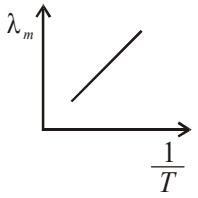
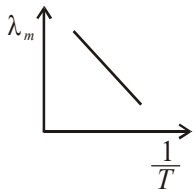
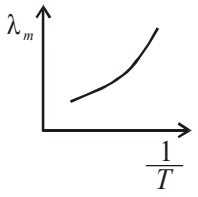
ASSIGNMENT_1

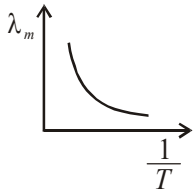
:

1. Woolen cloths are used in winter season because woolen cloths
   (1) Absorb heat from surrounding
   (2) Are good sources for producing heat
   (3) Transfer heat from surroundings to body
   (4) Traps air which is bad conductors of heat
2. The temperature of a rod in steady state
   (1) Increases with time
   (2) Decreases with time
   (3) Remains constant with time and same everywhere
   (4) Remains constant with time but different at different points
3. It is hotter at the same distance over the top of a fire than it is on the sides of it, mainly because
   (1) Heat is radiated upwards
   (2) Air conducts heat upwards
   (3) Convection takes more heat upwards
   (4) Convection takes more heat downwards
4. Relation between emissivity ε and absorptive power a of a black body is
   (1) $\varepsilon = 2a$ (2) $\varepsilon = a$
   (3) $\varepsilon = \frac{7}{a}$ (4) $\varepsilon = 4a^2$
5. For a body the ratio of absorptive power to the reflective power is
   (1) Always greater than 1
   (2) Always less than 1
   (3) Always 1
   (4) May be more than 1 or less than 1
6. If a polished plate with rough black paintings is heated to a high temperature and taken to a dark room, then
   (1) Paintings will appear brighter than the plate
   (2) Paintings will appear darker than the plate
   (3) Both will appear equally brighter
   (4) Both will not be visible
7. Spectrum from a black body radiation is a
   (1) Line spectrum
   (2) Band spectrum
   (3) Continuous spectrum
   (4) Line and band spectrum both
8. How one can determine the temperature of a star?
   (1) Using Kirchhoff's law
   (2) Using Ohm's law
   (3) Using Wein's displacement law
   (4) Using Kepler's law
9. For a black body, wavelength corresponding to maximum intensity varies with inverse of its absolute temperature as

   (1) 

   (2) 

   (3) 

   (4) 

10. The S.I. unit of Stefan's constant is
    (1) W m^{-2} K^{-1} (2) W m^{-2} K^{-4}
    (3) J m^{-2} s^{-1} K^4 (4) J m^{-2} K^{-4}

KEY

1.	(4)	2.	(4)	3.	(3)
4.	(2)	5.	(4)	6.	(1)
7.	(3)				
8.	(3)	9.	(1)	10.	(2)

ASSIGNMENT_2

11. For cooking the food, which of the following type of utensils are suitable?
    (1) Having high conductivity and low specific heat
    (2) Having low conductivity and low specific heat
    (3) Having high conductivity and high specific heat
    (4) Having low conductivity and high specific heat
12. Select correct statement related to heat
    (1) Heat is possessed by a body
    (2) Hot water contains more heat as compared to cold water
    (3) Heat is an energy which flows due to temperature difference
    (4) Heat is a fluid
13. Two identical rods of a metal are welded as shown in figure (1). A certain amount of heat flows through them in 16 min. If the rods are welded as shown in the figure (2) then the same amount of heat will flow in

(1) (2)

    (1) 1 minute (2) 4 minutes
    (3) 16 minutes (4) 2 minutes
14. A compound slab consists of two plates of identical dimension and having thermal conductivities K_1 and K_2 in parallel. Equivalent thermal conductivity of the slab is
    (1) $\frac{K_1 + K_2}{2}$ (2) $\sqrt{K_1 K_2}$
    (3) $\frac{K_1 + K_2}{K_1 K_2}$ (4) $\frac{2K_1 K_2}{K_1 + K_2}$
15. In which of the following process, convection does not take place primarily?
    (1) Boiling of water
    (2) Heating of air above a furnace
    (3) Heating of a car placed in sunlight
    (4) Sea and land breeze
16. If r, a and t represent the reflection coefficient, absorption coefficient and transmission coefficient respectively, then for a perfectly black body
    (1) $r = 0$, $a = 1$ (2) $r = 1$, $t = 0$
    (3) $a = 0$, $t = 1$ (4) $r = 0$, $a = 0$

17. Correct statement is
    (1) Every body radiates at all temperatures except at 0°C
    (2) A good reflector is a good radiator
    (3) A cool body can radiate heat to the hotter surroundings
    (4) All of these

18. A perfectly black body at room temperature is thrown into a furnace. Just after that it is observed that the body is
    (1) Darkest
    (2) Brightest
    (3) Cannot be distinguished at all
    (4) Invisible
19. A black body, which is at a high temperature T, radiates energy at the rate of E. If the temperature falls to $T/2$, then the rate of radiated energy will be
    (1) E (2) $E/4$
    (3) $E/64$ (4) $E/16$
20. Star A emits radiation of maximum intensity at a wavelength of 5000 Å and it has temperature 1227°C. If star B has temperature 2727°C, then the maximum intensity would be observed at
    (1) 4000 Å (2) 3500 Å
    (3) 3000 Å (4) 2500 Å
21. A black piece of iron is heated continuously, which of the following is the correct sequence of its observed colours?
    (1) Red, yellow, orange
    (2) Red, yellow, black
    (3) White, yellow, red
    (4) Red, yellow and white
22. When a body is at same temperature as that of surroundings, it radiates
    (1) No net heat
    (2) More heat than it absorbs
    (3) Less heat than it absorbs
    (4) No heat
23. According to Kirchhoff's law
    (1) Good reflectors are good emitters
    (2) Good absorbers are good reflectors
    (3) Good reflectors are good absorbers
    (4) Good emitters are good absorbers
24. A body cools from 70°C to 50°C in 20 minutes. The time it takes to cool from 50°C to 30°C will be (Given that temperature of surroundings is 30°C)
    (1) 20 minutes (2) 60 minutes (3)180 minutes (4) Infinite
25. A sphere, a cube and a thin circular plate, all made of the same mass and finish are heated to a temperature of 800°C. Which of these objects will lose heat at minimum rate, when left in air at room temperature?
    (1) The sphere
    (2) The cube
    (3) The circular plate
    (4) All will radiate heat at same rate

key:

11.	(1)	12.	(3)	13.	(2)	14.	(1)	15.	(3)	16.	(1)	17.	(3)						
18.	(1)	19.	(4)	20.	(4)	21.	(4)	22.	(1)	23.	(4)	24.	(4)						
25.	(1)																		

ASSIGNMENT_3

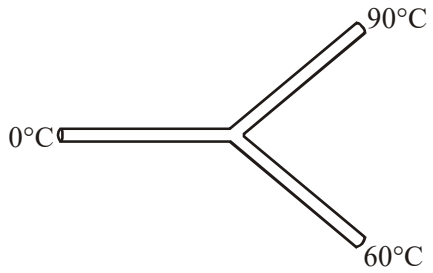
26. Four rods with different radii r and length l are used to connect two reservoirs of heat at different temperatures. Which one will conduct heat at maximum rate?
(1) $r = 1$ cm, $l = 1$ m (2) $r = 2$ cm, $l = 2$ m
(3) $r = 3$ cm, $l = 3$ m (4) $r = 4$ cm, $l = 4$ m

27. A slab consists of two layers of A and B of same thickness and having thermal conductivities in the ratio 1 : 4 in series. If the free face of B is at 150°C and that of A at 25°C, the temperature of the interface is
(1) 125°C (2) 50°C
(3) 100°C (4) 75°C

28. Two walls of same thickness and thermal conductivities K_1 and K_2 are in contact. If the temperatures at the outer surfaces are T_1 and T_2 in the steady state, then the temperature at the common surface will be
(1) $\frac{K_1T_1 + K_2T_2}{T_1 + T_2}$ (2) $\frac{K_1T_1 + K_2T_2}{K_1 + K_2}$
(3) $\frac{(K_1 + K_2)T_1T_2}{T_1 + T_2}$ (4) $\frac{K_1T_2 + K_2T_1}{K_1 + K_2}$

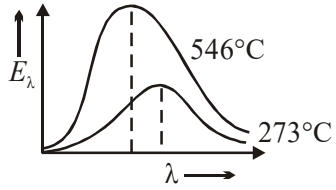
29. The temperature gradient of a rod of length 2 m is 50°C per metre at steady state. If temperature of the hot end is 110°C, then temperature at distance 50 cm from the cold end is
(1) 35°C (2) 75°C
(3) 85°C (4) 25°C

30. Three rods made of the same material and having the same cross-section have been joined as shown in the figure. Each rod is of same length. The temperatures of free ends are shown in the figure. The temperature of the junction will be



(1) 50°C (2) 30°C
(3) 20°C (4) 75°C

31. The spectra of a black body at temperatures 273°C and 546°C are shown in the figure. If A_1 and A_2 be the areas under the two curves respectively, the value of $\frac{A_2}{A_1}$ is



(1) $\frac{81}{16}$ (2) $\frac{16}{1}$ (3) $\frac{27}{8}$ (4) $\frac{16}{81}$

32. A body cools down from 80° C to 60° C in 20 minutes when the temperature of surroundings is 30°C. The temperature of the body after next 20 minutes will be

(1) 30°C (2) 48°C (3) 50°C (4) 52°C

33. A body radiates energy at a rate of 20 W at temperature 127°C. If the temperature of the body is increased by 800°C, then it will radiate at the rate of

(1) 1620 W (2) 1500 W (3) 410 W (4) 81 W

34. Two metal spheres *A* and *B* have radii *r* and 4*r* respectively. They are heated to 4000 K each and allowed to cool down. The respective ratio of their rates of cooling is

(1) 1 : 4 (2) 4 : 1 (3) 1 : 256 (4) 1 : 16

35. A black metallic sphere *P* has radius 4 m and temperature 4000 K and another metal sphere *Q* has radius 1 m and temperature 8000 K. The ratio of their rates of loss of heat is

(1) 1 : 1 (2) 4 : 1 (3) 1 : 4 (4) 2 : 1

key:

26. (4) 27. (1) 28. (2) 29. (1) 30. (1) 31. (1) 32. (2)
33. (1) 34. (2) 35. (1)