

Rajasthan Public Service Commission - 2016

Paper : Inspector-of-Factories-and-Boiler-2015

Ques # :1

heat transferred to a closed stationary system constant volume is equal to

- 1) work transfer
 - 2) increase in internal energy
 - 3) increase in enthalpy
 - 4) increase in gibbs function
-

Ques # :2

there is no stream drum in

- 1) la mount boiler
 - 2) loffler boiler
 - 3) benson boiler
 - 4) velox boiler
-

Ques # :3

a condenser of a refrigeration system rejects heat at a rate of 120 kw while compressor consumes power of 30 kw. the co-efficient of performance of the system would be

- 1) $1/4$
 - 2) 4
 - 3) $1/3$
 - 4) 3
-

Ques # :4

if the depth of a rectangular beam is halved, the deflection for a beam carrying a mid point load shall be

- 1) halved
 - 2) doubled
 - 3) four times
 - 4) eight times
-

Ques # :5

stress concentration occurs when

- 1) a body is subjected to excessive stress
 - 2) a body is subjected to unidirectional stress
 - 3) a body is subjected to fluctuating stress
 - 4) a body is subjected to non-uniform stress distribution
-

Ques # :6

for a four-bar linkage in toggle position, the value of mechanical advantage is

- 1) 0.0
 - 2) 0.5
 - 3) 1.0
 - 4) ∞
-

Ques # :7

Match the following metal forming processes with their associated stresses in the work piece

Metal forming process

(i) Coining

(ii) Wire Drawing

(iii) Blanking

(iv) Deep Drawing

Types of stress

P. Tensile

Q. Shear

R. Tensile and Compressive

S. Compressive

- 1) (i) - s , (ii) - p , (iii) - q , (iv) - r
 - 2) (i) - p , (ii) - q , (iii) - s , (iv) - r
 - 3) (i) - s , (ii) - p , (iii) - r , (iv) - q
 - 4) (i) - p , (ii) - r , (iii) - q , (iv) - s
-

Ques # :8

a streamline and an equipotential line in a flow field

- 1) are parallel to each other
 - 2) are perpendicular to each other
 - 3) intersect at an acute angle
 - 4) are identical
-

Ques # :9

the efficiency of a reversible cycle depends upon the

- 1) nature of the working substance
 - 2) amount of the working substance
 - 3) temperature of the two reservoirs between which the cycle operates
 - 4) type of cycle followed
-

Ques # :10

in high pressure natural circulation boilers, the flue gases flow through the following boiler accessories (a) superheater (b) air heater (c) economiser (d) i.d. fan the correct sequence of the flow of the gases through these boiler accessories is

- 1) (a) -> (c) -> (d) -> (b)
 - 2) (c) -> (a) -> (d) -> (b)
 - 3) (c) -> (a) -> (b) -> (d)
 - 4) (a) -> (c) -> (b) -> (d)
-

Ques # :11

a refrigerating machine working on reversed cannot cycle takes out 2 kw of heat from the system while working between temperature limits of 300 k and 200 k , the cop and power consumed are respectively

- 1) 1 and 1 kw
 - 2) 2 and 1 kw
 - 3) 1 and 2 kw
 - 4) 2 and 2 kw
-

Ques # :12

If C_f is the co-efficient of speed fluctuation of a flywheel then the ratio of $\frac{w_{max}}{w_{min}}$ will be

- 1) $\frac{1 - 2 C_f}{1 + 2 C_f}$
 - 2) $\frac{2 - C_f}{2 + C_f}$
 - 3) $\frac{1 + 2 C_f}{1 - 2 C_f}$
 - 4) $\frac{2 + C_f}{2 - C_f}$
-

Ques # :13

the ratio of modulus of rigidity to modulus of elasticity for a poisson's ratio of 0.25 would be

- 1) 0.5
 - 2) 0.4
 - 3) 0.3
 - 4) 1.0
-

Ques # :14

the ability of a material to absorb energy when deformed elastically and to return it when unloaded is called

- 1) hardness
 - 2) resilience
 - 3) fatigue strength
 - 4) creep
-

Ques # :15

power transmitted through pipes will be maximum when

- 1) head lost due to friction = $\frac{1}{2}$ X (total head at inlet of the pipe)
 - 2) head lost due to friction = $\frac{1}{4}$ X (total head at inlet of the pipe)
 - 3) head lost due to friction = total head at inlet of the pipe
 - 4) head lost due to friction = $\frac{1}{3}$ X (total head at inlet of the pipe)
-

Ques # :16

Match List 1 with List 2 and choose the correct answer from the code

- | List 1 | List 2 |
|--------------------------|-------------------------------|
| (Laws of thermodynamics) | (Defines) |
| (A) First | (i) Absolute zero temperature |
| (B) Second | (ii) Internal Energy |
| (C) Zeroth | (iii) Temperature |
| (D) Third | (iv) Entropy |
-
- | | | | | |
|----|-------|------|-------|------|
| 1) | (A) | (B) | (C) | (D) |
| | (i) | (ii) | (iii) | (iv) |
| 2) | (A) | (B) | (C) | (D) |
| | (iii) | (iv) | (ii) | (i) |
| 3) | | | | |

- | | | | | |
|----|------|------|-------|-------|
| | (A) | (B) | (C) | (D) |
| | (iv) | (ii) | (i) | (iii) |
| 4) | (A) | (B) | (C) | (D) |
| | (ii) | (iv) | (iii) | (i) |

Ques # :17

an impulse turbine produces 50 kw of power when the blade mean speed is 400 m/s. what is the rate of change of momentum tangential to the rotor?

- 1) 200 n
- 2) 175 n
- 3) 150 n
- 4) 125 n

Ques # :18

nusselt number is a function of

- 1) reynold's number and dynamic viscosity
- 2) dynamic viscosity and prandtl number
- 3) prandtl number and reynold's number
- 4) reynold's number and thickness of boundary layer

Ques # :19

a circular solid disc of uniform thickness 20 mm, radius 200 mm, and mass 20 kg is used as a flywheel. it is rotates at 600 rpm, the kinetic energy of the flywheel in joules is

- 1) 395
- 2) 790
- 3) 1580
- 4) 3160

Ques # :20

A cantilever of length (l) carries a uniformly distributed load w per unit length over the whole length. The downward deflection at the free end will be

(where $W = wl = \text{total load}$)

- 1) $\frac{Wl^3}{8EI}$
- 2)

$$\frac{Wl^3}{3EI}$$

3)

$$\frac{5Wl^3}{384EI}$$

4)

$$\frac{Wl^3}{48EI}$$

Ques # :21

when the temperature of a solid metal increases

- 1) strength of the metal decreases but ductility increases
 - 2) both strength and ductility decrease
 - 3) both strength and ductility increase
 - 4) strength of the metal increases but ductility decreases
-

Ques # :22

for the laminar flow through a circular pipe

- 1) the maximum velocity = 1.5 times the average velocity
 - 2) the maximum velocity = 2.0 times the average velocity
 - 3) the maximum velocity = 2.5 times the average velocity
 - 4) the maximum velocity = $\sqrt{2}$ times the average velocity
-

Ques # :23

which of the following does not change during a throttling process ?

- 1) enthalpy
 - 2) entropy
 - 3) volume
 - 4) pressure
-

Ques # :24

fire tube boilers are those in which

- 1) flue gases pass through tubes and water around it
- 2) water passes through the tubes and flue gases around it
- 3) forced circulation takes place
- 4) tubes are laid vertically

Ques # :25

the saturation temperature at the partial pressure of water vapour in the air water vapour mixture is called

- 1) dry bulb temperature
- 2) wet bulb temperature
- 3) dew point temperature
- 4) saturation temperature

Ques # :26

a critical speed

- 1) the shaft runs smoothly
- 2) the shaft runs with noise due to vibration
- 3) the shaft becomes dynamically unstable with negligible lateral amplitudes
- 4) the shaft becomes dynamically unstable with large lateral amplitudes

Ques # :27

for a newtonian fluid

- 1) shear stress is proportional to shear strain
- 2) rate of shear stress is proportional to shear strain
- 3) shear stress is proportional to rate of shear strain
- 4) rate of shear stress is proportional to rate of shear strain

Ques # :28

for a circular shaft of diameter 'd' subjected to torque t, the maximum value of the shear stress is

- 1) $\frac{64 T}{\pi d^3}$
 - 2) $\frac{32 T}{\pi d^3}$
 - 3) $\frac{16 T}{\pi d^3}$
 - 4) $\frac{8 T}{\pi d^3}$
-

Ques # :29

a humidification process means

- 1) decrease in relative humidity
 - 2) an increase in specific humidity
 - 3) a decrease in temperature
 - 4) an increase in temperature
-

Ques # :30

coal fired power plant boilers manufactured in india generally use

- 1) pulverised fuel combustion
 - 2) fluidised bed combustion
 - 3) circulating fluidised bed combustion
 - 4) moving stoker firing system
-

Ques # :31

in a refrigeration system, expansion valve is incorporated between

- 1) evaporator and compressor
 - 2) condenser and evaporator
 - 3) compressor and condenser
 - 4) superheater and subcooler
-

Ques # :32

Match the items in Column I and Column II

	Column I	Column II
P.	Higher Kinetic pair	1. Grubler's equation
Q.	Lower Kinetic pair	2. Line contact
R.	Quick return mechanism	3. Euler's equation
S.	Mobility of a linkage	4. Shaper
		5. Surface contact

- 1) p -> 2 , q -> 5 , r -> 4 , s -> 1
 - 2) p -> 2 , q -> 5 , r -> 3 , s -> 4
 - 3) p -> 5 , q -> 4 , r -> 3 , s -> 2
 - 4) p -> 4 , q -> 3 , r -> 2 , s -> 1
-

Ques # :33

which of the following is a solid state joining process ?

- 1) gas tungsten arc welding
 - 2) resistance spot welding
 - 3) friction welding
 - 4) submerged arc welding
-

Ques # :34

In a two-dimensional velocity field with velocities u and v along the x and y directions respectively, the convective acceleration along the x - direction is given by

- 1) $u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y}$
 - 2) $u \frac{\partial u}{\partial x} + v \frac{\partial v}{\partial y}$
 - 3) $u \frac{\partial v}{\partial x} + v \frac{\partial u}{\partial y}$
 - 4) $v \frac{\partial u}{\partial x} + u \frac{\partial u}{\partial y}$
-

Ques # :35

the ratio of lateral strain to longitudinal strain is called

- 1) bulk modulus
 - 2) modulus of rigidity
 - 3) modulus of elasticity
 - 4) poisson's ratio
-

Ques # :36

in a vapour compression refrigeration system, the working fluid is superheated vapour at entrance to

- 1) evaporator
 - 2) condenser
 - 3) compressor
 - 4) expansion valve
-

Ques # :37

in an impulse turbine stage, pressure

- 1) increases in stator and decreases in rotor
 - 2) decreases in stator and increases in rotor
 - 3) decreases in stator and remains constant in rotor
 - 4) remains constant in both stator and rotor
-

Ques # :38

Two walls of thickness 'd' and '2d' called A and B are made of materials such that their thermal conductivities are

$$K_A = 2 K_B$$

If the difference of temperature on two sides is proportional to thickness, the ratio of heat transfer through A to that through B is

- 1) 6
 - 2) 4
 - 3) 2
 - 4) 1
-

Ques # :39

during inelastic collision of two particles, which one of the following is conserved ?

- 1) total kinetic energy only
 - 2) total linear momentum only
 - 3) both linear momentum and kinetic energy
 - 4) neither linear momentum nor kinetic energy
-

Ques # :40

two identical ball bearing p and q are operating at loads 30 kn and 45 kn respectively. the ratio of the life of bearing p to the life of bearing q is

- 1) 81/16
 - 2) 27/8
 - 3) 9/4
 - 4) 3/2
-

Ques # :41

for a laminar flow through a pipe, the discharge varies

- 1) as the square of the diameter
- 2) as the inverse of viscosity
- 3) inversely as the pressure gradient

4) as the square of viscosity

Ques # :42

the ratio of crippling load, for a column of length (l) with both ends fixed to the crippling load of the same column with both ends hinged is equal to

- 1) 2.0
 - 2) 4.0
 - 3) 0.25
 - 4) 0.50
-

Ques # :43

Match list 1 with List 2 and select the answer from the code given below :

	List 1				List 2			
	(Equipment in a refrigeration system)				(Purpose)			
A	Compressor				(i) Enthalpy remains constant			
B	Evaporator				(ii) Enthalpy increases			
C	Throttle valve				(iii) Enthalpy increases but pressure remains constant			
D	Condenser				(iv) Enthalpy decreases but pressure remains constant			
1)	A	B	C	D	(iii)	(ii)	(i)	(iv)
2)	A	B	C	D	(ii)	(iii)	(iv)	(i)
3)	A	B	C	D	(ii)	(iii)	(i)	(iv)
4)	A	B	C	D	(iv)	(ii)	(iii)	(i)

Ques # :44

in a reaction stage turbine, the velocity

- 1) increases in stator and remains constant in rotor
 - 2) increases in stator and decreases in rotor
 - 3) decreases in stator and remains constant in rotor
 - 4) remains constant throughout
-

Ques # :45

consider the following statements : in a shell and tube heat exchanger, baffles are provided on the shell side to (a) prevent the stagnation of shell side fluid (b) improve heat transfer (c) provide support for tubes (d) prevent fouling of the above four statements the correct ones are

- 1) (b), (c) and (d)
- 2) (a), (b) and (c)
- 3) (a), (c) and (d)
- 4) (a), (b) and (d)

Ques # :46

The speed of an engine varies from 210 rad/s to 190 rad/s. During a cycle the change in kinetic energy is found to be 400 Nm. The inertia (I) of the flywheel in $kg\ m^2$ is

- 1) 0.10
- 2) 0.20
- 3) 0.30
- 4) 0.40

Ques # :47

the piston rod and crosshead in a steam engine are usually connected by means of :

- 1) cotter joint
- 2) knuckle joint
- 3) ball joint
- 4) universal joint

Ques # :48

select the correct statement

- 1) viscosity of a gas increases with temperature
- 2) density of a gas increases with temperature
- 3) surface tension of a liquid increases with temperature
- 4) bulk modulus of elasticity is independent of temperature

Ques # :49

If the principle stresses in a plane stress problem are $\sigma_1 = 100\ MPa$,
 $\sigma_2 = 40\ MPa$, the magnitude of the maximum shear stress (in MPa)will be

- 1) 60
- 2) 50
- 3) 30

Ques # :50

for the same compression ratio, the efficiency of the brayton cycle is

- 1) equal to diesel cycle
 - 2) equal to otto cycle
 - 3) equal to dual cycle
 - 4) greater than diesel cycle
-

Ques # :51

scale is formed on heat transfer surfaces when

- 1) water is acidic
 - 2) water is alkaline
 - 3) water contains dissolved gases
 - 4) water contains dissolved calcium and magnesium salts
-

Ques # :52

Which of the following characteristics are applicable to stub 20° involute system

- 1) small interference
 - 2) strong tooth
 - 3) high production cost
 - 4) gear with small number teeth
-

Ques # :53

heat is transferred by all three modes of heat transfer in

- 1) refrigeration
 - 2) condenser
 - 3) electric bulb
 - 4) boiler furnace
-

Ques # :54

a mass of 1 kg attached to a light spring extends it by 0.981 mm. the natural frequency of vibration will be approximately

- 1) 26 hz

- 2) 21 hz
 - 3) 16 hz
 - 4) 11 hz
-

Ques # :55

The velocity potential for a two dimensional flow is $\phi = x(2y - 1)$.

Determine the velocity at a point $P(4,5)$.

- 1) 10.25 unit
 - 2) 12.04 unit
 - 3) 15.35 unit
 - 4) 18.74 unit
-

Ques # :56

in a cantilever, maximum deflection occurs where

- 1) bending moment is zero
 - 2) bending moment is maximum
 - 3) shear force is zero
 - 4) slope is zero
-

Ques # :57

when a liquid boils at constant pressure, the following parameter increases

- 1) temperature
 - 2) latent heat of vapourization
 - 3) kinetic energy
 - 4) entropy
-

Ques # :58

rankine efficiency of steam power plant

- 1) improves in summer as compared to that in winter
 - 2) improves in winter as compared to that in summer
 - 3) is unaffected by climatic conditions
 - 4) none of these
-

Ques # :59

It is desired to increase the heat dissipation rate from the surface of an electronic device of spherical shape of 5 mm radius exposed to convection with $h = 10 \text{ W/m}^2 \text{ K}$ by encasing it in a spherical sheath of conductivity 0.04 W/mK . For maximum heat flow, the diameter of the sheath should be

- 1) 8 mm
 - 2) 12 mm
 - 3) 16 mm
 - 4) 18 mm
-

Ques # :60

the product of the circular pitch and diametral pitch is equal to

- 1) 2π
 - 2) π
 - 3) $\frac{\pi}{2}$
 - 4) 1.0
-

Ques # :61

a pair of spur gears with module 5 mm and a centre distance of 450 mm is used for a speed reduction of 5:1. the number of teeth on pinion is

- 1) 60
 - 2) 90
 - 3) 30
 - 4) 50
-

Ques # :62

the torsional vibrational frequency of a shaft with n oscillating masses will be

- 1) n
 - 2) n-1
 - 3) n+1
 - 4) 2n
-

Ques # :63

A centrifugal pump is required to lift $0.0125 \text{ m}^3/\text{s}$ of water from a well with depth 30 m . If the motor is 5 KW find the efficiency of the pump

- 1) 71.5 %
 - 2) 68.2 %
 - 3) 65.3 %
 - 4) 73.6 %
-

Ques # :64

A steel rod of diameter 1 cm and 1 m long is heated from 20°C .
Its $\alpha = 12 * 10^{-6} / K$ and $E = 200GN/m^2$. If the rod is free to expand, the thermal stress developed in it is :-

- 1) $12 * 10^4 N/m^2$
 - 2) $240 KN/m^2$
 - 3) Zero
 - 4) Infinity
-

Ques # :65

in a lifting machine, an effort of 200 n is applied to raise a load of 800 n. what will be the velocity ratio, if efficiency is 50 %.

- 1) 8
 - 2) 6
 - 3) 7
 - 4) 9
-

Ques # :66

A refrigeration cycle operates between condenser temperature of +27°C and evaporator temperature of -23°C . The coefficient of performance of cycle will be

- 1) 0.2
 - 2) 1.2
 - 3) 5
 - 4) 6
-

Ques # :67

a small steam whistle (perfectly insulated) and doing no shaft work causes a drop of 0.8 kj/kg in the enthalpy of steam from entry to exit. if the kinetic energy of steam at entry is negligible, the velocity of steam at exit is

- 1) 4 m/s

- 2) 40 m/s
 - 3) 80 m/s
 - 4) 120 m/s
-

Ques # :68

An ideal gas at 27°C is heated at constant pressure till the volume becomes three times. The temperature of the gas will then be

- 1) 81°C
 - 2) 900°C
 - 3) 627°C
 - 4) 927°C
-

Ques # :69

the square threads are usually found in

- 1) spindle of bench vices
 - 2) railway carriage coupling
 - 3) feed mechanism of machine tools
 - 4) screw cutting lathes
-

Ques # :70

40 % of incident radiant energy on the surface of thermally transparent body is reflected back. if the transmissivity of the body be 0.15 then emissivity of the surface is

- 1) 0.45
 - 2) 0.55
 - 3) 0.40
 - 4) 0.75
-

Ques # :71

In a certain slider crank mechanism, lengths of crank and connecting rod are equal. If the crank rotates with a uniform angular speed of 14 rad/s and the crank length is 300 mm, the maximum acceleration of the slider (in m/s^2) is

- 1) 11.76 m/s^2
- 2) 117.6 m/s^2
- 3)

- 1176.2 m/s^2
- 4) 1.1762 m/s^2
-

Ques # :72

The principal strains at a point in a body under biaxial state of stress are 1000×10^{-6} and -600×10^{-6} . What is the maximum shear strain at that point ?

- 1) 200×10^{-6}
- 2) 800×10^{-6}
- 3) 1000×10^{-6}
- 4) 1600×10^{-6}
-

Ques # :73

if the compression ratio of an engine working on otto cycle is increased from 5 to 7 then the percentage increase in efficiency will be

- 1) 2%
- 2) 4%
- 3) 8%
- 4) 14%
-

Ques # :74

natural frequency of transverse vibration of shaft carrying a load at the centre of span is

- 1) $\frac{0.4987}{\sqrt{\delta}} \text{ Hz}$
- 2) $\frac{49.87}{\sqrt{\delta}} \text{ Hz}$
- 3) $\frac{0.04987}{\sqrt{\delta}} \text{ Hz}$
- 4) $\frac{4.987}{\sqrt{\delta}} \text{ Hz}$
-

Ques # :75

Two plates spaced 150 mm apart are maintained at 1000°C & 70°C .

The heat transfer will take place mainly by

- 1) convection
 - 2) free convection
 - 3) forced convection
 - 4) radiation
-

Ques # :76

the ratio of euler's buckling load of columns with same parameters having (i) both ends fixed (ii) both ends hinged is

- 1) 2
 - 2) 4
 - 3) 6
 - 4) 8
-

Ques # :77

a slider crank mechanism has the maximum acceleration of slider when the crank is

- 1) at the inner dead centre position
 - 2) at the outer dead centre position
 - 3) exactly midway position between two dead centres
 - 4) none of these
-

Ques # :78

If the temperature of solid surface changes from 27°C to 627°C then its emissive power changes in the ratio of

- 1) 81
 - 2) 6
 - 3) 9
 - 4) 27
-

Ques # :79

Steam enters an adiabatic turbine operating at steady state with an enthalpy of 3251.0 KJ/Kg leaves as a saturated mixture of 15 KPa with dryness fraction (quality) 0.9 . The enthalpy of the saturated liquid and vapour at 15 KPa are $h_f = 225.94 \text{ KJ/Kg}$ and $h_g = 2598.3 \text{ KJ/Kg}$ respectively. The mass flow rate of steam is 10 Kg/sec . Kinetic & Potential energy changes are negligible. The power output of Turbine in Mega Watt is

- 1) 6.5
- 2) 9.1
- 3) 8.9
- 4) 27.0

Ques # :80

in an adiabatic process 5000 j of work is performed on a system. the system returns to its original state while 1000 j of heat is added . the work done during non adiabatic process

- 1) +4000 j
- 2) -4000 j
- 3) +6000 j
- 4) -6000 j

Ques # :81

A single degree freedom of spring -mass is subjected to a sinusoidal force of 10 N amplitude and frequency ω along the axis of the spring. The stiffness of the spring is 150 N/m , damping factor is 0.2 and undamped natural frequency is low. At steady state, the amplitude of vibration (in m) is approximately

- 1) 0.05
- 2) 0.07
- 3) 0.70
- 4) 0.90

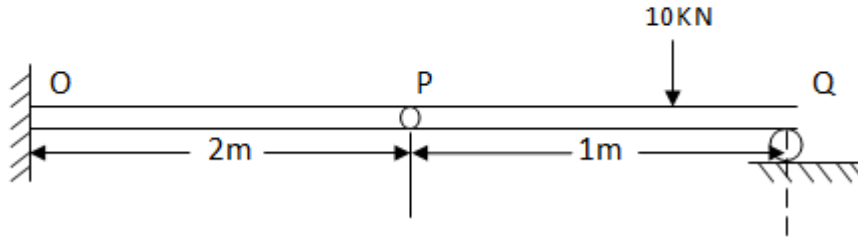
Ques # :82

The ratio of momentum diffusivity (γ) to thermal diffusivity (α) is called

- 1) prandtl no
- 2) nussel no
- 3) biot no
- 4) lewis no

Ques # :83

A cantilever OP is connected to another beam PQ with a pin joint as shown in figure. A load of 10KN is applied at the mid-point of PQ. The magnitude of bending moment in (KNm) at fixed end O is



- 1) 2.5
- 2) 5
- 3) 10
- 4) 25

Ques # :84

in a spring mass system, the mass is m and the spring constant is k . the critical damping coefficient of system is 0.1 kg/sec . in another spring mass system, the mass is $2m$ and the spring constant is $8k$. the critical damping coefficient (in kg/sec) of this system is :

- 1) 4×0.1
- 2) 4.5×0.1
- 3) 3.8×0.1
- 4) 5.2×0.1

Ques # :85

The plastic sleeve of outer radius $r_0 = 1 \text{ mm}$ covers a wire (radius $r = 0.5 \text{ mm}$) carrying electric current. Thermal conductivity of the plastic is 0.15 W/mK . The heat transfer coefficient on the outer surface of the sleeve exposed to air is $25 \text{ W/m}^2\text{K}$. Due to the addition of the plastic cover, the heat transfer from the wire to the ambient will

- 1) increase
 - 2) remain the same
 - 3) decrease
 - 4) be zero
-

Ques # :86

the wave length at which the black body emissive power reaches its maximum value at 300 k is

- 1) $9.6 \mu m$
 - 2) $15.5 \mu m$
 - 3) $5.1 \mu m$
 - 4) $38.0 \mu m$
-

Ques # :87

a rod is subjected to a uniaxial load within linear elastic limit. when the change in the stress is 200 mpa, the change in strain is 0.001 . if the poisson's ratio of the rod is 0.3, the modulus of rigidity (in gpa) is

- 1) 75.31
 - 2) 76.92
 - 3) 77.23
 - 4) 76.11
-

Ques # :88

coefficient of steadiness for flywheel in terms of speed is given as

- 1) $\frac{N_1 - N_2}{N}$
 - 2) $\frac{N}{N_1 - N_2}$
 - 3) $\frac{N}{N_1 + N_2}$
 - 4) $\frac{N_1 + N_2}{N}$
-

Ques # :89

Match the item in Column I and II

	<u>Column I</u>		<u>Column II</u>
P	Addendum	1	Cam
Q	Instantaneous center of velocity	2	Beam
R	Section modulus	3	Linkage
S	Prime Circle	4	Gear

Select the correct answer using the codes given below

- 1) p - 4 , q - 3 , r - 2 , s - 1
- 2) p - 4 , q - 2 , r - 3 , s - 1
- 3) p - 3 , q - 2 , r - 1 , s - 4
- 4) p - 3 , q - 4 , r - 1 , s - 2

Ques # :90

in reaction turbines

- 1) the steam is expanded in nozzles and there is no fall in pressure as the steam passes over the rotor blades
- 2) steam is directed over bucket-like-blades which propels the rotor
- 3) expansion of steam takes place as it passes through the moving blades on the rotor as well as through the guide blades fixed to the casing
- 4) steam pressure remains constant

Ques # :91

lumped system analysis of transient heat conduction situation is valid when the biot number is

- 1) very small
- 2) very large
- 3) approximately one
- 4) cannot say unless the fourier number is known

Ques # :92

the number of degrees of freedom in a planar mechanism having n links and j simple hinge joints is :

- 1) $3(n-3) - 2j$
- 2) $3(n-1) - 2j$
- 3) $3n - 2j$
- 4) $2j - 3n + 4$

Ques # :93

tolerances are specified

- 1) to obtain desired fits
 - 2) because it's not possible to manufacture a size exactly
 - 3) to obtain high accuracy
 - 4) to have proper allowance
-

Ques # :94

The equation of effectiveness $E = 1 - e^{-NTU}$ of a heat exchanger is valid in the case of

- 1) boiler & condenser for parallel flow
 - 2) boiler & condenser counter flow
 - 3) boiler & condenser for both parallel flow and counter flow
 - 4) gas turbine for both parallel flow and counter flow
-

Ques # :95

A $200 * 100 * 50 \text{ mm}^3$ steel block is subjected to a hydrostatic pressure of 15MPa .

The Young's modulus and poisson's ratio of the material are 200 GPa and 0.3 respectively. The change in volume of block in mm^3 is :

- 1) 85
 - 2) 90
 - 3) 100
 - 4) 110
-

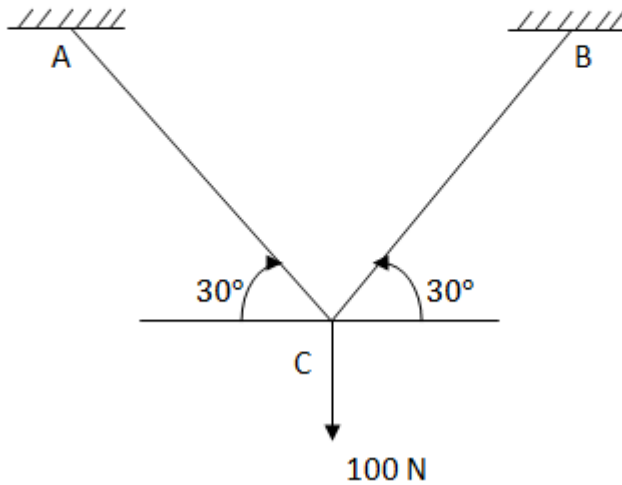
Ques # :96

bleeding in turbine means

- 1) leakage of steam
 - 2) steam doing no useful work
 - 3) extracted steam for pre-heating feed water
 - 4) removal of condensed steam
-

Ques # :97

Two identical trusses supported a load of 100 N as shown in figure. The length of each truss is 0.1 ; cross sectional area is 200 mm^2 , Young's modulus $E = 200 \text{ GPa}$. The force in the truss AC (in N) is



- 1) 200
- 2) 300
- 3) 50
- 4) 100

Ques # :98

in drop forging, forging is done by dropping

- 1) the work piece at high velocity
- 2) the hammer at high velocity
- 3) the die with hammer at high velocity
- 4) a weight on hammer to produce the requisite impact

Ques # :99

A composite wall consists of two layers of different materials having conductivity K_1 and K_2 . For equal thickness of two layers , the equivalent thermal conductivity of the slab will be

- 1) $K_1 + K_2$
- 2) $\frac{2 K_1 K_2}{(K_1 + K_2)}$
- 3) $\sqrt{K_1 K_2}$
- 4) $\frac{K_1 K_2}{(K_1 + K_2)}$

Ques # :100

a cantilever beam having square cross section of side a is subjected to an end load. if a is increased by 19% the tip deflection decreases approximately

- 1) 19%
 - 2) 29%
 - 3) 41%
 - 4) 50%
-