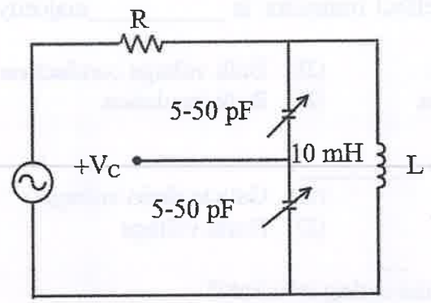

Determine the tuning range for circuit. If the inductance is 10 mH.

27. a.	Define Gunn effect and describe the two valley model theory of Gunn diode, with necessary diode.	10	2	1,2	1,3	
	(OR)					
b.	What is tunnel diode? Describe the working of energy band diagrams of tunnel diode.	10	2	1,2	1,3 ,15	
28. a.i.	Discuss the working of heterojunciton bipolar transistors.	5	2	1,4	1,3 ,15	
ii.	Explain the principle of operation of semiconductor materials used in MESFET.	5	2	1,4	1,3 ,15	
	(OR)					
b.i.	List out the difference between MISFET and MESFET.	5	2	1	1,3	
ii.	Discuss the working and operational characteristic of MISFET.	5	2	1	1,3	
29. a.	Define HEMT transistor. Describe the design and operation of HEMT device.	10	3	1,4	1,3 ,15	
	(OR)					
b.i.	What is short channel effect? Explain it briefly.	5	2	1,6	1,3	
ii.	What is RF power tranistor and also explain the figure of merit for RF power transistor.	5	2	1,4	1,3 ,15	
30. a.	Discuss the mechanical design and thermal management of RF package.	10	2	1,4	1,3 ,15	
	(OR)					
b.	Explain the process of computer integrated manufacturing and give the thermal analysis of resistance networks.	10	2	1	1,3 ,15	

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth, Sixth and Seventh Semester

18ECE321T – RF AND MICROWAVE SEMICONDUCTOR DEVICES

(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

PART – A (25 × 1 = 25 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
1.	The most widely used semiconducting material in electronic device is (A) Germanium (B) Silicon (C) Copper (D) Carbon	1	1	1	1
2.	Any voltage that is connected across a P-N junction is called _____ voltage. (A) Breakdown (B) Barrier (C) Reverse (D) Bias	1	1	1	1
3.	The process of adding impurities to a pure impurities to a pure semiconductor is called _____ (A) Doping (B) Diffusing (C) Refining (D) Mixing	1	1	1	1
4.	The schottky diode is used in high speed operation because of (A) Small current potential (B) High speed of electrons (C) Small size (D) Insignificant storage delay	1	1	1,6	1
5.	The VARICAP are ordinarily used (A) As a voltage controlled capacitance circuitry (B) As a constant current source (C) As a voltage multiplier circuitry (D) As a constant voltage source	1	1	1	1,2
6.	IMPATT diode is _____ (A) A high frequency rectifying device (B) A degenerate semiconductor device (C) A bulk negative differential conductance device (D) A negative conductance microwave device	1	1	1,2	1,3
7.	Which of the following type does not possess a negative region in its characteristics? (A) The tunnel type (B) The Gunn type (C) The Zener type (D) The Impatt type	1	1	1	1

8.	Avalanche breakdown primarily to influenced by the phenomenon of _____ (A) The field ionization (B) The impact ionization (C) The particle collision (D) The impurity doping	1	1	1,2	1,3	
9.	Gunn diode is utilized in _____ (A) The microwave oscillator (B) The RF oscillator (C) An audio oscillator (D) An audio amplifier	1	1	1	1,3 ,15	
10.	When a reverse bias voltage exceeding the breakdown voltage is applied to an IMPATT diode, it results in (A) Breakdown of deletion region (B) High reverse saturation current (C) Avalanche multiplication (D) Average resistance	1	1	1,2	1	
11.	In MESFET, an applied signal at the gate modulates the electron carries, this produces _____ in the FET. (A) Voltage amplification (B) Voltage attenuation (C) Electron multiplication (D) Electron recombination	1	1	1	1,3	
12.	High – power circuits generally use higher values of _____ (A) Gate to source current (B) Drain to source current (C) Drain current (D) Gate to source voltage	1	1	1	1,2	
13.	Advantage of using GaAs in MESFET as compared to use of silicon is _____ (A) GaAs are cost effective (B) They have high resistance for flow of current in the reverse direction (C) They have lesser mobility (D) They have higher mobility	1	1	1,4	1,5	
14.	A major disadvantage of TRAPATT diode is _____ (A) Fabrication is costly (B) Low operational bandwidth (C) Low gain (D) High noise figure	1	1	1,6	1,3	
15.	The frequency response of an amplifier is _____ (A) Wide band (B) Narrow band (C) Pass band (D) Zero	1	1	1,3	1,2	
16.	A major disadvantage of high electron mobility transistor is that _____ (A) They have low gain (B) High manufacturing cost (C) Temperature sensitive (D) High driving voltage is required	1	1	1,4	1,3 ,15	
17.	HEMT fabricated using GaN and aluminium gallium nitride on a silicon substrate ca be used in _____ (A) High power transmitters (B) High power receivers (C) RADAR (D) Smart antennas	1	1	1,4	1,3 ,15	

18.	The gallium arsenide field effect transistor is _____majority carrier device. (A) Bulk voltage insulation (B) Bulk voltage conduction (C) Bulk current conduction (D) Bulk insulation	1	1	1,4	1,1 5	
19.	The MESFET has maximum _____ (A) Gate to source voltage (B) Gate to drain voltage (C) Source voltage (D) Drain voltage	1	1	1	1,3	
20.	Which technology has semi-insulating substrate? (A) Silicon (B) Silicon nitride (C) Gallium oxide (D) Gallium arsenide	1	1	1,4	1,3 ,15	
21.	Since multiple layers of semiconductor material is used in high electron mobility transistors, this results in (A) Thermal stress (B) Temperature stability (C) High gain (D) Power loss	1	2	1,5	1,2	
22.	For designing and fabricating a low frequency circuit using the hybrid IC methodology, the material with _____ is preferred. (A) Low dielectric constant (B) High resistivity (C) Low resistivity (D) High dielectric constant	1	1	6,5	1,3 ,15	
23.	Method used for fabrication of GaAs FET is (A) Conduction (B) Diffusion (C) Ion implantation (D) Deposition	1	1	1,4	1,1 5	
24.	Why one should avoid inductor in RF and microwave CAD design? (A) Small foot print (B) Large foot print (C) Power attenuation (D) Power consumption	1	2	1,4, 6	1,3	
25.	Which device has short channel effect? (A) BJT (B) MOSFET (C) UJT (D) JFET	1	1	1,6	1,3	

PART – B (5 × 10 = 50 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
26. a.	Derive the diode equation.	10	2	1	1,3
	(OR)				
b.i.	Discuss the construction and operation of varactor diode.	5	2	1	1
ii.	The capacitance of certain varactor diode can be varied from 5pF to 50 pF. The diode is used in a tuned circuit of a radio receiver as shown in the figure.	5	3	1	1,2