29. a.	Explain how the heat sink helps in reducing the junction temperature in natural and forced convection.	12	2	2	1
	(OR)				
b.	Explain the difference in steady state and transient heat transfer.	12	3	2	1
30. a.	Explain the forced convection and phenomenon and where it can be applied in electronics cooling.	12	2	3	1
	(OR)				
b.	Discuss the advantages and disadvantages of natural and forced convection and which can be better for electronic cooling applications.	12	2	3	1
31. a.	Explain the radiation heat transfer phenomenon and how it helps in electronic cooling.	12	2	4	1
	(OR)				
b.	What is radiation view factor? And how it helps in electronic cooling.	12	2	4	1,2
32. a.	What is a heat pipe and how it reduces the temperature of electronic packaging.	12	1	5	1,2
	(OR)				
b.	Explain in detail about the use of fans for electronic cooling and how the fans can be selected for cooling applications.	12	3	5	1

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2023
Sixth Semester

18MEO122J – ELECTRONICS THERMAL MANAGEMENT
(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
1.	The driving force for conduction heat transfer is (A) Temperature gradient (B) Surface area (C) Cross section area (D) Heat transfer coefficient	1	1	1	1
2.	Heat sinks are used to (A) Decrease the heat transfer rate (B) Increase the heat transfer rate (C) Increase the pressure drop (D) Decreases the pressure drop	1	1	1	1
3.	Unit of thermal conductivity is (A) W/ m^2K (B) W/ m.K (C) W/ m^2K (D) W/ mK^2	1	1	1	1
4.	The mean time between failure of electronic devices increases (A) Exponentially with increase in temperature (B) Linearly with decrease in temperature (C) Linearly with increase in temperature (D) Exponentially with decreases in temperature	1	1	1	1
5.	As per the Moore's law the number of transistors per microprocessor will double every (A) 18 months to 2 years (B) 1.8 months to 2 months (C) 18 years to 20 years (D) 18 weeks to 20 weeks	1	1	2	1
6.	At the critical thickness of insulation, the heat transfer is (A) Minimum (B) Maximum (C) Very low (D) Heat transfer never change with insulation thickness	1	1	2	1
7.	In forced convection, the two significant dimensionless parameters are (A) Reynolds number and Fourier number (B) Reynolds number and biot number (C) Biot number and Fourier number (D) Reynolds number and Prandtl number	1	1	2	1

8. The temperature profile for heat conduction through a wall of constant thermal conductivity in the absence of a heat source is — 1 1 2 1
   (A) Hyperbolic (B) Logarithmic
   (C) A straight line (D) Parabolic

9. The thermal conductivity of semiconductors — 1 1 3 1
   (A) Do not vary (B) Are constant
   (C) Increases with temperature (D) Decrease with temperature

10. _____ causes the shear stress in bonded dissimilar materials used in electronic packing. — 1 1 3 1
   (A) Thermal conductivity (B) Pressure
   (C) Coefficient of thermal expansion (D) Density

11. The laminar or turbulent flow is determined by using — 1 1 3 1
   (A) Nusselt number (B) Reynold's number
   (C) Biot number (D) Fourier number

12. Nusselt number in free convection is a function of — 1 1 3 1
   (A) Grashof number and Reynolds number (B) Grashof and Prandtl number
   (C) Prandtl and Reynold's number (D) Grashof number, Prandtl number and Reynolds number

13. Radiation heat transfer take place — 1 1 4 1
   (A) Two solid surfaces in physical contact (B) Between a solid surface and a fluid
   (C) Without any medium (D) Between two fluids

14. The view factor between two concentric cylinders arranged very closely with infinite length can be — 1 1 4 1
   (A) 1 (B) 0.8
   (C) 0 (D) 0.3

15. Good emitters of radiation are also good absorbers of radiation at specific wavelength. This fact is referred to as — 1 1 4 1
   (A) Kirchoff's law (B) Wien's law
   (C) Plank's law (D) Newton's law

16. The emissivity of grey body can be assumed as — 1 1 4 1
   (A) 0 (B) 1
   (C) 0.8 (D) 0.6

17. Liquid immersion cooling has — 1 1 5 1
   (A) Lower heat transfer coefficient than air (B) Same heat transfer coefficient as air
   (C) No cooling effects (D) Higher heat transfer coefficient than air

18. Heat pipe works in the principle of — 1 1 5 1
   (A) Evaporation and condensation (B) Conduction alone
   (C) Convection alone (D) Radiation alone

19. Thermocouple is used to measure the — 1 1 5 1
   (A) Wind speed (B) Air density
   (C) Temperature (D) Solar radiation

20. The pressure drop _____ with flow rate. — 1 1 5 1
   (A) Decreases (B) Increases
   (C) May increase of decrease (D) Never change

PART – B (5 × 4 = 20 Marks) — Marks BL CO PO
Answer **ANY FIVE** Questions

21. State Fourier's law of heat conduction and explain how it helps in electronic cooling. — 4 1 1 1

22. Explain why coefficient of thermal expansion is important in electronic packaging. — 4 2 1 1

23. What is the purpose of heat sink in electronic cooling? — 4 1 2 1

24. What are the difference between fin efficiency and fin effectiveness? — 4 1 2 1

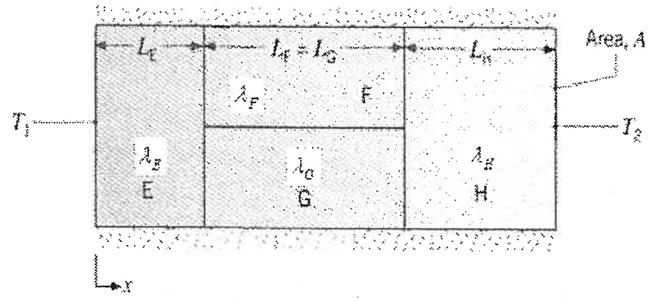
25. Difference between forced and natural convection. — 4 2 3 1

26. State the Stefan Boltzmann law. — 4 1 4 1

27. Explain why measurement are important in electronic cooling.

PART – C (5 × 12 = 60 Marks) — Marks BL CO PO
Answer **ALL** Questions

28. a. Draw and explain in detail about the electrical equivalent of thermal resistance network for the below thermal system. — 12 2 1 1



(OR)

b. Explain why the thermal interface material are important in reducing the junction temperature. — 12 2 1 1