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ESE 2025 : Prelims Exam
CLASSROOM TEST SERIES

MECHANICAL ENGINEERING

Test 4

Section A : Production Engineering & Material Science [All Topics]
Section B : Thermodynamics-1 [Part Syllabus]
Section C : Refrigeration and Air-Conditioning-1 [Part Syllabus]

Answer Key

1.	(a)	**16.**	(c)	**31.**	(c)	**46.**	(b)	**61.**	(a)
2.	(c)	**17.**	(c)	**32.**	(d)	**47.**	(b)	**62.**	(d)
3.	(c)	**18.**	(b)	**33.**	(c)	**48.**	(d)	**63.**	(a)
4.	(a)	**19.**	(b)	**34.**	(a)	**49.**	(a)	**64.**	(b)
5.	(a)	**20.**	(a)	**35.**	(b)	**50.**	(a)	**65.**	(a)
6.	(c)	**21.**	(b)	**36.**	(c)	**51.**	(b)	**66.**	(c)
7.	(c)	**22.**	(b)	**37.**	(d)	**52.**	(b)	**67.**	(c)
8.	(b)	**23.**	(b)	**38.**	(d)	**53.**	(b)	**68.**	(b)
9.	(b)	**24.**	(b)	**39.**	(b)	**54.**	(c)	**69.**	(c)
10.	(c)	**25.**	(a)	**40.**	(b)	**55.**	(d)	**70.**	(b)
11.	(d)	**26.**	(d)	**41.**	(d)	**56.**	(c)	**71.**	(d)
12.	(c)	**27.**	(a)	**42.**	(d)	**57.**	(a)	**72.**	(a)
13.	(a)	**28.**	(b)	**43.**	(b)	**58.**	(b)	**73.**	(d)
14.	(c)	**29.**	(d)	**44.**	(d)	**59.**	(c)	**74.**	(a)
15.	(c)	**30.**	(c)	**45.**	(d)	**60.**	(c)	**75.**	(c)

Section A : Production Engg. & Material Science

1. (a)

- The sand-resin mixture used in shell moulding can-withstand moderate temperature. Metals with high melting point like tungsten may damage the shell.
- The controlled thermal environment and precise mould properties of shell moulding contribute to uniform grain structure.

2. (c)

- Central core is used to form the inner surface of casting.
- Always vertical axis of rotation is used.

3. (c)

Cold working induces work hardening in metals, which increases their strength and hardness. As the material is deformed, dislocations accumulate within the metal's crystal structure, making it more resistance to further deformation.

4. (a)

- Since the forming is done using electromagnetic forces, there is no need of physical contact.
- Unlike processes like welding, EMF generates little to no heat in the workpiece.

5. (a)

$$\mu = \frac{F}{N} = \frac{F_c \sin\alpha + F_t \cos\alpha}{F_c \cos\alpha - F_t \sin\alpha}$$

$$= \frac{1800 \times 0.156 + 900 \times 0.987}{1800 \times 0.987 - 900 \times 0.156}$$

$$= 0.71$$

6. (c)

For A, $$T = \left(\frac{50}{V}\right)^2$$

For B, $$T = \left(\frac{100}{V}\right)^4$$

Now, $$\left(\frac{V}{50}\right)^2 = \left(\frac{V}{100}\right)^4$$

$\Rightarrow$ $$V^2 = \frac{100^4}{50^2}$$

$\Rightarrow$ $$V = \frac{(100)^2}{50} = 200 \text{ m/min}$$

7. (c)

8. (b)

At UTS, $\in_T = n$

$$\text{flow stress at UTS, } \sigma_f = 1000 \times 0.5^{0.5} = \frac{1000}{\sqrt{2}} \text{ MPa}$$

$$\in_T = \ln(1+\in)$$

$$\Rightarrow \quad 1 + \in = e^{0.5}$$

$$\text{Engineering stress at UTS} = \frac{(\sigma_f)_{UTS}}{1+\in} = \frac{\frac{1000}{\sqrt{2}}}{\sqrt{e}}$$

$$= \frac{1000}{\sqrt{2e}} \text{ MPa}$$

9. (b)

$$\therefore \quad \text{Average flow stress, } \bar{\sigma}_f = (\sigma_f)0.8$$

$$\frac{\sigma_f}{n+1} = 0.8\sigma_f$$

$$n = 0.25$$

10. (c)

$$\eta IV = eA_c \cdot v$$

$$eA_c = \frac{\eta IV}{v} = \frac{0.9 \times 300 \times 20}{\frac{200}{60}}$$

$$= 1620 \text{ J/mm}$$

11. (d)

- Hydrogen induced cracks are due to moisture in electrodes.
- Preheat thick sections to reduce thermal gradient.
- Control cooling rate with post-weld heat treatment.

12. (c)

Advantage of powder metallurgy process:

1. Material efficiency
   (a) Near net shape
   (b) High material utilization
2. Complex geometries and customization
   (a) Intricate shape can produce that are difficult to machine
   (b) Controlled density enables light weight and high-strength parts.
3. Porous powder metallurgy component can be impregnated with lubricants.

13. (a)

$$I^2 D = \text{Constant}$$

$$I_2^2 (1)^2 = 900^2 \times 0.81$$

$$I_2 = 900 \times 0.9 = 810\text{ A}$$

$$\%\text{decrease} = \frac{I_1 - I_2}{I_1} = 1 - \frac{810}{900} = 0.1 \text{ or } 10\%$$

14. (c)

If metal is poured too slowly, it loses heat before reaching all sections of the mould. So an optimal pouring speed has to be maintained.

15. (c)

Incomplete fusion occurs when the base metal and filler metal do not properly merge, leading to weak joint.

16. (c)

Diffusion wear happens at high temperatures when tool material diffuses into the chip flowing at rack face.

17. (c)

Stereolithography uses an UV laser to harden liquid photopolymer resin layer by layer.

18. (b)

When molten metal cools, it shrinks, leading to shrinkage defects like porosity. A properly designed riser acts as a reservoir that supplies molten metal to compensate for this shrinkage.

19. (b)

A dull cutting tool leads to increased tool wear and a poorer surface finish because the blunt edge causes more friction, generating excessive heat and tearing the material in cutting zone, resulting in a rough surface. A sharp cutting tool on the other hand, minimizes cutting forces and heat generation due to its smooth cutting action, leading to a better surface finish and improve machining accuracy.

20. (a)

21. (b)

$$\text{Torque} = F \times a$$

$$= \left(\bar{\sigma} b \cdot \sqrt{R\Delta h}\right) \times \left(\frac{\sqrt{R\Delta h}}{2}\right)$$

$$= \frac{\bar{\sigma} b \cdot R\Delta h}{2} = \frac{200 \times 100 \times \frac{800}{2} \times (20 - 16)}{2} \times 10^{-6}$$

$$= 16 \text{ kN-m}$$

22. (b)

Material removal rate is given by,

$$MRR = (wd)(fzN)$$

$$\frac{MRR}{w} = (d)(fzN)$$

$$= 5 \times 0.2 \times 10 \times \frac{600}{60} = 100 \text{ mm}^2/\text{s}$$

23. (b)

$$d_{\text{hkl}} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} = \frac{4}{\sqrt{2^2 + 1^2 + 2^2}} = \frac{4}{3} Å$$

24. (b)

25. (a)

$$d_{100} = \frac{3}{\sqrt{1^2 + 0^2 + 0^2}} = 3Å$$

Bragg's law:

$$n\lambda = 2d \sin\theta$$

$$1.5 = 2 \times 3 \sin\theta$$

$$\sin\theta = \frac{1}{4}$$

$$\theta = \sin^{-1}\frac{1}{4} \simeq 15°$$

26. (d)

Annealing of steel reduce hardness, so improve machinability.

27. (a)

The combination of the plane with the highest atomic density (slip plane) and a most closely packed atomic direction (slip direction) forms a slip system.

28. (b)

In FCC, slip occurs on the {1 1 1} planes, which have the highest atomic packing density, and along the (1 1 0) direction, which is the most closely packed direction in that plane.

29. (d)

The least symmetric structure is triclinic because, $\alpha \neq \beta \neq \gamma \neq 90°$ and also $a \neq b \neq c$.

30. (c)

31. (c)

X-ray diffraction is used to

(i) Crystallite size of this material.

(ii) Micro strain in the material

32. (d)

Characteristics of screw dislocation:

- The Burgers vector is parallel to the dislocation line, unlike in edge dislocation where it is perpendicular.
- The material undergoes a shear displacement along the dislocation.
- Screw dislocation can move in multiple slip planes, enhancing plasticity.
- Screw dislocation can shift from one slip plane to another, allowing for more deformation pathways.

33. (c)

- Option (a) is true for uniform corrosion.
- Option (b) is true for Galvanic corrosion.
- Option (d) is true for Inter-granular corrosion.

34. (a)

$$\text{Density, } \rho = \frac{\bar{n}M}{6.023\times 10^{23}\times V}$$

$$= \frac{4\times 42.161}{6.023\times 10^{23}\times\left(5\times 10^{-10}\times 10^{2}\right)^{3}} = 2.24 \text{ g/cc}$$

35. (b)

$$E = \sum x_i E_i = 0.6\times 200 + 0.4\times 10 = 124 \text{ GPa}$$

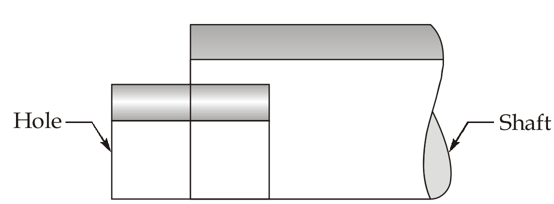
$$x_i = \text{Volume fraction}$$

36. (c)

- Fine-grained materials have a higher grain boundary density, which provides more nucleation sites for recrystallization, this promotes faster grain nucleation and growth, reducing the temperature required for recrystallization.
- Larger grains store energy less efficiently because they have fewer grain boundaries and lower dislocation density, thus to reach the same stored energy level as a fine-grained material, more deformation is required.

37. (d)

Interference fit:



$$(\text{Lower limit})_{\text{shaft}} > (\text{Higher limit})_{\text{hole}}$$

Section B : Thermodynamics-1

38. (d)

If both conditions are met simultaneously it typically indicates a phase change such as boiling or condensation.

39. (b)

Work transfer in all four processes of the cycle but heat transfer in only two isothermal processes.

40. (b)

As volume of gas remains the same. So equating, it at two states.

$$\because \quad \left[\frac{n\bar{R}T}{P}\right]_i = \left[\frac{n\bar{R}T}{P}\right]_f$$

$$\Rightarrow \quad \left[\frac{\frac{1}{20}\bar{R}T}{P}\right]_i = \left[\frac{\left(\frac{1}{20}+\frac{4}{40}\right)\bar{R}T}{P}\right]_f$$

$$\therefore \quad P_f = 3P_i = 3P$$

41. (d)

$$x = \frac{m_g}{m_f + m_g} = \frac{1}{1+\frac{m_f}{m_g}}$$

$$= \frac{1}{1+\frac{V_f}{v_f}\times\frac{v_g}{V_g}} = \frac{1}{1+\frac{V}{0.001}\times\frac{1.6}{10V}}$$

$$= \frac{1}{161}$$

42. (d)

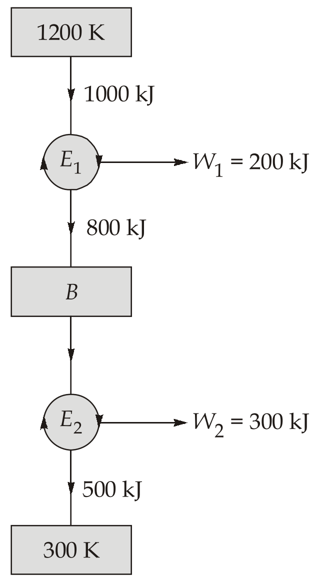
$$W_{\text{poly}} = \frac{P_1V_1 - P_2V_2}{n-1} = \frac{mR}{n-1}(T_1 - T_2)$$

$$= \frac{P_1V_1}{n-1}\left[1-\left(\frac{P_2}{P_1}\right)^{\frac{n-1}{n}}\right]$$

$$= \frac{1500\times 0.1}{1.5-1}\left[1-\left(\frac{12}{1.5}\right)^{\frac{1.5-1}{1.5}}\right] = 300\left(1-(8)^{1/3}\right)$$

$$= 300(1-2) = -300 \text{ kJ}$$

43. (b)



Efficiency of engine E_2 is,
$$\eta = \frac{300}{800} = \frac{3}{8} = 0.375$$

44. (d)

$$W = \frac{RE}{COP} = \frac{RE}{\frac{T_L}{T_H - T_L}}$$

$$= \frac{1.8}{\frac{270}{300-270}} = 0.2 \text{ kW}$$

45. (d)

- Entropy generation within the isolated system leads to exergy destruction.
- Entropy generation outside the system boundary in an irreversible process is not necessarily always positive it depends on how system interacts with its surroundings with respect to heat transfer.

46. (b)

For adiabatic process

$$\delta W = -dU$$

So compression lead to increase in temperature of the gas as C_V for any gas is positive.

For polytropic compression process ($P_2 > P_1$), the final temperature depends on 'n'. i.e. it may increase or decrease.

47. (b)

For ideal gas,

$$V = \frac{(\Sigma mR)T}{P} = \frac{\left(2\times\frac{\bar{R}}{28}+4\times\frac{\bar{R}}{40}\right)\times 400}{100}$$

$$= \bar{R}\left(\frac{1}{14}+\frac{1}{10}\right)\times 4 = 8.314\times\frac{24}{140}\times 4$$

$$= 5.701 \text{ m}^3$$

48. (d)

$$m_1c_{p_1}+m_2c_{p_2} = m_1\frac{\gamma_1}{\gamma_1-1}\frac{\bar{R}}{M_1}+m_2\frac{\gamma_2}{\gamma_2-1}\frac{\bar{R}}{M_2}$$

$$= \bar{R}\left[\frac{2}{28}\times\frac{\frac{7}{5}}{\frac{7}{5}-1}+\frac{4}{40}\times\frac{\frac{5}{3}}{\frac{5}{3}-1}\right]$$

$$= \frac{\bar{R}}{2}$$

∴ Head added, $Q = \left(m_1c_{p_1}+m_2c_{p_2}\right)(T_2-T_1) = \frac{\bar{R}}{2}(T_2-T_1)$

$$= \frac{8.314}{2}\times 400\left(\frac{V_2}{V_1}-1\right)$$

$$= \frac{8.314}{2}\times 400\left(\frac{V_1+1}{V_1}-1\right)$$

$$= \frac{8.314}{2}\times 400\left(\frac{1}{5.7}\right) = 291.72 \text{ kJ}$$

49. (a)

The second law states that while the entropy of a system can decrease, it must be accompanied by an increase in the entropy of the surrounding such that the total entropy of the universe always increases. This is the principle of entropy generation.

$$\Delta S_{sys} + \Delta S_{surr} \geq 0$$

If a system undergoes external irreversibility, such as thermal resistance during heat transfer, it cannot achieve Carnot efficiency. The Carnot efficiency only be attained when both internal and external irreversibilities are eliminated. External irreversibilities cause entropy generation in the surroundings, leading to deviation from the ideal Carnot performance.

50. (a)

In an open system entropy can enter and exit with mass flow and heat. The entropy balance for a steady flow system is

$$\left(\frac{ds}{dt}\right)_{cv} = \sum \dot{m}s_{in} - \sum \dot{m}s_{out} + \int \frac{\delta Q}{T} + \dot{s}_{gen}$$

For steady flow conditions

$$\left(\frac{ds}{dt}\right)_{cv} = 0$$

Meaning the entropy of control volume remain constant if

$$\dot{s}_{gen} = \sum \dot{m}s_{out} - \sum \dot{m}s_{in} - \int \frac{\delta Q}{T}$$

Even in an irreversible process, entropy generated inside the system can be exactly balanced by the entropy carried out by mass flow and heat transfer.

51. (b)

$$\left(\frac{ds}{dt}\right)_{cv}^{\nearrow 0} = \dot{m}\left(\dot{s}_{in} - \dot{s}_{out}\right) + \dot{s}_{gen}$$

$$\dot{s}_{gen} = \dot{m}\left(s_{out} - s_{in}\right) = \dot{m}\left[c_p \ln\frac{T_2}{T_1} - R\ln\frac{P_2}{P_1}\right]$$

$$= 10\left\{1.005 \times \ln\frac{5}{3} - 0.287\ln 4\right\} = 1.155 \text{ kW/K}$$

52. (b)

Heat addition at constant volume is given by,

$$(\Delta Q)_V = mC_V(T_2 - T_1) = \frac{P_2V_2 - P_1V_1}{\gamma - 1} = \frac{(P_2 - P_1)V_1}{\gamma - 1} \qquad [\because V = C]$$

Head addition at constant pressure is given by,

$$(\Delta Q)_P = mC_P(T_2 - T_1) = \frac{\gamma}{\gamma - 1} \times (P_2V_2 - P_1V_1)$$

$$= \frac{\gamma P_1(V_2 - V_1)}{\gamma - 1} \qquad [\because P = C]$$

Total heat addition, $Q = Q_{1\text{-}2} + Q_{2\text{-}3} + Q_{3\text{-}4}$

$$= \frac{P_2V_2 - P_1V_1}{\gamma - 1} + \frac{\gamma}{\gamma - 1}(P_3V_3 - P_2V_2) + \frac{P_4V_4 - P_3V_3}{\gamma - 1}$$

$$= (P_2 - P_1)\frac{V_1}{\gamma - 1} + \frac{P_2 \cdot \gamma}{\gamma - 1}(V_3 - V_2) + \frac{P_4 - P_3}{\gamma - 1} \cdot V_3$$

$$= \frac{(300-200)\times 2}{1.4-1} + \frac{1.4}{1.4-1}\times 300(4-2) + \frac{(400-300)4}{1.4-1}$$

$$= 3600 \text{ kJ}$$

53. (b)

$$\cancelto{0}{\delta Q} = dE + \cancelto{0}{\delta W}$$

$$\Rightarrow \quad dE = 0$$

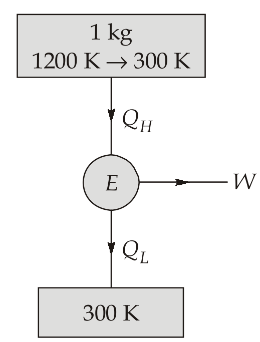
$$\Rightarrow \frac{1}{2}m\left(V_f^2 - V_i^2\right) + m\left[c\left(T_m - T_i\right) + Kh_{sf}\right] = 0$$

$$\Rightarrow \frac{1}{2}\left(0 - 500^2\right) + 100(325-100) + K\times 125\times 10^3 = 0$$

$$\therefore \quad K = \frac{41}{50} \text{ or } 82\%$$

54. (c)

For maximum work output the engine must be reversible i.e.



$$\oint \frac{\delta Q}{T} = 0$$

$$mC_V \ln\frac{1200}{300} = \frac{Q_L}{300}$$

$$1 \times C_V \times 2 \times \ln 2 = \frac{Q_L}{300}$$

$$Q_L = 600\ C_V \ln 2 \text{ kJ}$$

$$Q_H = mC_V(T_H - T_L)$$

$$= 1 \times C_V(1200 - 300)$$

$$= 900\ C_V \text{ kJ}$$

$$W = Q_H - Q_L$$

$$= 900\ C_V - 600\ C_V \ln 2 = 300\ C_V(3 - 2\ln 2)$$

$$= 347.6 \text{ kJ}$$

55. (d)

$$W_{gas} = P(V_2 - V_1)$$

$$= 200(0.3 - 0.1)$$

$$= 200 \times 0.2 = 40 \text{ kJ}$$

$$W_{piston} = -W_{gas}$$

$$= -40 \text{ kJ}$$

56. (c)

$$(\Delta S)_{uni} = (\Delta S)_{sys} + (\Delta S)_{surr}$$
$$= \frac{4000}{400} + \frac{-4000}{400} = 0$$

Section C : Refrigeration and Air-Conditioning-1

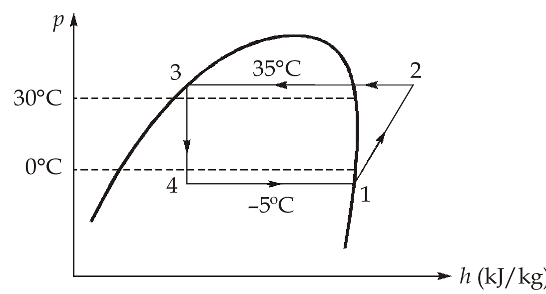
57. (a)

Refrigerator temperature = –0°C

T_1 = 0 – 5 = –5°C

Ambient temperature = 30°C

T_3 = 30 + 5 = 35°C



$$\text{Mass flow rate } (\dot{m}) = \frac{10 \times 3.5}{h_1 - h_4}$$
$$= \frac{10 \times 3.5}{185 - 72} = \frac{35}{113} = 0.3097 \text{ kg/s}$$

$$\text{Power required for compressor} = \dot{m}(h_2 - h_1)$$
$$= 0.3097 \times [210 - 185]$$
$$= 7.74 \text{ kW}$$

58. (b)

η_n = 80% = 0.8, η_e = 0.6, η_c = 0.7

$(h_f - h_e)$ = 202.4 kJ/kg, $(h_a - h_b)$ = 900 kJ/kg

Mass of motive steam required/kg of flash vapour (m_s)

$$m_s = \frac{h_f - h_e}{(h_a - h_b)\eta_n\eta_e\eta_c - (h_f - h_e)}$$

$$m_s = \frac{202.4}{(900) \times 0.8 \times 0.6 \times 0.7 - (202.4)}$$

$$m_s = \frac{202.4}{302.4 - 202.4} = \frac{202.4}{100}$$

$$m_s = 2.024 \text{ kg}$$

59. (c)

The desirable properties of secondary coolants are low freezing point, low viscosity, non-flammability, good stability and low vapour pressure.

60. (c)

For fixed range of evaporator temperature and condenser temperature the correct sequence of refrigerants in order of decreasing COP is

R-11, R-717, R-12, R-22

61. (a)

The refrigerant which is most miscible with oil is R-717 while R-12 is not miscible with oil.

62. (d)

This system is often called Munters Platen system. Ammonia is used as a refrigerant. Though it is toxic, and not otherwise preferred in domestic appliances, it is very safe in this system due to absence of any moving parts in the system and, therefore, there is the least chance of any leakage. The operation of this system is based on the concept of Dalton's Law. The whole plant is charged to a pressure of about 15 bar. Water is used as a solvent for ammonia.

63. (a)

In a combined absorption and VCRS system, the high pressure steam expands in a turbine which supplies the power for the compressor of VCRS system. The exhaust steam from the turbine, then goes to the generator of VARS system.

$\therefore$ Steam turbine power = Mass of steam rate × (Adiabatic enthalpy drop)

$$P = 1.5 \times (3100 - 2700) = 600 \text{ kW}$$

Rate of heat addition to absorption system (Q_G) = 1.5(2700 – 417.5)

= 3423.75 kW

Refrigeration capacity of VCRS = P × COP

= 600 × 3.8 = 2280 kW

Refrigeration capacity of VARS = Head addition × HCOP

= 3423.75 × 0.6

= 2054.25 kW

Total refrigeration capacity = $(Q_E)_{\text{VCRS}} + (Q_E)_{\text{VARS}}$

= 2280 + 2054.25

= 4334.25 kW

64. (b)

$$(\text{COP})_{\text{combined}} = \frac{\text{Total refrigeration capacity}}{\text{Total heat supplied}}$$

$$= \frac{4334.25}{1.5(3100-417.5)} = \frac{4334.25}{4023.75} = 1.07$$

65. (a)

The evaporator efficiency is greatest when the load on evaporator is highest.

66. (c)

Heat rejection in condenser = Evaporator capacity × Heat rejection factor

= 8.8 × 1.2

= 10.56 kW

67. (c)

$$T_g = 115°C = 115 + 273 = 388 \text{ K}$$
$$T_c = 30°C = 30 + 273 = 303 \text{ K}$$
$$T_L = -10°C = -10 + 273 = 263 \text{ K}$$
$$\text{COP} = \left[\frac{T_L}{T_C - T_L}\right] \times \left[\frac{T_G - T_C}{T_G}\right]$$
$$= \left[\frac{263}{303 - 263}\right] \times \left[\frac{388 - 303}{388}\right]$$
$$= 1.44$$

68. (b)

Clog point : All lubricating oils is contains more or less wax and paraffins. These contents will start precipitating if the temperature of oil is reduced below a particular temperature. The temperature at which this precipitation starts is known as clog point.

Floc point : It is the temperature of the oil at which the wax will start precipitating from a mixture of 90% *F*-13 and 10% oil by volume.

69. (c)

70. (b)

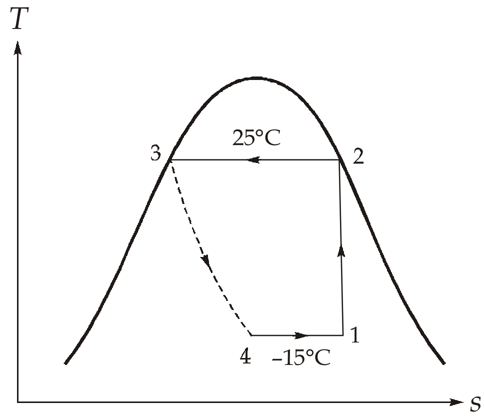
71. (d)

It is necessary to see the required properties of the material in thermo-electric refrigeration which meet the following conditions:

1. The thermo-electric material must be excellent conductor of electricity to minimize resistance losses.
2. The thermo-electric material must be a very poor conductor of heat because the heat must be absorbed at one end, and rejected at the other.
3. The thermo-electric material must have high thermo-electric power. This means it must have a high rate of change in voltage with temperature that means $\left(\frac{dE}{dT}\right)$ must be high.

72. (a)

73. (d)



As process 1-2 is isentropic compression,

$$s_{f_1} + x_1 s_{fg1} = s_{g_2}$$

$$-0.2134 + x_1[5.0585 - (-0.2134)] = 4.4894$$

$$x_1 = 0.892$$

$$h_1 = h_{f_1} + x h_{fg1}$$

$$= -54.56 + 0.892[1304.99 - (-54.56)]$$

$$h_1 = 1158.15 \text{ kJ/kg}$$

$$\text{Refrigeration effect} = 1158.15 - 380.74$$

$$= 777.41 \text{ kJ/kg}$$

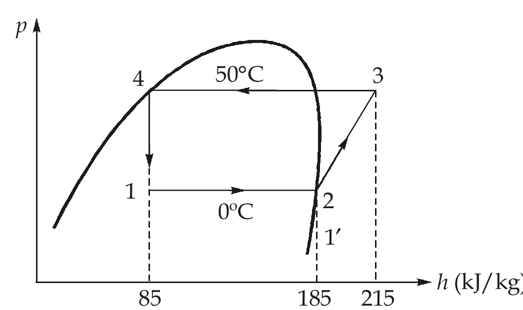
74. (a)

$$R.C = 1 \text{ ton}$$

$$h_1 = h_4 = 85 \text{ kJ/kg}$$

$$h_2 = 185 \text{ kJ/kg}$$

$$h_3 = 215 \text{ kJ/kg}$$



Capacity of the plant is given by

$$R.C. = \dot{m}(h_2 - h_1)$$

$$\dot{m} = \frac{3.5 \times 1}{(185 - 85)} = \frac{3.5}{100} = 0.035 \text{ kg/sec}$$

Power of the motor to run the compressor = $\dot{m}(h_3 - h_2) = 0.035(215 - 185)$

$$= 0.035 \times 30$$

$$= 1.05 \text{ kW}$$

75. (c)

As suction temperature increases, refrigeration effect increases and power input to compressor decreases. Hence, power per ton of refrigeration will decrease.

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