NEET PHYSICS 2018-19 - Chennai

Test ID : 034 **Test date: 11.04.2019**

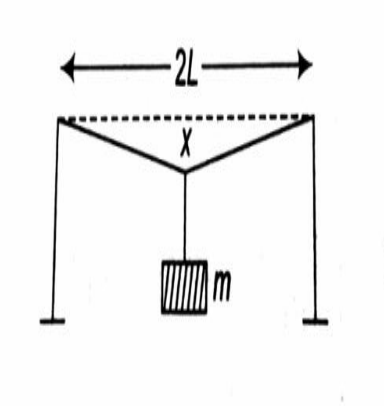
Number of questions: 60 **Time**: 2HRS

Name: ________________________________

ID No: ____________________

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. A mild steel wire of length $2L$ and cross-sectional area A is stretched, well within elastic limit, horizontally between two pillars as shown in figure. A mass m in suspended from the mid-point of the wire strain in the wire is



a) $\frac{x^2}{2L^2}$
b) $\frac{x}{L}$
c) $\frac{x^2}{L}$
d) $\frac{x^2}{2L}$

2. The following four wires are made of the same material. Which of these will the largest extension when the same tension is applied?
a) Length = 50 cm, diameter = 0.5 mm
b) Length = 100 cm, diameter = 1 mm
c) Length = 200 cm, diameter = 2 mm
d) Length = 300 cm, diameter = 3 mm

3. **Assertion** (A) Bulk modulus of elasticity B represents incompressibility of the material.
Reason (R) $B = -\frac{\Delta p}{\Delta V/V}$, where symbols have their usual meaning
a) If both Assertion and Reasons are true and the Reason is the correct explanation of the Assertion
b) If both Assertion and Reasons are true but the Reason is not the correct explanation of the Assertion
c) If Assertion is true but Reason is false
d) If both Assertion and Reason are false

4. Copper of fixed volume V is drawn into wire of length l. When this wire is subjected to a constant force F, the extension produced in the wire is Δl. Which of the following graphs is a straight line?
a) Δl versus $\frac{1}{l}$
b) Δl versus l^2
c) Δl versus $\frac{1}{l^2}$
d) Δl versus l

5. A wind with speed 40 m/s blows parallel to the roof of a house. The area of the roof is 250 m^2. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be (ρ_{air} = 1.2 kg/m^3)
a) 4.8×10^5 N, downwards
b) 4.8×10^5 N, upwards
c) 2.4×10^5 N, upwards
d) 2.4×10^5 N, downwards

6. A liquid of density ρ_0 is filled in a wide tank to a height h. A solid road of length L, cross-section area A and density ρ is suspended freely in the tank. The lower end of the road touches the base of the tank and $h = \frac{L}{\eta}$ (where, $\eta > 1$). Then, the angle of inclination of the rod with the horizontal in the equilibrium position is
   a) $0 = \sin^{-1}\left[\frac{1}{\eta}\sqrt{\frac{\rho_0}{\rho}}\right]$
   b) $0 = \sin^{-1}\left[\frac{1}{\eta}\sqrt{\frac{\rho}{\rho_0}}\right]$
   c) $0 = \sin^{-1}\left[\eta\sqrt{\frac{\rho_0}{\rho}}\right]$
   d) $0 = \sin^{-1}\left[\sqrt{\frac{\rho_0}{\rho}}\right]$

7. A copper rod of length L and radius r is suspended from the ceiling by one of its ends. What will be elongation of the rod due to its own weight when ρ and Y are the density and Young's modulus of the copper, respectively?
   a) $\frac{\rho^2 g L^2}{2Y}$
   b) $\frac{\rho g L^2}{2Y}$
   c) $\frac{\rho^2 g^2 L^2}{2Y}$
   d) $\frac{\rho g L}{2Y}$

8. A force F is applied on the wire of radius r and the length L and change in the length of wire is l. If the same force F is applied on the wire of the
   a) $\frac{l}{2}$
   b) $\frac{2l}{2}$
   c) $\frac{3l}{2}$
   d) none of these

9. The volume of water changes from 100 L to 99.5 L under a pressure of 100 atmosphere. The bulk modulus of elasticity of water will be
   a) 1.013×10^5 Nm $^{-2}$
   b) 1.013×10^9 Nm $^{-2}$
   c) 2.026×10^5 Nm $^{-2}$
   d) 2.026×10^9 Nm $^{-2}$

10. A cylindrical vessel of radius r containing a liquid is rotating about a vertical axis through the centre of circular base. If the vessel is rotating with angular velocity ω, then what is difference of the heights of liquid at centre of vessel and edge
   a) $\frac{r\omega}{2g}$
   b) $\frac{r^2\omega^2}{2g}$
   c) $\sqrt{2gr\omega}$
   d) $\frac{\omega^2}{2gr^2}$

11. In drops of a liquid, each with surface energy E, join to form a single drop. In this process
   a) some energy will be absorbed
   b) energy absorbed is $E\,(n - n^{2/3})$
   c) energy released will be $E\,(n - n^{2/3})$
   d) energy released will be $E\,(2^{2/3} - 1)$

12. In which one of the following cases will the liquid flow in a pipe be most streamlined?
   a) Liquid of high viscosity and high density flowing through a pipe of small radius
   b) Liquid of high viscosity and low density flowing through a pipe of small radius
   c) Liquid of low viscosity and low density flowing through a pipe of large radius
   d) Liquid of low viscosity and high density flowing through a pipe of large radius

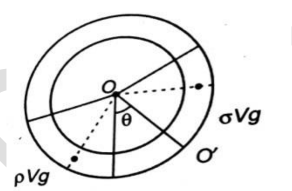
13. The work done in increasing the length of a wire of area of cross-section 0.1 mm^2 by 1% will be ($Y = 9 \times 10^{11}$ Pa)
   a) 2×10^{2} J
   b) 4.5×10^{2} J
   c) 3×10^{2} J
   d) 6×10^{2} J

14. The Young's modulus of brass and steel are respectively 1.0×10^{11} Nm^{-2} and 2.0×10^{11} Nm^{-2}. A brass wire and a steel wire of the same length are extended by 1 mm each under the same force. If radii of brass and steel wires are R_B and R_S respectively, then
   a) $R_S = \sqrt{2}R_B$
   b) $R_S = \frac{R_B}{\sqrt{2}}$
   c) $R_S = 4R_B$
   d) $R_S = \frac{R_B}{2}$

15. **Assertion** (A) A small drop of mercury is spherical but bigger drops are oval in shape.
   Reason (R) Surface tension of liquid decrease with increase in temperature.
   a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion
   b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion
   c) If Assertion is true but Reason is false
   d) If both Assertion and Reason are false

16. The approximate depth of an ocean is 2700 m. The compressibility of water is 45.4×10^{-11} Pa^{-1} and density of water is 10^3 kg/m^3,What fractional compression of water will be obtained at the bottom of the ocean?
   a) 0.8×10^{-2}
   b) 1.0×10^{-2}
   c) 1.2×10^{-2}
   d) 1.4×10^{-2}

17. A small uniform tube is bent into a circle of radius r whose plane is vertical. The equal volumes of two fluids whose densities are ρ and σ ($\rho > \sigma$), fill half the circle. Find the angle that the radius passing through the interface makes with the vertical where : OO' is line passing at fluid interface
   a) $\cot 0 = \frac{\rho - \sigma}{\rho + \sigma}$
   b) $\tan 0 = \frac{\rho - \sigma}{\rho + \sigma}$
   c) $\sin 0 = \frac{\rho + \sigma}{\rho - \sigma}$
   d) $\sin 0 = \frac{\rho}{\sigma}$



18. In steel, the Young's modulus and the strain at the breaking point are 2×10^{11} N/m^2 and 0.15 respectively. The stress at the breaking point for steel is therefore
   a) 2×10^{8} N/m^2
   b) 3×10^{10} N/m^2
   c) 3×10^{12} N/m^2
   d) None of these

19. The wettability of surface by a liquid depends primarily on
   a) viscosity
   b) surface tension
   c) density
   d) angle of contact between the surface and the liquid

20. In designing, beam for its use to support a load. The depression at centre is proportional to (where, Y is Young's modulus)
   a) Y^2
   b) Y
   c) $\frac{1}{Y}$
   d) $\frac{1}{Y^2}$

21. A cubical copper block has each side 2.0 cm. It is suspended by a string and submerged in oil of density 820 kg/m^3. The tension in the string is (density of copper 8920 kg/m^3, g = 10 m/s^2).
a) 0.648 N
b) 0.712 N
c) 0.66 N
d) 1.37 N

22. An ice-berg of density 900 kgm $^{-3}$ is floating in water of density 1000 kgm $^{-3}$. The percentage of volume of ice-berg outside the water is
a) 20%
b) 35%
c) 10%
d) 11%

23. A certain number of spherical drops of a liquid of radius r coalescence to form a single drop of radius R and volume V. If T is the surface tension of the liquid, then
a) energy = $4VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released
b) energy = $3VT\left(\frac{1}{r}+\frac{1}{R}\right)$ is absorbed
c) energy = $3VT\left(\frac{1}{r}-\frac{1}{R}\right)$ is released
d) energy is neither released nor absorbed

24. **Assertion** (A) to float, a body must displace liquid whose weight is greater than actual weight of the body.
Reason (R) During floating the body will experience no net downward force in that case.
a) If both Assertion and Reasons are true and the Reason is the correct explanation of the Assertion
b) If both Assertion and Reasons are true but the Reason is not the correct explanation of the Assertion
c) If Assertion is true but Reason is false
d) If both Assertion and Reason are false

25. The angle of contact between glass and water is 0^0 and it rises in a capillary upto 6 cm when its surface tension is 70 dyne cm $^{-1}$. Another liquid of surface tension 140 dyne cm $^{-1}$, angle of contact 60^0 and relative density 2 will rise in the same capillary by
a) 12 cm
b) 24 cm
c) 3 cm
d) 6 cm

26. A liquid is flowing through a horizontal tube with velocity 2×10^{-2} m/s. Find the velocity of the liquid, if the radius is decreased by 20%.
a) 3.13×10^{-2} ms $^{-1}$
b) 1.13×10^{-2} ms $^{-1}$
c) 13×10^{-2} ms $^{-1}$
d) 1.33×10^{-3} ms $^{-1}$

27. A rigid bar of mass M is supported symmetrically by three wires each of length l. Those at each end are of copper and the middle one is of iron. The ratio of their diameters, if each is to have the same tension is equal to
a) $Y_{\text{copper}} / Y_{\text{iron}}$
b) $\sqrt{\frac{Y_{iron}}{Y_{copper}}}$
c) $\frac{Y^2 iron}{Y^2 copper}$
d) $\frac{Y_{iron}}{Y_{copper}}$

28. A body of mass 1 kg is fastened to one end of a steel wire of cross-sectional area 3×10^{-6} m^2 and is rotated in horizontal circle of radius 20cm with constant speed 2 m/s. The elongation of the wire is ($Y = 2 \times 10^{11}$ N/m^2)
a) 0.33×10^{-5} m
b) 0.67×10^{-5} m
c) 2×10^{-5} m
d) 4×10^{-5} m

29. The length of a wire increases by l due to a force F applied on it. Then, the work done W in stretching the wire will be
   a) $W = F.l$
   b) $W = \frac{F.l}{4}$
   c) $W = \frac{F.l}{2}$
   d) $W = \frac{F.l}{3}$

30. Two water pipes of diameters 2 cm and 4 cm are connected with the main supply line. The velocity of flow of water in the pipe of 2 cm diameter is
   a) 4 times that in the other pipe
   b) $\frac{1}{4}$ times that in the other pipe
   c) 2 times that in the other pipe
   d) $\frac{1}{2}$ times that in the other pipe

31. As the temperature is increased, the time period of a pendulum
   a) increase as its effective length increases even though its centre of mass
   b) decreases as its effective length increases even though its centre of mass still remains at the centre of the bob
   c) increases as its effective length increases due to shifting of centre of mass below the centre of the bob
   d) increases as its effective length remains same but the centre of mass shifts above the centre of the bob

32. Two slabs A and B of different materials but of the same thickness are joined end to form a composite slab. The thermal conductivities of A and B are K_1 and K_2 respectively. A steady temperature difference of 12^0C is maintained across the composite slab. If $K_1 = \frac{K_2}{2}$, the temperature difference across slabs A is
   a) 4^0 C
   b) 6^0 C
   c) 8^0 C
   d) 10^0 C

33. The two ends of a metal rod are maintained at temperature 100^0C and 110^0C. The rate of heat flow in the rod is found to be 4.0 J/s. If the ends are maintained at temperatures 200^0 C and 210^0C, the rate of heat flow will be
   a) 44.0 J/s
   b) 16.8 J/s
   c) 8.0 J/s
   d) 4.0 J/s

34. If the radius of a star is R and its acts as a black body, what would be the temperature of the star in which the rate of energy production is Q?
   a) $\frac{Q}{4\pi R^2 \sigma}$
   b) $\left(\frac{Q}{4\pi R^2 \sigma}\right)^{1/2}$
   c) $\left(\frac{4\pi R^2 Q}{\sigma}\right)^{1/4}$
   d) $\left(\frac{Q}{4\pi R^2 \sigma}\right)^{1/4}$

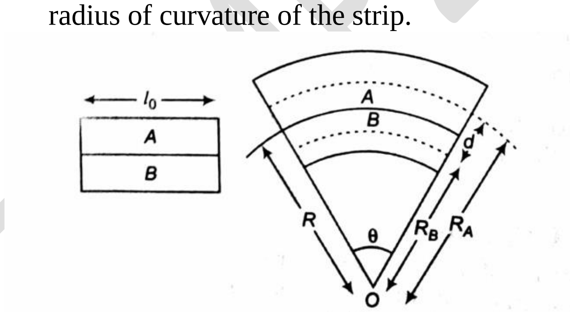
35. The total radiant energy per unit area, normal to the direction of incidence, received at a distance R from the centre of a star of radius r, whose outer surface radiates as a black body at a temperature T K is given by
   a) $\frac{\sigma r^2 T^4}{R^2}$
   b) $\frac{\sigma r^2 T^4}{4\pi r^2}$
   c) $\frac{\sigma r^2 T^4}{r^4}$
   d) $\frac{4\pi\sigma r^2 T^4}{R^2}$

36. An aluminium sphere is dipped into water. Which of the following is true?
   a) Buoyancy will be less in water at 0^0 C than that in water 4^0 C
   b) Buoyancy will be more in water at 0^0 C than that in water 4^0 C
   c) Buoyancy in water at 0^0 C will be same as that in water 4^0 C
   d) Buoyancy may be more or less in water at 4^0 C depending on the radius of the sphere

37. Certain quantity of water cools from 70^0 C to 60^0 C in the first 5 minutes and to 54^0 C in the next 5 minutes. The temperature of the surroundings is
a) 45^0 C
b) 20^0 C
c) 42^0 C
d) 10^0 C

38. Steam at 100^0C is passed into 20g of water at 10^0 C. When water acquires temperature of 80^0 C, the mass of water present will be(Take, specific heat of water = 1 cal $g^{-1}\,{}^0C^{-1}$ and latent heat of steam = 540 cal g^{-1}
a) 24 g
b) 31.5 g
c) 42.5 g
d) 22.5 g

39. At temperature T_0, two metal strips of length l_0 and thickness d, is bolted, so that their ends coincide. The upper strip is made up of metal A and have coefficient of expansion α_A and lower strip is made up of metal B with coefficient of expansionα_B $(\alpha_A > \alpha_B)$.When temperature of their blastic strip is increased from T_0 to $(T_0 + \Delta T)$, one strip becomes longer than the other and blastic strip is bend in the form of a circle as shown in figure. Calculate the radius of curvature of the strip.

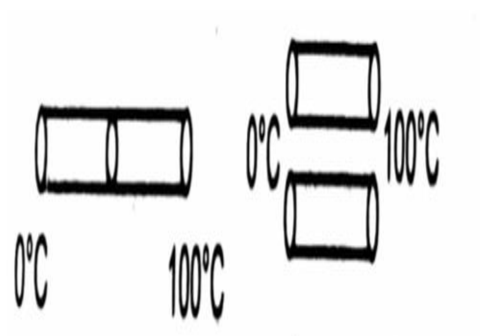


a) $R = \frac{[2+(\alpha_A+\alpha_B)\,\Delta T]d}{2\,(\alpha_A-\alpha_B)\,\Delta T}$
b) $R = \frac{[2-(\alpha_A+\alpha_B)\,\Delta T]d}{2\,(\alpha_A-\alpha_B)\,\Delta T}$
c) $R = \frac{[2+(\alpha_A-\alpha_B)\,\Delta T]d}{2\,(\alpha_A-\alpha_B)\,\Delta T}$
d) $R = \frac{[2-(\alpha_A-\alpha_B)\,\Delta T]d}{2\,(\alpha_A-\alpha_B)\,\Delta T}$

40. A wall has two layers A and B, each made of different materials. Both the layers have the same thickness. The thermal conductivity for A is twice of B and under steady condition, the temperature difference across the wall is 36^0C. The temperature difference across the layer A is
a) 6^0 C
b) 12^0 C
c) 24^0 C
d) 18^0 C

41. The specific heat of a substance at temperature t^0C is $s = at^2 + bt + c$. The amount of heat required to raise the temperature of m kg of the substance from 0^0C to $t_0\,{}^0$C is
a) $\frac{mt_0^3a}{3} + \frac{bt_0^2}{2} + ct_0$
b) $\frac{mt_0^3a}{3} + \frac{mbt_0^2}{2} + mct_0$
c) $\frac{mt_0^3a}{3} + \frac{mbt_0^2}{2}$
d) None of these

42. Two identical square rods of metal are welded end to end as shown in Fig. (i), 20 cal of heat flows through it in 4 min. If the rods are welded as shown in Fig. (ii), the same amount of heat will flow through the rods in



a) 1 min
b) 2 min
c) 4 min
d) 16 min

43. Assuming the sun to have a spherical outer surface of radius r, radiating like a black body at temperature t^0C, the power received by a unit surface, (normal to the incident rays) at a distance R from the centre of the sun is

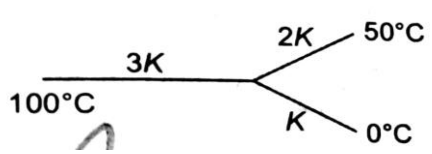
a) $\frac{4\pi r^2 t^4}{R^2}$

b) $\frac{r^2\sigma(t+273)4}{4\pi R^2}$

c) $\frac{16\pi^2 r^2 \sigma t^4}{R^2}$

d) $\frac{r^2\sigma(t+273)4}{R^2}$

44. Three rods of same dimensions have thermal conductivities $3K$, $2K$ and K. They are arranged as shown, with their ends at 100^0C, 50^0C and 0^0C. The temperature of their junction is



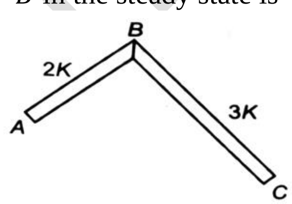
a) 75^0 C

b) $\frac{200}{3}$ ^{0}C

c) 40^0 C

d) $\frac{100}{3}$ ^{0}C

45. In the figure, ABC is a conducting rod whose lateral surfaces are insulated. The length of the section AB is one-half of that of BC and the respective thermal conductivities of the two sections are as given in the figure. If the ends A and C are maintained at 0^0C and 70^0C respectively, the temperature of junction B in the steady state is



a) 30^0C

b) 40^0C

c) 50^0C

d) 60^0C

46. A non-conducting body floats in a liquid at 20^0C with $\frac{2}{3}$ of its volume immersed in the liquid. When liquid temperature is increased to 100^0C, $\frac{3}{4}$ of body's volume is immersed in the liquid. Then the coefficient of real expansion of the liquid is (neglecting the expansion of container of the liquid)

a) $15.6 \times 10^{-4}\ {}^0C^{-1}$

b) $156 \times 10^{-4}\ {}^0C^{-1}$

c) $1.56 \times 10^{-4}\ {}^0C^{-1}$

d) $0.156 \times 10^{-4}\ {}^0C^{-1}$

47. A black body at a temperature of 2600 K has the wavelength corresponding to maximum emission 1200 Å assuming the moon to be perfectly black body. The temperature of the moon, if the wavelength corresponding to maximum emission is 5000 Å, is

a) 7800 K

b) 6240 K

c) 5240 K

d) 3640 K

48. A sphere, a cube and a thin circular plate, all of same material and of same mass are initially heated to same high temperature

a) plate will cool fastest and cube the slowest

b) sphere will cool fastest and cube the slowest

c) plate will cool fastest and sphere the slowest

d) cube will cool fastest and plate the slowest

49. A clock with a metal pendulum beating seconds keeps correct time at 0^0C. If it loses 12.5 s a day at 25^0C, the coefficient of linear expansion of metal pendulum is

a) $\frac{1}{86400}$ / ^{0}C

b) $\frac{1}{43200}$ / ^{0}C

c) $\frac{1}{14400}$ / ^{0}C

d) $\frac{1}{28800}$ / ^{0}C

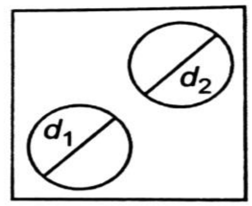
50. An experiment takes 10 min to raise temperature of water from 0^0C and 100^0C and another 55 min to convert it totally into steam by a stabilized heater. The latent heat of vaporization comes out to be
a) 530 cal/g
b) 540 cal/g
c) 550 cal/g
d) 560 cal/g

51. If λ_m denotes the wavelength at which the radiative emission from a black body at a temperature T K is maximum, then
a) $\lambda_m \propto T^4$
b) λ_m is independent of T
c) $\lambda_m \propto T$
d) $\lambda_m \propto T^{-1}$

52. A sphere has a surface area of $1.0 m^2$ and a temperature of 400 K and the power radiated from it is 150 W. Assuming the sphere is a black body radiator, the power in kilowatt radiated when the area expands to $2.0 m^2$ and the temperature changes to 800 K is
a) 6.2
b) 9.6
c) 4.8
d) 16

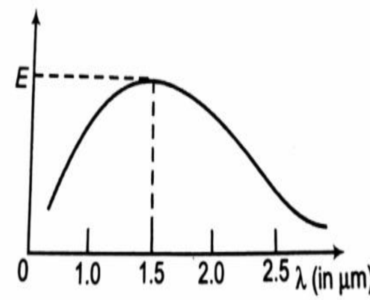
53. In similar calorimeters, equal volumes of water and alcohol when poured take 100 s and 74 s respectively to cool from 50^0C to 40^0C. If the thermal capacity of each calorimeter is numerically equal to volume of either liquid, then the specific heat capacity of alcohol is (Given, relative density of alcohol as 0.8 and specific heat capacity of water as 1 cal/g/^{0}C)
a) 0.8 cal/g^{0}C
b) 0.6 cal/g^{0}C
c) 0.9 cal/g^{0}C
d) 1 cal/g^{0}C

54. The metal sheet as shown in figure with two holes cut-off unequal diameters d_1 and d_2 ($d_1 > d_2$). If the sheet is heated,



a) both d_1 and d_2 will decrease
b) both d_1 and d_2 will increase
c) d_1 will increase, d_2 will decrease
d) d_1 will decrease, d_2 will increase

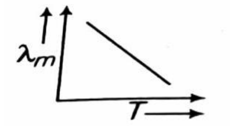
55. In the figure, the distribution of energy density of the radiation emitted by a black body at a given temperature is shown. The possible temperature of the black body at λ_m = 1.5 μm is

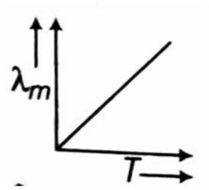


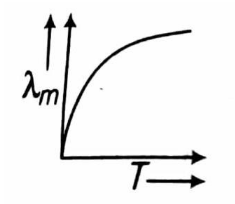
a) 1500 K
b) 2000 K
c) 2500 K
d) 3000 K

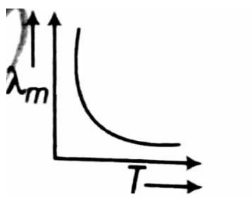
56. A piece of iron is heated in a flame. If first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observations is possible by using
a) Stefan's law
b) Wien's displacement law
c) Kirchhoff's law
d) Newton's law of cooling

57. Which of the following is the $\lambda_m - T$ graph for a perfectly black body?

a) 

b) 

c) 

d) 

58. The surface temperature of the sun is T K and the solar constant for a plate is S. The sun subtends an angle 0 at the planet. Then,
a) $S \propto T^4$
b) $S \propto T^2$
c) $S \propto 0^2$
d) $S \propto 0$

59. A black body calorimeter filled with hot water cools from 60^0C to 50^0C in 4 min and 40^0C to 30^0C in 8 min. The approximate temperature of surrounding is
a) 10^0C
b) 15^0C
c) 20^0C
d) 25^0C

60. A black body at 1227^0C emits radiations with maximum intensity at a wavelength of 5000 Å. If the temperature of the body is increased by 1000^0 C, the maximum intensity will be observed at
a) 4000 Å
b) 5000 Å
c) 6000 Å
d) 3000 Å