# BPSC TEST

**Date: 07 July, 2018**

## TEST 03 (OBJECTIVE SOLUTION)...

## ANSWERS

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

**BPSC TEST-03 Solutions**

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**1. (a)**

**2. (d)**

**3. (c)**

**4. (a)**

Thermodynamic properties are thermophysical properties of matter related to equilbrium state of system.

**5. (b)**

As per kinetic theory, thermal conductivity of gas depends on molecular diffusion

**6. (b)**

**7. (a)**

$K \alpha n\bar{v}\lambda$

$\bar{v}$ = Mean molecular speed

k = Thermal conductivity

$T \uparrow v \uparrow$

Pv = MRT

$T \alpha 1/M$ for given pressure and volume

**8. (a)**

Glycerine and water are exception among non metallic liquid

**9. (a)**

For metal thermal coefficient of expansion of thermal conductivity is negative but aluminium and certain non ferrous alloys are exception.

**10. (b)**

**11. (c)**

Except cattle hair all are high temperature insulating material.

**12. (a)**

Aluminium act as a superconductor whose thermal conductivity is 20000 w/mk at 10 k which is 100 times higher than that at room temperature.

**13. (c)**

**14. (b)**

$q'' = \frac{q}{A} = \text{Heat flux}$

**15. (b)**

**16. (b)**

Solid - molecular activity

Liquid - Elastic impact

Gas : Molecular diffusion

**17. (a)**

In alloy, the value of electronic component is lesser than metal but lattice component is dominating which increases the thermal conductivity with temperature but final value of thermal conductivity is lesser than metal.

**18. (b)**

Hollow cylinder has generally higher temperature uniformity than hollow sphere.

**19. (a)**

**20. (c)**

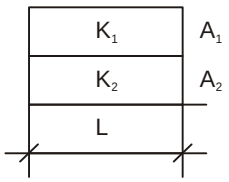
Thermal capacity = $\rho C$

$\rho$ = $Kg/m^3$

$C = \frac{J}{Kg\,K}$

**21. (d)**

**22. (b)**




$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

$R = \frac{R_1 \times R_2}{R_1 + R_2} = \frac{\frac{L}{K_1A_1} \times \frac{L}{K_2A_2}}{\frac{L}{K_1A_1} + \frac{L}{K_2A_2}} = \frac{L}{K_1A_1 + K_2A_2}$

**23. (b)**

**24. (a)**

The thermal contact resistance decreases with decreasing surface roughness and increasing joint pressure.

**25. (c)**

**26. (b)**

$q_{conduction} \propto$ 1/logarithmic of outer radius

$q_{convection} \propto$ outer radius

**27.** **(a)**

**28.** **(c)**

**29.** **(b)**

Here insulation means personnel protection and dissipation of heat.

**30.** **(b)**

Cost analysis is done for insulation and usually a compromise between desirability of dissipating as much heat as possible and the necessity of keeping cost down must be made.

**31.** **(c)**

**32.** **(b)**

**33.** **(c)**

**34.** **(d)**

$$\eta_{fin} = \frac{q_{fin}}{q_{ideal}} \propto \frac{\text{Fin surface area}}{\text{Base surface area}}$$

**35.** **(a)**

**36.** **(b)**

**37.** **(d)**

**38.** **(a)**

**39.** **(d)**

**40.** **(a)**

**41.** **(c)**

**42.** **(c)**

**43.** **(a)**

**44.** **(b)**

**45.** **(c)**

**46.** **(b)**

**47.** **(a)**

**48.** **(a)**

**49.** **(b)**

**50.** **(b)**

**51.** **(c)**

$$L_c = \frac{V}{A_s};$$

where, V = Volume

$A_s$ = Surface area

**52.** **(a)**

$h_{air}$ = 3-7 W/m$^2$K

$h_{gases}$ = 2-20 W/m$^2$K

Liquid = 30-300 W/m$^2$K

**53.** **(d)**

'h' depends on type of flow: Laminar, turbulent

Thermo physical properties: density, viscosity, specific heat etc. and Toughness or cleaness of surface

For flat tube h is different

For vertical h may change

$\therefore$ For tube h is different than flat plate

**54.** **(c)**

$$h \propto \sqrt{x}$$

where x = distance from leading $\left[h_L = \frac{1}{x}\int_0^L h_x dx\right]$

**55.** **(a)**

**56.** **(a)**

$$\delta_t = \frac{T - T_s}{T_\infty - T_s} = 0.99 \text{ for } T_s < T_\infty$$

or, $$\frac{T_s - T}{T_s - T_\infty} = 0.99 = \delta_t$$

for $T_s > T_\infty$

**57.** **(a)**

$$v = \frac{\mu}{\rho} = \frac{\text{N-s/m}^2}{\text{Kg/m}^3} = \frac{\text{Kg} \times \frac{\text{m}}{\text{s}^2} \times \text{s}}{\text{m}^2 \times \text{Kg/m}^3}$$

**58.** **(d)**

$$Pr = \frac{v}{\alpha}$$

**59.** **(c)**

**60.** **(b)**

$$Pr = \frac{v}{\alpha}$$

Pr < 1, i.e. $v < \alpha$

$\delta < \delta_t$

Pr = 1, $\delta = \delta_t$

Pr > 1 $\delta > \delta_t$ i.e. $v > \alpha$

**61. (c)**

$$\frac{h \times x}{K} = f(Re, Pr)$$

**62. (a)**

**63. (c)**

**64. (b)**

**65. (a)**

**66. (a)**

**67. (c)**

**68. (b)**

1 m = 100 cm

$1m^2 = 10^4\ cm^2$

**69. (c)**

**70. (d)**

**71. (b)**

**72. (d)**

**73. (c)**

**74. (d)**

**75. (b)**