69. 5 g of a powder (with apparent density of 4.3 g/cm^3) is fed into a compaction die having 10 mm diameter. The powder is then compacted to a green density of 6.6 g/cm^3 using an uniaxial single action press (pressing by upper punch only). Assuming no mass loss and neglecting elastic spring back effect during compaction, the upper punch will travel by a height of:

1. 5.16 mm 2. 9.65 mm 3. 14.81 mm 4. 15.35 mm

70. The elastic modulii of Al and SiC fibers are 69.0 GPa and 406.0 GPa, respectively, and the corresponding densities are 2.70 Mg/m^3 and 3.05 Mg/m^3, respectively. The specific modulus for an Al-matrix with 20 vol% of aligned continuous SiC fiber is:

1. 10.1 GPa/Mg/m^3
2. 3.4 GPa/Mg/m^3
3. 49.2 GPa/Mg/m^3
4. 84.4 GPa/Mg/m^3

71. At 300K calculate the density of conduction electrons in a silicon wafer doped with $2 \times 10^{16}/cm^3$ of Boron. (Intrinsic carrier density of Si at 300K is $9.65 \times 10^9/cm^3$)

1. $5 \times 10^3/cm^3$
2. $10^{10}/cm^3$
3. $2 \times 10^{12}/cm^3$
4. $10^{20}/cm^3$

72. In a super conducting wire-loop, the current flow decays following the equation $i_t = i_0 . exp\left[-\frac{R}{L}t\right]$ where, R and L represent resistance and self inductance, respectively. The self-inductance of half a meter super conductor wire-loop having wire diameter of 1.2 mm is found to be $2 \times 10^{-6}\ \Omega{\cdot}s$. The maximum resistance that this superconductor loop should possess to maintain a current flow of 1A for 1 year with 2% decay will be:

1. $4.04 \times 10^{-8}\ \Omega$
2. $3.07 \times 10^{-14}\ \Omega$
3. $1.28 \times 10^{-15}\ \Omega$
4. $2.48 \times 10^{-13}\ \Omega$

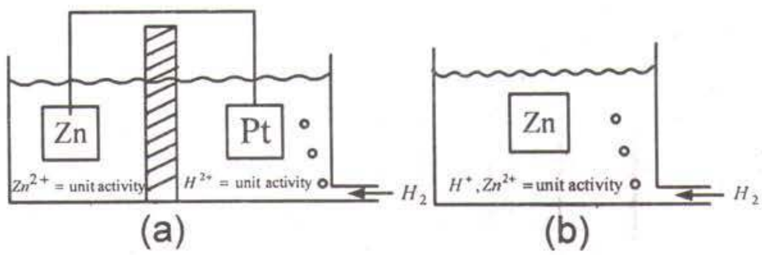
73. The critical resolved shear stress of a metal is 2.0 MPa. During plastic deformation of a single crystal of this metal, the slip plane rotates in a manner so that the angle between the tensile axis and the slip direction changes from 45° to 30°. If the angle between the normal to the slip plane and the tensile axis remains unaltered at 60°, the tensile stress changes as follows:

1. Increased by 1.04 MPa
2. Decreased by 1.04 MPa
3. Increased by 0.16 MPa
4. Decreased by 0.16 MPa

74. The atomic weight and density of iron are 55.85 g/mol and 7.86 g/cm^3, respectively. If net magnetic moment per atom of iron is 2.22 Bohr magnetron, the saturation magnetization for iron will be:
[Given: Avogadro's no: 6.023×10^{23} atoms/mol and Bohr magnetron: 9.27×10^{-24} A-m^2]

1. $1.52 \times 10^6\ A/m$
2. $1.73 \times 10^6\ A/m$
3. $1.91 \times 10^6\ A/m$
4. $2.03 \times 10^6\ A/m$

75. Figure (a) shows a reversible cell containing zinc and platinum electrodes which are short-circuited whereas figure (b) shows a zinc metal immersed in a hydrogen saturated acid solution.



Given: Standard oxidation-reduction (redox) potentials for $Zn = Zn^{2+} + 2e$ is – 0.763 V, for $H_2 = 2H^+ + Ze$ is 0 V and for $Pt = Pt^{2+} + 2e$ is 1.2 V.
Choose the appropriate phenomenon that would occur:

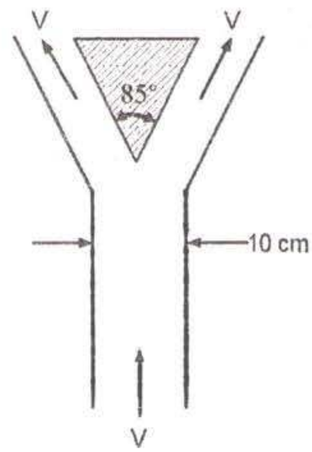
1. Zinc dissolution will be faster in case of (a) as voltage difference between anode and cathode is more (than (b)).
2. Short circuiting causes no potential difference between Pt and Zn in (a) and hence dissolution will not occur in (a), whereas dissolution in (b) occurs.
3. No dissolution occurs in either situation as there is no potential difference between cathode and anode in (a), and for (b), there is no cell formation (only one electrode).
4. In both cases, rate of zinc dissolution be same. Pt act as equilibrium hydrogen electrode in (a) whereas Zn-metal will act as both cathode and anode (localized).

FLUID MECHANICS

76. A fluid is flowing down a vertical tube (dia = 6 mm) due to gravity (g = 9.81 m/s^2) only. The density and viscosity of the liquid are 900 kg/m^3 and 0.01 Pa.s, respectively. Assume the flow to be incompressible, laminar and fully developed. If the length of the tube is 2 m, then neglecting all minor losses, the volumetric flow rate, in m^3/h, is numerically closest to

1. 0.1
2. 0.4
3. 0.2
4. 0.8

77. Air (density = 1.2 kg/m^3) is entering the bottom of an 85° conical flow meter circular duct at a mass flow rate of 0.3 kg/s as shown in the figure. This flow supports a centered conical body by steady annular flow around the cone and exits at same velocity as it enters. The weight of the body, in Newton, is numerically closest to



1. 2.5
2. 4.5
3. 6.5
4. 8.5

78. A homogenous right circular cylinder of length L, radius R and specific gravity SG is floating in water with its axis vertical. If SG = 0.8, then the minimum value of R/L above which the body will always be stable is

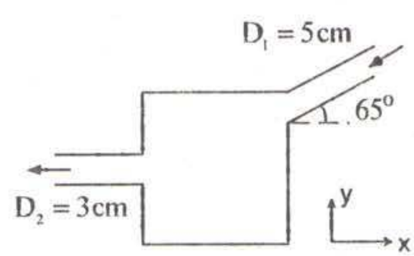
1. 0.16
2. 0.36
3. 0.56
4. cannot predict due to insufficient data

79. A tank of volume $\forall$ contains a gas at pressure p (absolute) and temperature T, with a uniform state. At t=0, the gas begins escaping from the tank through a valve with a flow area of A. The air passing through the valve has an average speed of $\bar{V}$ and density ρ. If the universal gas constant is R, then what is the instantaneous rate of change of density in the tank at t=0?

1. 0
2. $\frac{\rho A\bar{V}}{\forall}$
3. $-\frac{\rho A\bar{V}}{\forall}$
4. $\frac{\frac{-\partial p}{\partial t}}{RT}$

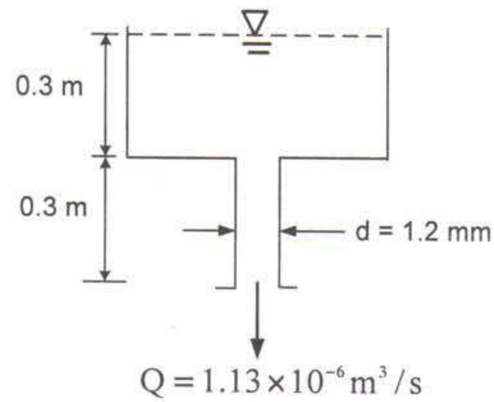
80. Water (density = 1000 kg/m^3) flows steadily through the box as shown in the figure. Assume all ducts to be circular, and all velocity profiles to be uniform. If the inflow velocity is 2 m/s, then the overall magnitude of force required to hold the box stationary against the flow momentum is numerically closest to

1. 10 N
2. 15 N
3. 20 N
4. 25 N



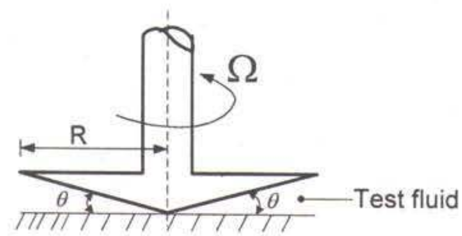
81. A liquid of specific weight 9 kN/m^3 flows by gravity through a 0.3 m tank and a 0.3 m capillary tube at a rate of 1.13×10^{-6} m^3/s, as shown in the figure. Top of the tank and outlet of the capillary are open to the atmosphere. If the flow is laminar, fully developed and incompressible, then the viscosity of the liquid, neglecting entrance effect, is numerically closest to

1. 1.86×10^{-4} Pa.s
2. 3.38×10^{-4} Pa.s
3. .. 6.75×10^{-4} Pa.s
4. 7.43×10^{-4} Pa.s

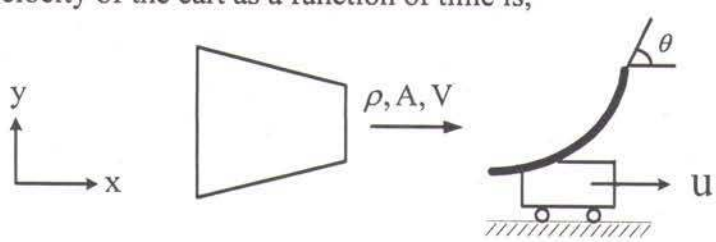


82. Consider a cone-plate viscometer arrangement as shown in the figure. The angle of the cone is very small (θ =10°) and the gap is filled with a test liquid. A torque of M = 0.001 N.m is being applied to rotate the cone having R = 0.01 m at a constant rate of Ω = 100 s^{-1}. Assuming a linear velocity profile in the liquid, the viscosity of the test liquid is numerically closest to

1. 0.6
2. 0.7
3. 0.8
4. 0.9

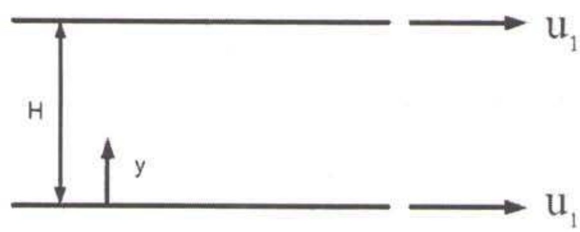


83. A vane, with turning angle of θ, is attached to a cart. The cart and vane, of mass M, roll on a level track, with a speed of u along x-axis as shown in the figure. Friction and air resistance may be neglected. The vane receives a jet of water (density ρ) which leaves horizontally at a uniform speed of V. The nozzle exit area is A. The governing differential equation describing the velocity of the cart as a function of time is,



1. $M\frac{du}{dt} = \rho(V-u)^2 A\cos\theta$
2. $M\frac{du}{dt} = \rho(V^2-u^2) A\,(1-\cos\theta)$
3. $M\frac{du}{dt} = \rho(V^2-u^2) A\cos\theta$
4. $M\frac{du}{dt} = \rho(V-u)^2 A(1-\cos\theta)$

84. Steady, fully developed flow takes place between two infinitely wide parallel plates. Density of the fluid is assumed to be constant. The top plate and bottom plate both move towards the right with a velocity u_1, as depicted in the figure. Assuming zero pressure gradient, the fully developed velocity profile between the plates is given by,



1. $u = u_1$
2. $u = 0$
3. $u = u_1 \frac{y}{H}$
4. $u = u_1(1 - \frac{y}{H})$

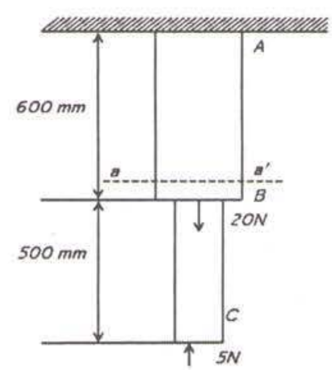
85. Two reservoirs that differ by a surface elevation of 40 m, are connected by a commercial steel pipe of diameter 8 cm. If the desired flow rate is 200 N/s of water at 20°C, determine the length of the pipe. Assume fluid properties of water at 20°C as ρ=1000 kg/m^3 and μ=0.001kg/m-s. The value of friction factor (f) = 0.0185 may be chosen if required.

1. 20.5 m
2. 205 m
3. 2050 m
4. 20500 m

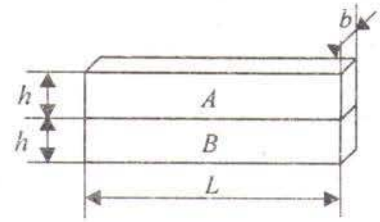
SOLID MECHANICS

86. A stepped bar is hung from the ceiling as shown in the figure. The cross-section of $AB = 500$ mm^2, and that of $BC = 200$ mm^2. Assuming that the density of both the rods are the same and equal to 7500 kg/m^3, find the axial force at a section a-a' just above B. Take $g = 10$ m/s^2. A downward force of 20 N is acting at B and a force of 5 N at C is acting upwards.

1. 32.5 N
2. 22.5 N
3. 90 N
4. 100 N

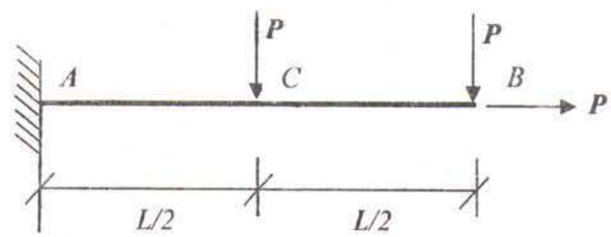


87. A strip of length, L, breadth, b, and height, h, is initially pulled with a force P and held while another strip B of the same dimension is taken and pasted to the strip A in the pulled condition as shown in the figure. Once the bond between A and B is fully developed, the force P is removed from A. Find the amount of shear force transferred to strip A by B at the interface.



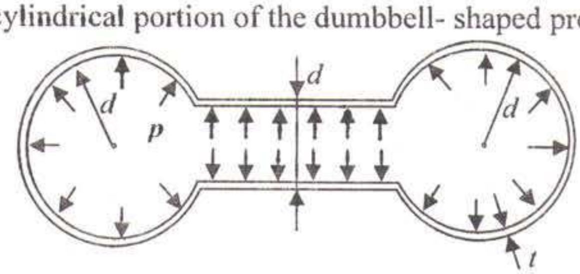
1. $\frac{PL}{4}$
2. $\frac{PhL}{8}$
3. $\frac{PL}{8}$
4. $\frac{Ph^2}{4}$

88. Find the magnitude of total deflection at B. (Assume elastic modulus = *1unit*, moment of inertia = *1unit*, area of cross-section = *2 units* and length = L = *1unit*)



1. $\frac{7P}{16}$
2. $\frac{7P}{8}$
3. $\frac{P\sqrt{53}}{16}$
4. $\frac{P\sqrt{113}}{16}$

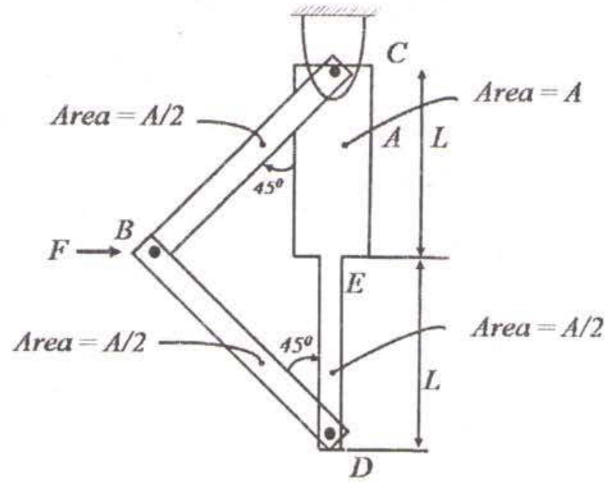
89. A dumbbell-shaped pressure vessel of uniform wall thickness t is subjected to an internal pressure p. The ends are made of spherical shaped vessels of diameter d, connected by a cylindrical vessel of diameter d at the middle as shown. Find the longitudinal stress, σ_l at the center of the cylindrical portion of the dumbbell- shaped pressure vessel.



1. $\sigma_l = \frac{2pd}{t}$
2. $\sigma_l = \frac{pd}{t}$
3. $\sigma_l = \frac{pd}{2t}$
4. $\sigma_l = \frac{pd}{4t}$

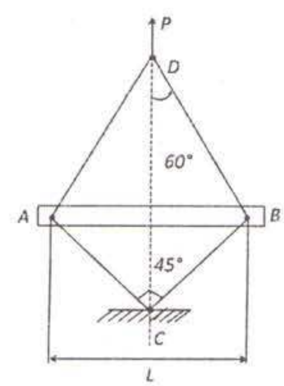
90. A force F is acting at the joint B of the truss BCD shown. Find the total strain energy stored in the elastic system due to the force F. Assume elastic modulus of E for all the bars.

1. $\frac{F^2L}{AE}\left[\frac{1}{\sqrt{2}}+\frac{3}{8}\right]$
2. $\frac{F^2L}{AE}\left[\sqrt{2}+\frac{3}{4}\right]$
3. $\frac{F^2L}{AE}\left[2\sqrt{2}+\frac{3}{4}\right]$
4. $\frac{F^2L}{AE}\left[\sqrt{2}+\frac{3}{8}\right]$

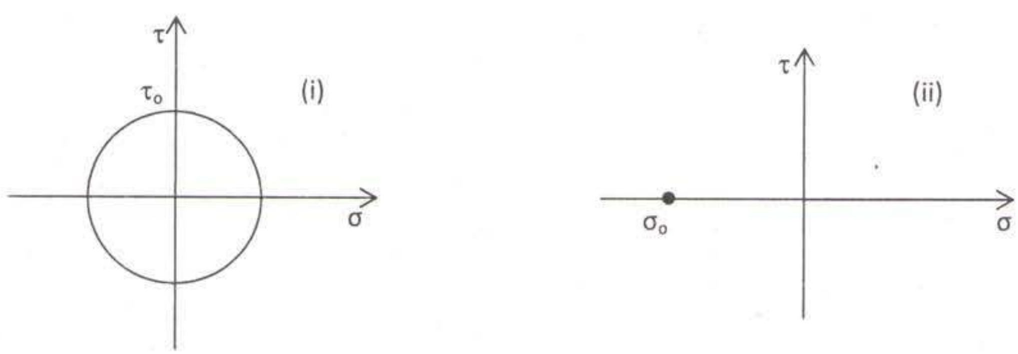


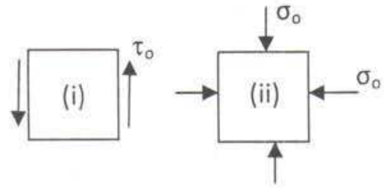
91. AB is a thin hollow tube of mean diameter d and thickness t. The tube is fixed to cables and pulled at D as shown. Find the load P for which the tube is likely to buckle according to Euler's formula.

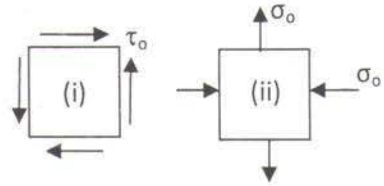
1. $\frac{\pi^3 E d^3 t}{4L^2(\sqrt{3}+1)}$
2. $\frac{\pi^2 E d^3 t}{L^2(\sqrt{3}+1)}$
3. $\frac{\pi^3 E d^3 t}{4L^2(\sqrt{3}-1)}$
4. $\frac{\pi^2 E d^3 t}{L^2(\sqrt{3}-1)}$

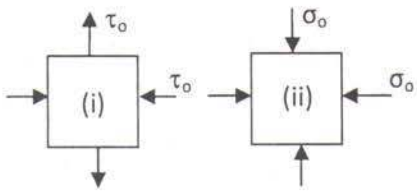


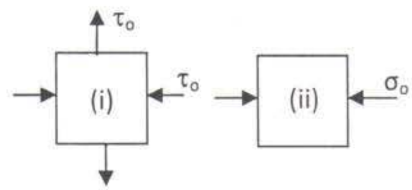
92. Select the appropriate pair of elements with the same state of stress as given by the following Mohr's circles.



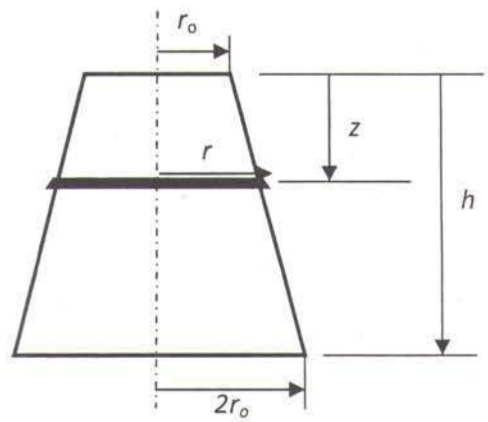
1. 

2. 

3. 

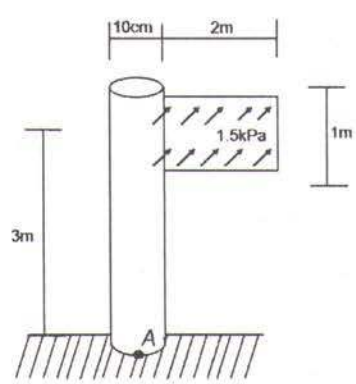
4. 

93. A rubber band of unstretched length equal to $2r_0$ is forced down the frustum of a cone as shown. Determine the average extensional strain in the band as a function of the distance from the top of the frustum, z.



1. $\frac{\pi(h+z)}{h} - 1$
2. $\frac{\pi z}{h}$
3. $\frac{z}{h}$
4. $\frac{z}{hr_0}$

94. A sign supported by a post of circular cross-section is subjected to a uniform wind load that acts normal to its plane as shown in the figure. What are the magnitudes of the normal and shear components of stress (σ_{xx} ,τ_{xy}) at A? Assume the moment of inertia (I) = 5 x 10^{-6} m^4.



1. σ_{xx} = 90 MPa, τ_{xy} = 30 MPa
2. σ_{xx} = 180 MPa, τ_{xy} = 30 MPa
3. σ_{xx} = 90 MPa, τ_{xy} = 15 MPa
4. σ_{xx} = 180 MPa, τ_{xy} = 15 MPa

95. A cubical block is subjected to a stress state given by:

$$\begin{pmatrix} 4\sigma & 0 & 44 \\ 0 & 2\sigma & -34 \\ 44 & -34 & -\sigma \end{pmatrix} MPa$$

What is the magnitude of σ for which the factor of safety against yield is about 2. Use von Mises criterion for yield. The yield strength of the material may be taken to be 520 MPa.

1. 36 MPa   2. 55 MPa   3. 117 MPa   4. 81 MPa

THERMODYNAMICS

96. A container having a volume of 0.5 m^3 is initially filled with saturated water at 250°C. Water is withdrawn from the container through a pipe such that the final mass in the container is half of the initial mass. Throughout this process, temperature of water is maintained constant by transferring heat to water. Specific volume and internal energy of saturated water at 250°C are 0.001251 m^3/kg and 1080 kJ/kg respectively. The internal energy of water at the end of the process is 1119 kJ/kg. The enthalpy of saturated liquid at 250°C is 1085 kJ/kg. The heat transfer in kJ is

1. 5875   2. 8780   3. 10680   4. 12395

97. An insulated box is divided into two equal compartments by a rigid partition. One compartment contains 1 kmol of N_2 whereas the other compartment contains 1 kmol of O_2. Pressure and temperature at both the compartments are 101 kPa and 200°C. The partition is removed and the gases are allowed to mix to come to a thermodynamic equilibrium state. The universal gas constant is 8.314 kJ/kmolK. The change in entropy (kJ/kmolK) is

1. 6.6   2. 8.5   3. 11.5   4. 15.3

98. In an ideal air standard Otto Cycle, the pressure and temperature at the beginning of compression are 101 kPa and 27°C respectively. The ratio of stroke volume to clearance volume is 9. Heat added to the cycle is 1800 kJ/kg.
Given, γ_{air}=1.4 and $c_{v,air}$ = 0.718 kJ/kgK. Maximum temperature (°C) in the cycle is

1. 2475   2. 2723   3. 2987   4. 3300

99. In an air-standard Brayton Cycle with regenerator, air enters a single-stage compressor at 100 kPa, 20°C and leaves the compressor at 1 MPa. The maximum temperature in the cycle is 1200°C. The regenerator effectiveness is 0.8. For air, γ_{air}=1.4 and $c_{p,air}$ = 1.005 kJ/kgK. The efficiency of the cycle is

1. 46.7%   2. 49.2%   3. 53.4%   4. 58.3%

100. Moist air enters a dehumidifier at 30°C with an absolute humidity of 0.0211 kg moisture/kg dry air. The enthalpy of saturated vapour at this temperature is 2556.25 kJ/kg. The moist air leaves the humidifier with an absolute humidity of 0.0107 kg moisture/kg dry air and 15°C. At this temperature, the enthalpies of saturated liquid and vapour are 62.98 kJ/kg and 2528.91 kJ/kg respectively.
Given, $c_{p,air}$ = 1.005 kJ/kgK. The heat removed (kJ/kg of dry air) is

1. 35.4
2. 41.3
3. 47.9
4. 49.7

101. A house is being heated during winter by a well known brand heat pump. The ambient temperature is –10°C and the house is maintained at 25°C. The house loses heat at a rate of 30 kW. The power input to the heat pump is 5 kW. The coefficient of performance of the heat pump is

1. 1.0
2. 3.0
3. 6.0
4. 7.5

102. A refrigerator works on an ideal vapour compression refrigeration cycle operating between 0.16 MPa and 0.80 MPa. The heat rejection to the environment is 180 kJ/kg. Saturation property of the refrigerant is given as:

Pressure, MPa	Enthalpy, kJ/kg	
	Saturated Liquid	Saturated vapour
0.16	31	240
0.80	95	267

The work input (kJ/kg) to the compressor is

1. 8
2. 27
3. 35
4. 64

103. Air gets preheated in a constant pressure heat exchanger where air enters at 40°C with a mass flow rate of 10 kg/s. The air exits the pre-heater at 100°C. Consider air as an ideal gas with c_p = 1.005 kJ/kgK and c_v = 0.718 kJ/kgK; ambient temperature is 27°C. The change in energy (kJ) of the air stream in the pre-heater is

1. –74
2. –53
3. 53
4. 74

104. An ideal regenerative Rankine cycle employs one open feed water heater (FWH) which operates at 1.2 MPa. The extracted steam leaves the turbine at 220°C. The condensate enters the FWH at an enthalpy of 195 kJ/kg.
Water property data: h=2862 kJ/kg at 1.2 MPa and 220°C. Saturated liquid enthalpy at 1.2 MPa = 800 kJ/kg.
Neglecting pump work input, the mass flow fraction extracted from the turbine is

1. 0.127
2. 0.227
3. 0.327
4. 0.427

105. Consider a steady-flow Carnot vapour power cycle within the saturation dome with the heat addition process between the saturated liquid and saturated vapour points. The cycle operates between 10 MPa and 0.02 MPa. Heat rejected in the condenser is 850 kJ/kg. Saturation properties of the working fluid:

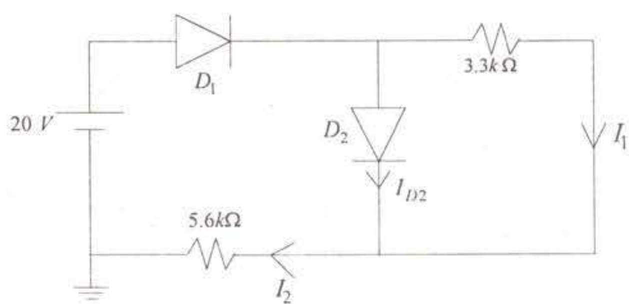
Pressure, MPa	Temperature, °C	Specific entropy (kJ/kgK)	
		Saturated liquid	Saturated vapour
10	311	3.36	5.62
0.02	-	0.83	7.91

The thermal efficiency of the cycle is

1. 35.6% 2. 46.6% 3. 64.4% 4. 84.6%

ELECTRONICS

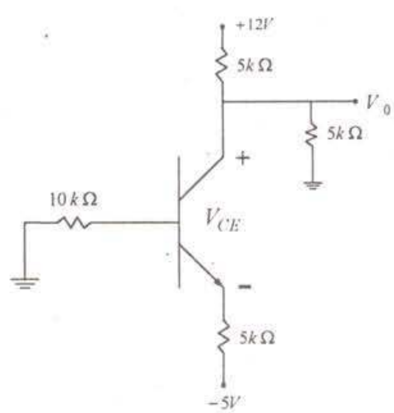
106.



For the circuit shown, determine the currents I_1, I_2 and I_{D2}. The cut-in voltage of each diode is 0.7 V.

1. 0.104 mA, 2.128 mA, and 2.024 mA
2. 0.310 mA, 4.213 mA, and 3.903 mA
3. 0.212 mA, 3.321 mA, and 3.109 mA
4. 0.175 mA, 2.918 mA, and 2.743 mA

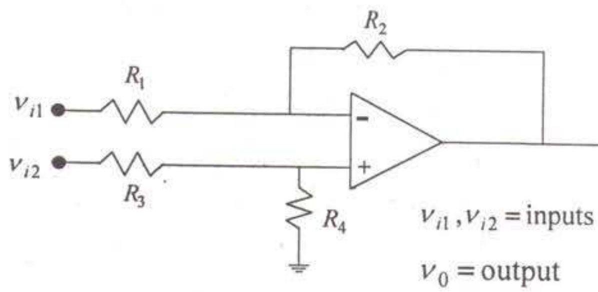
107.



For the circuit shown, what will be the output voltage (V_O) and collector-emitter voltage (V_{CE})? The transistor parameters are: $V_{BE(on)}$=0.7 V, and β=100.

1. 2.3 V and 2.9 V
2. 4.22 V and 5.35 V
3. 1.4 V and 3.05 V
4. 3.91 V and 4.69 V

108.



For this OPAMP-based difference amplifier circuit, determine the common-mode rejection ratio (CMRR) in dB. Assume $\frac{R_2}{R_1} = 15$ and $\frac{R_4}{R_3} = 16$.

1. 86.77 dB
2. 48.15 dB
3. 68.34 dB
4. 102.28 dB

109. A logic circuit has the following logical inputs and output:
Inputs: A, B, C
Output: Y
The output is high only when a majority of the inputs is high. Which one of the following is the correct logical relation between inputs and output?

1. Y = BC+AC+AB
2. Y = A+ BC
3. Y = ABC
4. Y = AB+C

110. The minimized form of the logic expression $f(A, B, C, D) = \Pi\ (0,3,4,5,6,7,11,13,14,15)$ is

1. $(\bar{A} + \bar{C} + \bar{D})\ (B + D)\ (B + C)(C + D)$
2. $\bar{A}\,\bar{C}\,\bar{D}\ + BD + BC + CD$
3. $(A + C + D)(\bar{B} + \bar{D})(\bar{B} + \bar{C})(\bar{C} + \bar{D})$
4. $ACD\ + \bar{B}\bar{D} + \bar{B}\bar{C} + \bar{C}\bar{D}$

111. Base-2 representation of decimal number 157.96875 is

1. 001101111.11111
2. 10011101.11111
3. 001101111.11101
4. 10011101.11101

112. Let $x(n)$ and $y(n)$ represent the input and output of an LTI system having an impulse response $h(n) = x(n-1) * y(n)$, where '$*$' denotes the discrete-time convolution operation. If $X(z)$ and $Y(z)$ are given as $1 - 3z^{-1}$ and $1 + 2z^{-2}$, respectively, then the output of the system for the input $\delta(n-1)$

1. has Z-transform $z^{-1}X(z)Y(z)$
2. has z-transform $1 - 3z^{-1} + 2z^{-2} - 6z^{-3}$
3. is equal to $\delta(n-2) - 3\delta(n-3) + 2\delta(n-4) - 6\delta(n-5)$
4. is equal to $\delta(n+2) + 3\delta(n-3) - 2\delta(n-4) + 6\delta(n+5)$

113. Let $s(t)$ be the step response of a linear system. Then the response of this system to an input $u(t)$ is given by

1. $\int_{-\infty}^{\infty} s(t-\tau)u(\tau)d\tau$
2. $\frac{d}{dt}\int_{-\infty}^{\infty} s(t-\tau)u(\tau)d\tau$
3. $\int_{-\infty}^{\infty} s(t-\tau)\,[\int_{-\infty}^{\infty} s(t-\tau)[\int_{-\infty}^{\infty} u(\tau_1)d\tau_1]d\tau$
4. $\int_{-\infty}^{\infty}[s(t-\tau)]^2 u(\tau)d\tau$

114. A voice signal band limited to 3.4 kHz is sampled at 8 kHz. It is then pulse-code modulated using 64 quantization levels. Ten such signals are time-division multiplexed (TDM) using one 5-bit synchronizing word for every alternate frame. The minimum channel bandwidth required for transmission of the TDM signal is

1. 260 kHz
2. 240 kHz
3. 44 kHz
4. 24 kHz

115. A 8 kHz communication channel has an SNR of 30 dB. If the channel band width is doubled keeping the signal power constant, the SNR of the modified channel will be

1. 27 dB
2. 30 dB
3. 33 dB
4. 60 dB

ROUGH WORK

JOINT CSIR-UGC-JRF/NET JUNE 2015 FINAL ANSWER KEY BOOKLET A **ENGINEERING SCIENCE (ENGLISH & BILINGUAL)**

Qn. Set A	Key
1	1
2	3
3	3
4	3
5	1
6	4
7	3
8	3
9	2
10	1
11	1
12	1
13	1
14	1
15	1
16	3
17	4
18	2
19	2
20	2
21	4
22	1
23	4
24	2
25	4
26	2
27	3
28	2
29	1
30	4
31	1
32	1
33	2
34	2
35	1
36	3
37	2
38	2
39	1
40	3
41	3
42	1
43	3
44	2
45	1
46	4
47	2
48	3
49	4

Qn. Set A	Key
50	2
51	2
52	3
53	1
54	2
55	2
56	2
57	3
58	4
59	2
60	3
61	3
62	3
63	3
64	2
65	2
66	1
67	3
68	2
69	1
70	3
71	1
72	3
73	2
74	2
75	4
76	1
77	1
78	3
79	3
80	3
81	3
82	3
83	4
84	1
85	2
86	2
87	3
88	4
89	4
90	4
91	1
92	3
93	1
94	3
95	2
96	2
97	3
98	3

Qn. Set A	Key
99	4
100	2
101	3
102	3
103	4
104	2
105	1
106	3
107	4
108	2
109	1
110	3
111	2
112	3
113	2
114	1
115	1

Qn. Set B	Key
1	3
2	3
3	1
4	1
5	2
6	4
7	1
8	1
9	3
10	1
11	3
12	1
13	3
14	4
15	2
16	1
17	1
18	3
19	2
20	2
21	2
22	3
23	1
24	4
25	1
26	4
27	4
28	2
29	2
30	4
31	3
32	1
33	1
34	3
35	1
36	2
37	1
38	1
39	2
40	1
41	3
42	2
43	2
44	2

Qn. Set B	Key
45	3
46	4
47	2
48	4
49	3
50	1
51	2
52	2
53	2
54	3
55	2
56	2
57	2
58	3
59	3
60	3
61	2
62	3
63	2
64	3
65	4
66	2
67	1
68	2
69	1
70	3
71	2
72	3
73	4
74	3
75	1
76	1
77	1
78	3
79	3
80	3
81	4
82	3
83	1
84	2
85	3
86	2
87	4
88	2

Qn. Set B	Key
89	4
90	3
91	3
92	4
93	1
94	3
95	1
96	3
97	4
98	3
99	4
100	1
101	2
102	3
103	2
104	3
105	2
106	1
107	3
108	4
109	2
110	2
111	3
112	2
113	1
114	1
115	3