Rajasthan Public Service Commission - 2016
Paper : VPITI-Mechanical

Ques # :1

In heat exchanger, the temperature of the hot fluid decreases while the temperature of the cold fluid increases. The increase and decrease follows:

1) An exponential law

2) A quadratic law

3) A linear law

4) A cubic law

Ques # :2

Which one of the following statements holds good for the equation: dQ = dE + dW

1) Any process undergone by a closed stationary system

2) Any process reversible and irreversible and for any system

3) A closed system when only pdV work is present

4) On reversible process

Ques # :3

Which of the following second-law statement is incorrect

1) The entropy of an isolated system must remain constant or increase

2) The entropy of a hot copper block deceases as it cools down

3) If ice is melted in water in an insulated container, the net entropy decreases

4) Work must be input if energy is transferred from a cold body to a hot body

Ques # :4

An ideal gas at 27° C is heated at constant pressure till its volume becomes three times. What would be then temperature of gas :

1) 327° C

2) 427° C

3) 527° C

4) 627° C

Ques # :5

A closed system receives 60 KJ heat but its internal energy decreases by 30 KJ. Then the Work done by

the system is

1) 30 KJ
2) 90 KJ
3) -30 KJ
4) -90 KJ

Ques # :6

For a heat engine operating on the Carnot cycle, the work output is 1/4th of the heat transferred to the sink. The efficiency of the engine is :

1) 20%
2) 33.7%
3) 38.5%
4) 40%

Ques # :7

Determine the heat transfer through a plane of length 4m, height 3m and thickness 0.2 m. The temperature of inner and outer surfaces are 150° C and 90° C respectively. Thermal Conductivity of the wall is 0.5 W/mK.

1) 1800W
2) 2000W
3) 2200W
4) 2400W

Ques # :8

Thermal diffusivity of a substance is :

1) Inversely proportional to thermal conductivity
2) Directly proportional to thermal conductivity
3) Directly proportional to the square of thermal conductivity
4) Inversely proportional to the square of thermal conductivity.

Ques # :9

Fins are made as thin as possible :

1) to reduce the total weight
2) to improve the flow of coolant around the fin
3) to increase the width for the same profile area

4) to accommodate more number of fins

Ques # :10

Consider the following statements: 1. Boiler mountings are mainly protective devices 2. Steam Stop Valve is an accessory 3. Feed water pump is an accessory 4. Economiser is a mounting Which of these statements are correct ?

1) 1,2,3 and 4

2) 1,2 and 4

3) 2 and 3

4) 3 and 1

Ques # :11

The increase in temperature results in

1) Increase in viscosity of gas

2) Increase in viscosity of liquid

3) Decrease in viscosity of gas

4) Decrease in viscosity of liquid

Ques # :12

According to Kirchoff's law

1) Radiant heat is proportional to fourth power of absolute temperature

2) Emissive power depends of temperature

3) Ratio of emissive power to absorptive power is maximum for perfectly black body

4) Ratio of emissive power to absorptive power for all bodies is same and equal to the emissive power of perfectly black body.

Ques # :13

The maximum net specific work obtainable in an idle
Brayton cycle for T_{max} = 1600K and
T_{min} = 400K is given by :

1)
   400 C_p

2)
   500 C_p

3)

    600 C_p

4)

    800 C_p

Ques # :14

An open cycle pressure gas turbine uses a fuel of calorific value of 36000 KJ/Kg with air-fuel ratio of 60:1 and develops a net output of 60 KJ/Kg of air. The Thermal efficiency of the cycle is:
1) 6%
2) 10%
3) 12%
4) 16%

Ques # :15

In case of impulse steam turbine :
1) There is enthalpy drop in fixed and moving blades
2) There is enthalpy drop only in moving blades
3) There is enthalpy drop in nozzles
4) There is enthalpy drop in fixed blades only

Ques # :16

The flow velocity in the convergent section of a nozzle, designed for maximum discharge is:
1) Subsonic
2) Sonic
3) Supersonic
4) None of these

Ques # :17

In refrigeration system refrigerant gains heat at :
1) Compressor
2) Evaporator
3) Condenser
4) Expansion valve

Ques # :18

The leaks in a refrigeration system using Freon are detected by :
1) A halide torch which on detection produces greenish flame light
2) Sulphur sticks which on detection gives white smoke
3) Using reagents
4) Sensing reduction in pressure

Ques # :19

A good refrigerant should have :
1) High Latent heat
2) High Thermal conductivity
3) Low Specific heat and Low Viscosity
4) All of these

Ques # :20

Which of the following statement is correct:
1) Dew point temperature can be measured with the help of thermometer.
2) Dew point temperature is the saturation temperature corresponding to the partial pressure of water vapour in moist air.
3) Dew point temperature is the same as the thermodynamic wet bulb temperature.
4) For standard air, dew point temperature is less than the wet bulb temperature.

Ques # :21

Where, H_1 = Total heat of air entering the heating coil
H_2 = Total heat of air leaving the heating coil
H_3 = Total heat of air at the end of the humidification
What is the sensible heat factor during the heating and humidification process equal to :

1) $(H_3-H_1)/ (H_3+H_1)$

2) $(H_2-H_1)/ (H_3-H_1)$

3) $(H_3+H_1) /(H_3+H_2)$

4) $(H_1+H_2) / (H_1+H_3)$

Ques # :22

The fins at the top of a motor cycle engine cylinder are longer than those at the bottom because:
1) Hot air rises
2) The top is the hottest part
3) They are in an unexposed position
4) Extra strength is required at the top

Ques # :23

The stroke of an engine is increased when the :
1) Piston is shortened
2) Connecting rod is lengthened
3) Crank shaft throw is lengthened
4) Gudgeon pin is moved nearer to the crank shaft.

Ques # :24

The purpose of large spring loaded valve in a radiator cap is to :
1) lower the temperature at which the coolant boils
2) prevent the coolant escaping when it boils
3) reduce the risk of the rubber hoses collapsing when the pressure is low
4) pressurize the system which raises the boiling point of the coolant

Ques # :25

The word "castor" in automobile is associated with which of the following :
1) Transmission system
2) Oils for automobile
3) Front axle alignment
4) Propeller shaft for power transmission

Ques # :26

For cars, which is the most popular manual steering gear?
1) Worm and nut type
2) Worm and wheel type
3) Cam and roller type

4) Rack & pinion type

Ques # :27

Which instruments are used for measuring Solar radiation parameters : 1. Pyrheliometer 2. Pyranometer 3. Pyradiometer 4. Pyrometer

1) 1,2,3 and 4

2) 1,3 and 4

3) 2,3 and 4

4) 1,2 and 3

Ques # :28

Which are fuel cells ? 1. Methane 2. Phosphoric acid fuel cell 3. Solid Oxide fuel cell

1) 1 and 2 only

2) 1 and 3 only

3) 2 and 3 only

4) All 1,2 and 3

Ques # :29

Calculate logarithmic decrement if damping factor is 0.33.

1) 1.36

2) 3.23

3) 5.16

4) 2.19

Ques # :30

Gross head of a hydro-power station is:

1) The height of water level in the river where the storage is provided

2) The height of the water level in the river tail race is provided

3) The difference between maximum and minimum storage level of river

4) The difference of water level between the level in the storage and tail race

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Ques # :31

The presence of reflector in nuclear power plant results in

1) Increase production of neutrons
2) Controlled production of neutrons
3) Decreases leakages of neutrons
4) Decreases the speed of neutrons

Ques # :32

flow which neglects changes in transverse direction is known as

1) One dimensional flow
2) Uniform flow
3) steady flow
4) Turbulent flow

Ques # :33

An ideal flow of any fluid must fulfil the following

1) Newton's law of viscosity
2) Pascal's Law
3) continuity equation
4) Boundary layer theory

Ques # :34

Water hammer in pipe line takes place when :

1) Fluid is flowing with high velocity
2) Fluid is flowing with high pressure
3) Flowing fluid is suddenly brought to rest by closing a valve
4) Flowing fluid is brought to rest by gradually closing a valve

Ques # :35

Identify the following statements as true: (i) Axisymmetric flows are two dimensional (ii) One dimensional flow can take place in a curved passage (iii) Local acceleration is zero in steady flow (iv) Uniform flow can take place in a conical passage

1) (i) and (ii) are true
2) (i), (iii) and (iv) are true
3) (ii) and (iv) are true
4) (i), (ii), (iii) and (iv) are true

Ques # :36

Principle of similitude forms the basis of
1) Comparing two identical equipments
2) Designing models so that result can be converted to prototypes
3) Comparing similarity between design and actual equipment
4) Hydraulic designs

Ques # :37

Uniform flow of a real fluid takes place in a pipe of diameter D.
If p_1 and p_2 are pressure at the upstream and downstream sections
of a stretch of length L of the pipe, the boundary shear stress
τ_0 could be expressed as the momentum equation as $\tau_0 =$

1) $(p_1 - p_2)\pi D^2/4L$

2) $(p_1 - p_2)D/4L$

3) $(p_1 - p_2) \, 4L/D$

4) $(p_1 - p_2)D/\rho g L$

Ques # :38

A hydraulic press has a ram of 15 cm diameter and plunger of 1.5 cm. It is required to lift a weight of 1 tonne. The force required on plunger is equal to
1) 10 Kg
2) 100 Kg
3) 1000 Kg
4) 1 Kg

Ques # :39

The preferred type of pump for small discharge and high head is :
1) Centrifugal type
2) Reciprocating type

3) Axial flow type

4) Radial flow type

Ques # :40

For a given Centrifugal pump

1) Head varies inversely as square of speed

2) Discharge varies directly as speed

3) Discharge varies directly as square of speed

4) Power varies directly as fifth power of speed

Ques # :41

Priming is necessary in

1) Centrifugal pumps to lift water from a greater depth

2) Centrifugal pumps to remove air in the suction pipe and casing

3) Hydraulic turbine to remove air in the turbine casing

4) Hydraulic turbine to increase the speed of the turbine and to generate more power

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Ques # :42

A Francis turbine working at 4000 rpm has a unit speed of 50 r.p.m. and develops 500 KW of power. What is the effective head under which this turbine operates ?

1) 49 m

2) 64 m

3) 81 m

4) 100 m

Ques # :43

Consider the following statements : Cavitation in hydraulic machines occurs at the 1. Exit of the pump 2. Entry of the pump 3. Exit of the turbine 4. Entry of the turbine Of these the correct statements are :

1) 1 and 2

2) 1 and 3

3) 2 and 4

4) 2 and 3

Ques # :44

The efficiency of a centrifugal pump is maximum when its blades are
1) Straight
2) Bent forward
3) Bent backward
4) Bent forward first and then backward

Ques # :45

If two pumps identical in all respects and each capable of delivering a discharge Q against a head H are connected in series, the resulting discharge is
1) 2Q against a head 2H
2) Q against a head 2H
3) 2Q against a head H
4) Q against a head $\sqrt{2}$H

Ques # :46

During tensile test on a specimen of 1 cm² cross-section,
maximum load observed was 80 KN and area of
cross-section at neck was 0.5 cm² . U.T.S. of the specimen is :

1) 400 MPa
2) 800 MPa
3) 1600 MPa
4) 2200MPa

Ques # :47

The following torsional terms is analogous to bending terms except
1) T/J corresponds to M/I
2) G/I corresponds to E/R
3) T/r corresponds to σ/y
4) GΘ/I corresponds to E/R

Ques # :48

In a simply supported beam of length L with a triangular load W varying from zero at one end and to the maximum value at the other end, the maximum bending moment is:

1) WL/3

2) $2WL/9\sqrt{3}$

3) WL/4

4) $WL/9\sqrt{3}$

Ques # :49

Two wires of different materials but of same diameter are connected end to end and a force is applied which stretches them by 1 cm. The two wires will have the

1) Same stress and strain

2) Same stress but different strain

3) Same strain but different stress

4) Different stress and strain

Ques # :50

Maximum principal stress theory is used for

1) Brittle materials

2) Ductile materials

3) Brittle materials and Ductile materials Both

4) None of these

Ques # :51

The problem of ' hunting ' of a centrifugal governor becomes very acute when the governor becomes :

1) Less Sensitive

2) Highly Sensitive

3) Highly Stable

4) Less Stable

Ques # :52

Kinematic pairs are those which have

1) Two elements held together mechanically

2) Two elements having relative motion

3) Minimum of two instantaneous centers

4) All of these

Ques # :53

Pitch point on cam is

1) Any point on pitch curve

2) The point on cam pitch curve having maximum pressure angle

3) Any point on pitch circle

4) The point on cam pitch curve having minimum pressure angle

Ques # :54

A prime mover running at 300 r.p.m. drives a D.C. generator at 500 r.p.m. by a belt drive. Diameter of the pulley on the outside shaft of the prime mover is 600 mm. Assuming slip of 3 %, What is the approximate diameter of generator pulley if the belt running over it is 6 mm thick ?

1) 346.7 mm

2) 406.6 mm

3) 506.5 mm

4) 606.4 mm

Ques # :55

In a clock mechanism, hour and minute hands are connected by

1) Epicyclic gear train

2) simple gear train

3) Reverted gear train

4) Compound gear train

Ques # :56

If the air screw of an aeroplane rotates clockwise when viewed from the rear and aeroplane takes a right turn, the gyroscopic effect will be

1) Tends to raise the tail and depress the nose

2) Tends to raise the nose and depress the tail

3) Tilt the aeroplane about the spin axis

4) None of these

Ques # :57

Which of the following dynamometer is used for measuring large power along the propeller shaft of turbine

1) Rope brake dynamometer

2) Belt transmission dynamometer

3) Electric dynamometer

4) Torsion dynamometer

Ques # :58

A large uniform plate containing the hole is subjected to a uniform axial tension 'σ'.
The maximum stress in the plate is

1) $\sigma_{max} = 5\,\sigma$

2) $\sigma_{max} = 2\,\sigma$

3) $\sigma_{max} = 3\,\sigma$

4) $\sigma_{max} = \sigma$

Ques # :59

The ratio of hoop stress to longitudinal stress in thin walled cylinder is

1) 1/4

2) 1/2

3) 1

4) 2

Ques # :60

The reason why a laminated spring is made up of a series of leaves is to :

1) reduce the inter leaf friction

2) soften the spring action and increase the maximum deflection

3) allow the leave to slide during the bump movement

4) overcome the weakness at the centre of a single leaf spring

Ques # :61

Shear stress in a closed coil helical spring (coil diameter 'D') of wire (diameter 'd') subjected to an axial

load 'W' is

1)
WD / πd3

2)
$(H_2-H_1)/ (H_3-H_1)$

3)
$(H_3+H_1) /(H_3+H_2)$

4)
$(H_1+H_2) / (H_1+H_3)$

Ques # :62

The greatest twisting moment which a shaft can resist is given by
1) Modulus of rigidity / polar moment of inertia
2) Maximum shear stress / polar modulus
3) Maximum shear stress x modulus of rigidity
4) Torsional rigidity of the shaft

Ques # :63

If the tearing efficiency of riveted joint is 75%, the ratio of diameter of rivet to the pitch is equal to
1) 0.2
2) 0.25
3) 0.50
4) 0.6

Ques # :64

The key will fail in which of the following manner?
1) Shearing only
2) Crushing only
3) Both shearing and crushing
4) None of these

Ques # :65

For a hollow shaft of inner diameter ' d ' and outer diameter ' D ' the modulus of rupture is :
1)

$$8TD / \pi (D^4 - d^4)$$

2)
$$16\,TD / \pi (D^4 - d^4)$$

3)
$$32\,TD / \pi (D^4 - d^4)$$

4)
$$64\,TD / \pi (D^4 - d^4)$$

Ques # :66

Endurance limit or fatigue limit is the maximum stress that a member can withstand for a infinite number of load applications without failure when subjected to

1) Dynamic loading
2) Static loading
3) Combined static and dynamic loading
4) Completely reversed loading

Ques # :67

Lewis correlation is used to determine which of the following

1) Fatigue Stress
2) Tensile stress in bending
3) Shear stress
4) Compressive stress in bending

Ques # :68

The lip angle of a single point tool is usually

1) 60° to 80°
2) 40° to 60°
3) 20° to 40°
4) None of these

Ques # :69

Cast iron during machining produces

1) Discontinuous chips

2) Continuous chips

3) None of these

4) Continuous chips with built up edge

Ques # :70

In D.C. reverse polarity arc welding :

1) The W.P. is made positive and the electrode is made negative

2) The W.P. is made negative and the electrode is made positive

3) Both the W.P. and the electrode are made positive

4) Both the W.P. and the electrode are made negative

Ques # :71

Which of the following statement is correct regarding grinding of high carbon steel?

1) Grinding at high speed results in the reduction of chip thickness and cutting forces per grit.

2) The grinding wheel has to be of open structure.

3) Aluminum oxide wheels are employed.

4) All of these

Ques # :72

During transverse vibrations, shaft is subjected to which type of stresses?

1) Tensile stresses

2) Torsional shear stress

3) Bending stresses

4) All the these

Ques # :73

A medium carbon steel workpiece is turned on a lathe at 50 m/min cutting speed, 0.8 mm/rev feed and 1.5 mm depth of cut, what is the rate of metal removal :

1) $100 \text{ mm}^3 / \text{min}$

2) $20000 \text{ mm}^3 / \text{min}$

3) $60000 \text{ mm}^3 / \text{min}$

4) Data insufficient

Ques # :74

In milling machine, the cutting tool is held in position by :
1) Chuck
2) Spindle
3) Arbor
4) Tool holder

Ques # :75

Consider the following statement regarding fixtures employed for holding work piece during machining (i) The location is based on 3-2-1 principle, (ii) The number refers to pins employed in three mutually perpendicular planes to arrest all the degree of freedom (iii) Fixtures also provides the tool guidance
1) (i), (ii) and (iii) are true
2) (ii) and (iii) are true
3) (i) and (iii) are true
4) (i) and (ii) are true

Ques # :76

Which of the following taper turning operation can be used for turning external taper
1) Form tool
2) Tailstock offset
3) Taper turning attachment
4) Compound rest

Ques # :77

A hole size $30.00^{+0.03}_{-0}$ mm. The corresponding shaft is of size $30.00^{+0.08}_{+0.04}$ mm.

The resulting assembly has

1) Interference fit
2) Transition fit
3) Clearance fit
4) None of these

Ques # :78

Which one of the following instruments is used for conducting alignment tests ?
1) Strain gauge
2) Dial gauge
3) Dynamometer
4) Tachometer

Ques # :79

Interferometry is used to measure
1) Straightness
2) Flatness
3) Roundness
4) Angularity

Ques # :80

The angle on which the strength of the tool depends is
1) Lip angle
2) Clearance angle
3) Rake angle
4) Cutting angle

Ques # :81

The factor responsible for the formation of continuous chips with built up edge is
1) High cutting speed and large rake angle
2) High cutting speed and small rake angle
3) Low cutting speed and large rake angle
4) Low cutting speed and small rake angle

Ques # :82

The interpolator in a CNC machine controls
1) Spindle Speed
2) Coolant flow
3) Feed rate
4) Tool change

Ques # :83

Two and half axis control in NC machines means

1) Control of three axis simultaneously

2) Control of two axis and spindle speed simultaneously

3) Control of two axis simultaneously and one axis independently

4) Control of two axis simultaneously and one axis is stationary

Ques # :84

Critical temperature is the temperature above which

1) A gas will never liquefy

2) A gas will immediately liquefy

3) Water will evaporate

4) Water will never evaporate

Ques # :85

Time study of an operator with a performance rating of 120% yields a time of 2 minutes. If the allowances of 10% of total available time are to be given, then what is the Standard time of the operation.

1) 2.00 minutes

2) 2.40 minutes

3) 2.64 minutes

4) 2.67 minutes

Ques # :86

Which one among the following is a 'THERBLIG' :

1) Get

2) Step

3) Put

4) Position

Ques # :87

Work sampling is used to find

1) Percentage occurrence of certain activity

2) Rating of job

3) Pre-determined motion time data

4) Quality control of incoming inventory

Ques # :88

Negative slack occurs when

1) Events stick to their schedule

2) There is deficiency of resources

3) Dummy activities are large in number

4) Activities lie on the critical path

Ques # :89

The depreciation in any particular year is charged as fixed percentage of the remaining value of asset. This approach is adopted in

1) Sinking fund

2) Diminishing balance

3) Annuity charge

4) Sum of year digits

Ques # :90

In PERT the span of time between the optimistic and pessimistic time estimates of an activity is

1) 6σ

2) 3σ

3) 12σ

4) σ

Ques # :91

In inventory control theory, the economic order quantity is

1) capacity of a warehouse

2) optimum lot size

3) average level of inventory

4) lot size corresponding to break-even analysis

Ques # :92

The aim of value engineering is to

1) Minimize the cost without change in quality of the product

2) Find the depreciation value of a machine

3) Determine the selling price of a product

4) All of these

Ques # :93

A company sells 14000 units of its products. It has a variable cost of Rs. 15 per unit. Fixed cost is Rs 47000 and total required profit is Rs 23000. Per unit product price (in Rs) will be :

1) 60

2) 40

3) 30

4) 20

Ques # :94

Which one of the following is not the solution method of transportation method

1) Hungarian method

2) North west corner method

3) Least cost method

4) Vogel's approximate method

Ques # :95

In linear programming problem variables are

1) Probabilistic and continuous

2) Deterministic and continuous

3) Discrete or continuous and deterministic

4) All the these

Ques # :96

For the Pay off matrix given below : Player Y 3 -1 4 2 Player X -1 -3 -7 0 4 -6 2 -9
1) The value of the game = -1
2) The value of the game = -3
3) The value of the game = -7
4) The value of the game = 2

Ques # :97

Which one of the following method can be used for forecasting the sales potential of a new product
1) Time series analysis
2) Jury of executive opinion method
3) Sales force composite method
4) Direct survey method

Ques # :98

If the demand of an item is doubled and the ordering cost is halved, the economic order quantity
1) remains unchanged
2) increase by factor of $\sqrt{2}$

3) is doubled
4) is halved

Ques # :99

The interchangeability can be achieved by
1) Bonus plan
2) Better process planning
3) Standardisation
4) Better product planning

Ques # :100

A master production schedule specifies
1) The financial resource required for production
2) What components are to be made and when
3) What product is to be made and when
4) The labour hours required for production