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Solution Report For All India Mock GATE 2019: CBT-2 (ME)
Q. No

Question Status
Q. 1 Choose the correct set of words to complete the sentence: Politicians must be $\qquad$ for the people, but they should never be $\qquad$ for public welfare.
a. disinterested, uninterested
b. disinterested, disinterested
c. uninterested, uninterested
d. uninterested, disinterested

Correct Ans. a
Solution
Q. 2 The given sentence is split into four parts. One of them has an error, identify that part of the sentence: Raja Ram Mohan Roy's religious reform movement brought through a change
(1)
(2)
$\underbrace{\text { in the position of }} \underbrace{\text { women in Indian society }}$
(3)
(4)
a. 1
b. 2
c. 3
d. 4

Correct Ans. b
Q. 3

The value of $\left[\frac{1}{\log _{(p / q)} x}+\frac{1}{\log _{(q / r)} x}+\frac{1}{\log _{(r / p)} x}\right]$ is
a. 3
b. 2
c. 1
d. 0

Correct Ans. d
Solution
Q. 4 How many numbers between 1 to $\mathbf{3 0 0}$ are divisible by only 11 or only 13 but not by both?
a. 45
b. 46
c. 48
d. 50

A student purchases some books for Rs. 1200. If he had bought 6 more books for the same amount, each book would cost Rs. 10 less. The number of books he buys is $\qquad$ _.

## Correct Ans. 24

Q. 6 A sphere is inscribed in a cube with an edge of 10 units. What is the shortest possible distance in units from one of the vertices of the cube to the surface of the sphere?
a. $10(\sqrt{3}-1)$
b. 5
c. $10(\sqrt{2}-1)$
d.

$$
5(\sqrt{3}-1)
$$

Correct Ans. d

Five kilograms of oranges contained $98 \%$ of water. If the next day, after some water evaporated, the concentration of water decreased to $96 \%$, what was the new weight of the oranges, in kilograms?
a. 4.9
b. 4.8
c. 2.5
d. 2.4

Correct Ans. c
Solution
$A$ and $B$ will participate in a sack race (In a sack race, people hop to reach the finish line). In the time that $A$ takes 3 hops, $B$ takes 4 hops but the distance covered by $A$ in 4 hops is equal to distance covered by $B$ in 5 hops. What is the ratio of A's speed: B's speed?
a. $3: 5$
b. $12: 20$
c. $15: 16$
d. 1:1

Correct Ans. c
Solution

When I asked a beggar about his age, he said that he has two siblings and the product of the age of all three is 15 , and sum of their ages is an odd number. What is the age of the beggar if he is the eldest sibling?
a. 1
b. 3
c. 5
d. Cannot be determined
Q. 10 A teacher prepares a test. She gives 5 objective type questions out of which 4 have to be answered. The total ways in which they can be answered if the first 2 questions have 3 choices and the last 3 have 4 choices is $\qquad$ —.

Correct Ans. 816
Solution
Q. 11 An open rectangular box of base $2 \mathrm{~m} \times 2 \mathrm{~m}$ contains a liquid of specific gravity of 0.8 upto a height of 3.5 m . If the box is imparted with vertically upward acceleration of $5.19 \mathrm{~m} / \mathrm{s}^{2}$, what will be the pressure on the base? $\left(g=9.81 \mathrm{~m} / \mathrm{s}^{2}\right)$
a. 29.40 kPa
b. 42 kPa
c. 32 kPa
d. 51 kPa

## Correct Ans. b

Solution
Q. 12 A rigid tank contains 5 kg of refrigerant 134 a , initially at $20^{\circ} \mathrm{C}$ and 140 kPa . The refrigerant is now cooled while being stirred until its pressure drops to 100 kPa . What will be the dryness fraction of the refrigerant at the end of the process?
At state 1:

$$
P_{1}=140 \mathrm{kPa},
$$

$$
T_{1}=20^{\circ} \mathrm{C}, \quad v_{1}=0.16544 \mathrm{~m}^{3} / \mathrm{kg}
$$

At state 2:
$P_{2}=100 \mathrm{kPa}$, $v_{f}=0.0007259 \mathrm{~m}^{3} / \mathrm{kg}, v_{g}=0.19254 \mathrm{~m}^{3} / \mathrm{k}$
a. 0.452
b. 0.570
c. 0.667
d. 0.859

Correct Ans. d
Solution

Correct Ans. a

a. 32.22 mm
b. 35 mm
c. 37.67 mm
d. 30 mm

Correct Ans. b
Solution

Which of the following statement is correct regarding some most common organic refrigerant and their applications?
a. R-11 refrigerant is used with centrifugal compressors in small units of air conditioning
b. R-12 refrigerant is used with reciprocating compressor in small units of air conditioning
c. R-22 refrigerant is used with reciprocating compressors in small units of air conditioning.
d. None of the above

## Correct Ans. b

Solution
Q. 16

A thin cylindrical steel shell of diameter 150 mm and wall thickness 3 mm has hemispherical ends. What will be the thickness of hemispherical ends, if there is no distortion of junction under the pressure? [ $E$ for steel $=200 \mathrm{GPa}, \boldsymbol{\mu}=0.3$ ]
a. 1.235 mm
b. 1.325 mm
c. 7.285 mm
d. 1.535 mm

Correct Ans. a

Which of the following is incorrect if friction increases in metal forming process?
a. The work load increases with the increase in friction between tool and workpiece
b. It causes the wear of the various metal working tools
c. It does not affect the deformation pattern of the metal.
d. It increases the amount of maximum draft possible in rolling.

Correct Ans. c

## Consider the following statements regarding negative rake angle:

Negative rake angle is recommended for

1. Turning of longer shaft
2. Cutting at higher speed
3. Machining high strength alloys
4. Brittle cutting tools

Which of the above statements are correct?
a. 1,3 and 4
b. 1 and 3
c. 2,3 and 4
d. 1,2 and 4

Correct Ans. c
Q. 19

A beam is loaded as shown in figure, what is slope at A ? (where El is in $\mathrm{kNm}^{\mathbf{2}}$ )

a.
$\frac{15}{E I}$
b. $\frac{30}{E I}$
c. $\frac{18}{E I}$
d.

Correct Ans. a
Solution

A bar $A B$ is fixed at one end. For how much increase in temperature this bar will buckle, if this bar $A B$ acts as fixed beam after touching end $C$ of wall?

a. $62^{\circ} \mathrm{C}$
b. $65^{\circ} \mathrm{C}$
c. $73^{\circ} \mathrm{C}$
d. $69^{\circ} \mathrm{C}$

Correct Ans. d

a. 4 kN
b. 10 kN
c. 6 kN
d. 5 kN

Correct Ans. ©
Solution

If the stream function is given by $\psi=3 x y$, then the velocity at a point $(3,2)$ will be
a. $7.8 \mathrm{~m} / \mathrm{s}$
b. $10.11 \mathrm{~m} / \mathrm{s}$
c. $11.39 \mathrm{~m} / \mathrm{s}$
d. $10.816 \mathrm{~m} / \mathrm{s}$

## Correct Ans. d

Which of the following statements are correct regarding operations performed on rolls generally?
a. Hot rolls are roughened whereas cold rolls are ground.
b. Both hot rolls and cold rolls are roughened.
c. Hot rolls are ground and cold rolls are roughened.
d. Both hot rolls and cold rolls are ground.

Correct Ans. a
a. $\frac{1}{1000}$
b.
b.
$\frac{1}{625}$
c. $\frac{1}{125}$
d. $\frac{96}{99}$

## Correct Ans. b

For the partial differential equation

$$
\frac{(x-1)}{2} \frac{\partial^{2} u}{\partial x^{2}}+B \frac{\partial^{2} u}{\partial x d y}+\frac{(x+1)}{2} \frac{\partial^{2} u}{\partial y^{2}}+\frac{\partial u}{d y}=u
$$

to be parabolic, what should be the value of $B^{2}$ ?

| a. $\sqrt{x^{2}-1}$ <br>  $\frac{x+1}{2}$ <br> b.  <br> c. $\frac{x-1}{2}$  <br> d.  <br> $x^{2}-1$  | Solution |
| ---: | :--- |

An oil filled thermometer well made up of steel tube ( 100 mm long) is installed in a tube through which air is flowing. The temperature of the air stream is measured with the help of the thermometer placed in the well. The temperature recorded by the thermometer is $88^{\circ} \mathrm{C}$. The magnitude of measurement error (in ${ }^{\circ} \mathrm{C}$ ) if the temperature at the base of the well is $40^{\circ} \mathrm{C}$ will be $\qquad$ -.

The temperature equation for the excess temperature $(\theta)$ of thermometric well surface at the distance $x$ meter from the base is given by:
$\frac{d^{2} \theta}{d x^{2}}-400 \theta=0$
[Neglect heat loss from the tip of well]

Correct Ans. 17.37 (16-19)
Solution

A piping system, consists of three pipes arranged in series, the length of the pipes are $1200 \mathrm{~m}, 1750 \mathrm{~m}$ and 600 m and diameters are $750 \mathrm{~mm}, 680 \mathrm{~mm}, 850 \mathrm{~mm}$ respectively. The equivalent length of pipe of diameter 680 mm is $\qquad$ m. (Consider same friction factor for all pipes).

Correct Ans. 2681.83 (2650-2700)

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Solution
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Fixed cost of production is $₹ 5000$. If selling price is $₹ 70$ per unit, variable price per unit to get breakeven at 900 unit is $\qquad$ .

Correct Ans. 64.44 (64-65)

An inventory of an item whose annual demand is 70000 units has carrying cost of $₹ 5$ per unit per year. If ordering cost per order is $₹ 600$, economic order quantity is $\qquad$ units.

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Correct Ans. 4098.78 (4090-5010)
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2 Solution

A turning operation is being carried out on a Lathe machine. The required finish on the part can be achieved by turning three passes. If the cutting velocity is $5 \mathbf{m} / \mathrm{min}$, diameter of part is 5 cm , length of workpiece is 15 cm and feed is $1 \mathrm{~mm} / \mathrm{rev}$, then the total time for machining is $\qquad$ minutes.
Q. 31 A hollow casting is produced using a core which is in shape of frustum of cone of height 10 cm with 4 cm and $\mathbf{6 ~ c m}$ diameters. If density of liquid metal is $7500 \mathrm{~kg} / \mathrm{m}^{3}$ and density of core material is 1400 $\mathrm{kg} / \mathrm{m}^{3}$, net buoyancy on core in Newton is $\qquad$ . (Use $\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}$ )

Correct Ans. 12.137 (12.00-12.30)

## Solution

In a power plant, the efficiency of the electric generator, turbine, boiler and the overall plant are 0.97, $0.95,0.92$ and 0.33 , respectively. The percentage of total electricity generated is consumed in running the auxiliaries is $7.32 \%$. The cycle efficiency of the power plant is $\qquad$ -

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Correct Ans. : 0.42 (0.41-0.43)
Q. 33 Stress tensor matrix is given below:
\(\left[\begin{array}{ccc}30 & 0 & 0 \\ 0 & 40 & 0 \\ 0 & 0 & -50\end{array}\right]\) All units are in MPa

The maximum shear stress is \(\qquad\) MPa.

Correct Ans. 45

The third approximation of \(x^{3}-4 x-9=0\) in [2,3] by bisection method is \(\qquad\) . (upto 3 decimal places)

Correct Ans. 2.625 (2.620-2.630)
2 Solution
Q. 35

A matrix \(A=\left[a_{i j}\right]_{15 \times 15^{\prime}}\), where \(a_{i j}=\left\{\begin{array}{lll}i & \forall & i=j \\ 0 & \forall & i \neq j\end{array}\right.\) then sum of eigen values of \(\boldsymbol{A}\) will be \(\qquad\) .

A bar is subjected to fluctuating tensile load from \(30 \mathbf{k N}\) to 110 kN . The material has yield strength of 220 MPa and endurance limit is 150 MPa . According to soderberg principle, the area of cross section in \(\mathrm{mm}^{2}\) of the bar for a factor of safety of 2.5 is
a. 1462.12
b. 1362.33
c. 1413.33
d. 1493.12

Solution
Q. 37 A lightly loaded full journal bearing has journal diameter of \(\mathbf{5 0} \mathbf{~ m m}\), bush bore of \(\mathbf{5 0 . 0 5} \mathbf{~ m m}\) and bush length of \(\mathbf{4 0} \mathbf{~ m m}\). If rotational speed of journal is \(\mathbf{1 0 0 0} \mathbf{~ r p m}\) and average viscosity of liquid lubricant is 0.03 Pa.s, the power loss (in Watt) will be
a. 49.732
b. 54.677
c. 36.706
d. 51.677

Correct Ans. d
Solution
Q. 38 A 90 cm diameter spherical vessel is completely filled up with a liquid of specific gravity 0.75 , the vessel and the liquid are then rotated about the vertical axis, without relative motion, at a rotational speed of \(\mathbf{6 0}\) rpm. (Take \(\mathrm{g}=10 \mathrm{~m} / \mathrm{s}^{2}\) ). The points of maximum pressure lie on a horizontal plane below the centre of sphere by
a. 45 cm
b. 29.43 cm
c. 25.33 cm
d. 20.33 cm

Correct Ans. ©

In the stepped shaft with torques applied, the total stored strain energy is \(\qquad\) kN-m.


Use \(T_{1}=50 \mathrm{Nm}, T_{2}=70 \mathrm{Nm}\) and \(G=110 \mathrm{GPa}\)
a. 1.937
b. 2.237
c. 1.737
d. 2.437

Correct Ans. a
Solution
Q. 40 In the shown epicyclic gear train gear A is fixed, gear C is rotating in clockwise direction with a speed of 125 rpm.


If the speed of arm in Case: \(I\) is \(a\) and speed of the arm in Case: II is \(b\) when position of \(B\) and \(C\) is interchanged, then value of \(|b-a|\) will be
a. \(1.359 \mathrm{rad} / \mathrm{sec}\)
b. \(6.120 \mathrm{rad} / \mathrm{sec}\)
c. \(35.714 \mathrm{rad} / \mathrm{sec}\)
d. \(2.381 \mathrm{rad} / \mathrm{sec}\)

Correct Ans. b
Solution
Q. 41

A metal joined using MIG welding require \(20 \mathrm{~J} / \mathrm{mm}^{3}\) for melting. 30 Volt and 250 A power source is used. If melting efficiency is \(\mathbf{8 0 \%}\) and weld area is \(\mathbf{2} \mathrm{mm}^{2}\) and welding speed is \(100 \mathrm{~mm} / \mathrm{s}\), then what is the arc heat transfer efficiency?
a. \(66.67 \%\)
b. \(33.33 \%\)
c. \(53.33 \%\)
d. None of above

Correct Ans. a
Solution
Q. 42

For the gear train as shown in figure, \(T_{S}=24, T_{P}=30, T_{C}=18, T_{A}=90 . P\) and \(C\) form a compound gear carried by the arm a and annular gear \(A\) is held stationary. What is fixing torque required on \(A\) if 5 kW is delivered to \(\mathbf{S}\) at \(\mathbf{8 0 0} \mathbf{~ r p m}\) with an efficiency of \(\mathbf{9 0 \%}\) ?

a. 459 Nm
b. 521 Nm
c. 224 Nm
d. 329.86 Nm

Correct Ans. d
Solution

Hartnell governor with equal arms, when sleeve is in midposition, the masses rotate in a circle with a diameter of 150 mm (arms are vertical in mid position). Neglecting friction, equilibrium speed for this position is \(\mathbf{2 4 0} \mathbf{r p m}\). Maximum variation of speed when friction is taken into account is \(\mathbf{1 0 \%}\) of mid position speed, for a maximum sleeve movement of 30 mm . The sleeve mass is \(5 \mathbf{k g}\) and friction at the sleeve is 35 N .
Assuming that power of governor is sufficient to overcome the friction by \(1 \%\) change of speed on each side at mid position, what is the stiffness of spring?
a. \(25.67 \mathrm{~N} / \mathrm{mm}\)
b. \(44.56 \mathrm{~N} / \mathrm{mm}\)
c. \(86.17 \mathrm{~N} / \mathrm{mm}\)
d. \(22.43 \mathrm{~N} / \mathrm{mm}\)

\section*{Correct Ans. b}
Q. 44 A real gas follows the following relation:
\(\left(P+\frac{a}{V^{2}}\right)(V-b)=m R T\)
Where \(P\) is pressure in \(\mathbf{k P a}, \mathbf{V}\) is volume in \(\mathrm{m}^{3}\) and m is mass of gas in kg ( a and b are constants).
If the system goes isothermally from 1 m 3 to 10 m 3 at a temperature of 293 K , then what will be the work done by the system?
Use the values, \(a=155 \mathrm{kNm}^{4}, b=0.98 \times 10^{-2} \mathrm{~m}^{3}, m=10 \mathrm{~kg}\) and \(R=0.287 \mathrm{~kJ} / \mathrm{kgK}\)
a. 2204 kJ
b. 1804 kJ
c. 1733.33 kJ
d. 1656 kJ

\section*{Correct Ans. b}

A sphere of \(\mathbf{3 0 0} \mathbf{~ g m}\) is attached to an inextensible string of length 1.3 m , whose upper end is fixed to the ceiling. The spring is made to describe a horizontal circle of radius 0.5 m . What is angular velocity of sphere?

a. \(2.859 \mathrm{rad} / \mathrm{sec}\)
b. \(7.23 \mathrm{rad} / \mathrm{sec}\)
c. \(8.86 \mathrm{rad} / \mathrm{sec}\)
d. \(10.2 \mathrm{rad} / \mathrm{sec}\)

Correct Ans. a

For the given crank and slotted bar mechanism. What will be the velocity of slider with respect to slotted link \(A B\) and angular velocity of link \(A B\) respectively?

a. \(50 \mathrm{~mm} / \mathrm{s}, 5 \mathrm{rad} / \mathrm{s}\)
b. \(50 \mathrm{~mm} / \mathrm{s}, 8.66 \mathrm{rad} / \mathrm{s}\)
c. \(86.6 \mathrm{~mm} / \mathrm{s}, 8.66 \mathrm{rad} / \mathrm{s}\)
d. \(86.6 \mathrm{~mm} / \mathrm{s}, 5 \mathrm{rad} / \mathrm{s}\)

Correct Ans. d
Solution
Q. 47 A straight bar of steel 2.4 m long of rectangular section, \(3 \mathrm{~cm} \times 1.6 \mathrm{~cm}\) is used as a strut with both ends hinged. Assuming that Euler's formula is applicable and material attains its yield strength at time of buckling. What will be the central deflection in bar? [ \(E=210 \mathrm{GPa}\), yield strength \(=\mathbf{2 7 0} \mathrm{MPa}\) ]
a. 46 mm
b. 63 mm
c. 125 mm
d. 91 mm

Correct Ans. d
Solution
Q. 48

A hollow steel pipe is loaded as shown in the figure, with \(d_{0}=120 \mathrm{~mm}, d_{i}=100 \mathrm{~mm}\)


What is the value of \(W\) if maximum principle stress at point \(A\) on top of pipe doesn't exceed 80 MPa ?
a. 25.49 kN
b. 38.47 kN
c. 35.13 kN
d. 28.29 kN

Correct Ans. C
Solution

A small geothermal well in a remote desert area produces \(\dot{m} \square \mathrm{~kg} / \mathrm{h}\) of saturated steam vapour at \(T_{1} \mathrm{~K}\). The environment temperature is \(T_{0} \mathrm{~K}\). This geothermal steam will be suitably used to produce cooling for homes at \(T K\). The steam will emerge from this system as saturated liquid at 1 atm . What will be the maximum cooling rate that could be provided by such a system?
[Symbol have their usual meanings]
\(\frac{\dot{m}\left(h_{1}-h_{2}\right)}{\left(\frac{T_{0}}{T}-1\right)}\)
a.
b.
\[
\frac{\dot{m}\left[\left(h_{1}-T_{0} s_{1}\right)-\left(h_{2}-T_{0} s_{2}\right)\right]}{\left(\frac{T_{0}}{T}-1\right)}
\]
\[
\frac{\dot{m}\left(h_{1}-h_{2}\right)}{\left(1-\frac{T_{0}}{T}\right)}
\]
d. \(\frac{\dot{m}\left[\left(h_{1}-T_{0} s_{1}\right)-\left(h_{2}-T_{0} s_{2}\right)\right]}{\left(1-\frac{T_{0}}{T}\right)}\)

Correct Ans. b
Solution
Q. 50 The maximum value of \(f(x)=x(x-1)(x-2)\) in the interval [1, 2] is
a. -0.384
b. 0.384
c. 0
d. -0.375

Correct Ans. ©
Q. 51

The nullity of \(A=\left[\begin{array}{lll}2 & 3 & 7 \\ 1 & 1 & 9 \\ 9 & 2 & x\end{array}\right]\) is 1 , then the value of \(x\) will be
a. 6
b. 7
c. 11
d. None of these

Correct Ans. d

A stepper motor has 150 steps. The output shaft of the motor is directly coupled to a lead screw of pitch 5 mm , which drives a table. If the frequency of pulse supply to the motor is 250 Hz , the speed of the table is \(\qquad\) mm/min.

A dam is having a curved surface as shown in the figure. The net force acting on the dam is \(\qquad\) \(\mathbf{M N}\). Use \(\rho_{\text {water }}=1000 \mathrm{~kg} / \mathrm{m}^{3}, g=9.81 \mathrm{~m} / \mathrm{s}^{2}\).


Correct Ans. 49.3556 (48-51)
20 Solution
Q. 54

In a dimensional analysis, both viscous and gravity forces are dominant. If oil of kinematic viscosity \(92.9 \times 10^{-6} \mathbf{~ m}^{2} / \mathrm{s}\) is used in the model tests and if the prototype liquid has a kinematic viscosity of \(\mathbf{7 4 3 . 2}\) \(\times 10^{-6} \mathrm{~m}^{2} / \mathrm{s}\). The ratio of model length to prototype length is \(\qquad\) _.

Correct Ans. \(0.25(0.24-0.26): \quad\) Solution

A flow of \(0.1 \mathrm{~kg} / \mathrm{s}\) of exhaust gases of 700 K from a gas turbine is used to preheat the incoming air, which is at the ambient temperature of 300 K . It is desired to cool the exhaust to 400 K , and it is estimated that an overall heat transfer coefficient of \(30 \mathrm{~W} / \mathrm{m}^{2} \mathrm{~K}\) can be achieved in an appropriate exchanger. The area (in \(\mathrm{m}^{2}\) ) required for a counter flow heat exchanger is \(\qquad\) -.
Take the heat capacity of exhaust gases same as for air which is equal to \(1 \mathrm{~kJ} / \mathrm{kg}-\mathrm{K}\).
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Correct Ans. 10
Solution

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Steam at 4 MPa and \(350^{\circ} \mathrm{C}\) enters the turbine in a Rankine cycle and exits at 15 kPa . If the turbine has an isentropic efficiency of \(85 \%\), the thermal efficiency of the cycle is \(\qquad\) \(\%\). Use the following table if required:
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline State & \multicolumn{2}{|c|}{\(h(\mathrm{~kJ} / \mathrm{kg})\)} & \(s(\mathrm{~kJ} / \mathrm{kgK})\) & \(v\left(\mathrm{~m}^{3} / \mathrm{kg}\right)\) \\
\hline Steam at \(4 \mathrm{MPa}, 350^{\circ} \mathrm{C}\) & \multicolumn{2}{|c|}{3095} & 6.6783 & \multicolumn{2}{c|}{0.05512} \\
\hline Water at 15 kPa & \(h_{f}\) & \(h_{g}\) & \(s_{f}\) & \(s_{g}\) & \(v_{f}\) & \(v_{g}\) \\
\hline & 225 & 2600 & 0.755 & 8.012 & \(1.014 \times 10^{-3}\) & 10.02 \\
\hline
\end{tabular}

Correct Ans. 27.48 (26.5-28.5)
Solution

In a combined vapour cycle coupled in a series with three different working fluids \(\mathrm{Na}, \mathrm{Hg}\) and water. The efficiency of the Na cycle, Hg cycle and steam cycle are \(0.5,0.4\) and 0.4 respectively, the overall efficiency (in \%) of the combined vapour cycle is \(\qquad\) -.

If the surface temperature of the sun (ideal radiation) is 5800 K and the solar insolation on the earth is
\(1.4 \mathrm{~kW} / \mathrm{m}^{2}\). Then the ratio of radius of the earth's orbit to that of sun is \(\qquad\) —.

Correct Ans. 214.08 (213-215)
Solution
Q. 59 In an aircraft refrigeration system air enters the compressor at 298 K . The pressure ratio of the system is 5 . Air exits the condenser at 270 K and enters the expander. If the actual COP of the system is \(50 \%\) of ideal, the power required for refrigeration for \(3 \mathrm{~kg} / \mathrm{s}\) of air is__ kW. [Use \(\gamma=1.4\) and \(\left.C_{P}=1.005 \mathrm{~kJ} / \mathrm{kgK}\right]\)

Correct Ans. 449.18 (448-450)
Q. 60 In a transportation problem, there are three plants A, B and C which produces 50,60 and 40 units respectively and three stores \(P, Q\) and \(R\) whose demand is 25,35 and 60 units respectively. If the carrying cost, ₹ per unit is given in the matrix form, total transportation cost after allocation using column minima method is ₹ \(\qquad\) _.
\begin{tabular}{c|c|c|c|} 
& \multicolumn{1}{c}{P} & \multicolumn{1}{c}{Q} & \multicolumn{1}{c}{R} \\
\cline { 3 - 4 } & 2 & 5 & 3 \\
\hline & 2 & 4 & 3 \\
\hline & 1 \\
\hline & 1 & 2 & 5 \\
\hline
\end{tabular}

Correct Ans. 215

Q. 61 In a M/M/1 queueing model, arriving rate is 2 person per hour and service rate is 3 person per hour. The probability of having more than 3 people in the queue is \(\qquad\) (Correct upto 2 decimal place)

Correct Ans. 0.1316 (0.12-0.14)
2 Solution
Q. 62

The value of Grashoff number for a horizontal square plate of side 3 m is \(\qquad\) \(\times 10^{9}\). The properties at mean temperature are:
\(\beta=0.003125 \mathrm{k}^{-1}, v=1.78 \times 10^{-5} \mathrm{~m}^{2} / \mathrm{s}, T_{\mathrm{atm}}=320 \mathrm{~K}, T_{\text {plate }}=374 \mathrm{~K}\)

Correct Ans. 2.204 (2.1-2.3)
Solution
Q. 63 Air contains \(79 \% \mathrm{~N}_{2}\) and \(21 \% \mathrm{O}_{2}\) on a molar basis. A hydrocarbon fuel \(\left(\mathrm{C}_{2} \mathrm{H}_{6}\right)\) is burned with \(50 \%\) excess air than required stoichiometrically. Assume complete combustion of fuel, the molar percentage of \(\boldsymbol{N}_{\mathbf{2}}\) in the products is \(\qquad\) .
Q. 64 If \(y^{\prime}-x \neq 0\) and \(y(0)=2\), then value of \(y(1)\) for differential equation \(y^{\prime}\left(y^{\prime}+y\right)=x(x+y)\) would be \(\qquad\) . (Upto 3 decimal places)

Correct Ans. \(0.367(0.360-0.370):\) Solution
Q. 65 A coin is tossed till tail appears for the first time. The average number of tosses required is \(\qquad\)

Correct Ans. 2
Solution```

