permanent magnet.

Q. 70 The operation of a moving coil recording instrument is based on

- (a) Photo-electric principle
- (b) D' Arsonval principle
- (c) Piezo-electric principle
- (d) Thermo-electric principle

Q. 71 Thermocouples are generally used for temperature measurements upto

- (a) 500 °C

(b) 1000 °C

(c) 1500 °C

(d) 2000 °C

Q. 72 Which instrument is used for surface roughness measurement

- (a) Clinometer
- (b) Auto-collimeter
- (c) Optical square
- (d) Profilometer

Q. 73 In a spring mass system, the mass of the system is made half and the spring stiffness is doubled. The natural frequency of longitudinal vibrations

- (a) is halved
- (b) is doubled
- (c) is quadrupled
- (d) remains unaffected

Q. 74 In a forced vibration with viscous damping, maximum amplitude occurs when forced frequency is

- (a) Equal to natural frequency
- (b) Slightly less than natural frequency
- (c) Slightly greater than natural frequency
- (d) Zero

Q. 75 A shaft is rotating at a speed less than the critical speed. The phase difference between displacement and centrifugal force would be

- (a) 0°
- (b) 45°
- (c) 90°
- (d) 180°

Q. 76 The radiator tubes are manufactured from

- (a) Cast iron
- (b) Aluminum
- (c) Brass
- (d) Steel

Q. 77 Which of the following is not the effect of detonation

- (a) High operating temperature
- (b) Loss in efficiency and power output
- (c) Loud and pulsating noise

(d) High local stresses

Q. 78 The brake shoes are curved to conform to the inner diameter of the

- (a) Tyre
- (b) Wheel
- (c) Pedal
- (d) Brake drum

Q. 79 The material used for the piston of the modern cars is

- (a) Brass
- (b) Cast Iron
- (c) Aluminum
- (d) Steel

Q. 80 IHP minus FHP is equal to

- (a) BHP
- (b) SAF HP
- (c) m.e.f
- (d) None of the above

Q. 81 The meaning of 'Payoffs' in Game Theory is

- (a) Outcome of a game when different alternatives are adopted by players
- (b) No. of players involved in a game
- (c) Value of a game
- (d) Strategies used by players

Q. 82 The North West Corner rule

- (a) is used to find an initial feasible solution
- (b) is used to find an optimal solution
- (c) is based on the concept of minimizing opportunity cost
- (d) none of the above

Q. 83 The poisson's ratio for most of the material is close to

- (a) 0.5
- (b) 0.33
- (c) 0.25
- (d) 0.2

Q. 84 Which one of the following is a spring controlled centrifugal governor

- (a) Pickering governor
- (b) Porter governor
- (c) Proell governor

(d) Watt governor

Q. 85 Steel can be hardened quickly by the process of

- (a) Induction hardening
- (b) Nitriding
- (c) Cyaniding
- (d) Carburizing

Q. 86 The thickness of the washer is usually taken as

- (a) 0.1d
- (b) 0.15d
- (c) 0.25d
- (d) 0.4d

Q. 87 The clearance angle is provided on the tools with a view to

- (a) Strengthen the tool
- (b) Shear off the metal
- (c) Facilitate easy flow of chips
- (d) Prevent the tool from rubbing on workpiece

Q. 88 On a lathe machine, the spindle speed is lowest during

- (a) Taper turning
- (b) Threading
- (c) Parting off
- (d) Knurling

Q. 89 The stream function for a two dimensional flow is given by

$\psi = 2xy + \text{constant}$, The flow between stream lines at (1, 1) and (2, 2) would be

- (a) 3 units
- (b) 5 units
- (c) 6 units
- (d) 10 units

Q. 90 In a impulse turbine, the blade friction reduces the relative velocity of steam on passing over the blades by about

- (a) 5-8%
- (b) 10-15%
- (c) 15-20%
- (d) 20-30%