Q. Code:243745

Reg. No. | | | | | | | | | | | | | |

B.E. / B. TECH DEGREE EXAMINATIONS, MAY 2024

Second Semester

EC22201 – ELECTRON DEVICES

(Electronics and Communication Engineering)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Gain Knowledge of PN diodes.	**2**
CO 2	Analyze the characteristics of BJT and use it in designing simple circuits.	**4**
CO 3	Analyze the characteristics of FET and use it in designing simple circuits.	**4**
CO 4	Analyze the working principle of Special diodes and use it in designing simple circuits.	**4**
CO 5	Analyze the working principle of power and display devices and use it in designing simple circuits.	**4**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How the PN junction diode is formed?	**1**	**2**
2.	The reverse saturation of a silicon PN junction diode is 10μA.Calculate the diode current for the forward bias voltage of 0.6V at 25ºC.	**1**	**3**
3.	Why is silicon preferred over germanium in the manufacture of semiconductor devices?	**1**	**2**
4.	What is meant by doping in a semiconductor? Name some donar and acceptor impurities.	**1**	**2**
5.	Draw the input and output characteristics of a transistor in CB configuration and mark the cutoff, saturation and active regions.	**2**	**3**
6.	Solve the value of β,if a transistor has a value of α=0.97.	**2**	**3**
7.	Draw the h-parameter model of CE transistor.	**2**	**2**
8.	Sketch the Ebers-Moll model.	**2**	**3**
9.	Draw the structure and symbol for an N-Channel JFET.	**3**	**2**
10.	Define drain to source resistance of JFET.	**3**	**2**
11.	Compare BJT and FET.	**3**	**3**
12.	Define Channel length modulation.	**3**	**2**
13.	Define avalanche breakdown.	**4**	**2**
14.	Write any two applications of Zener Diode.	**4**	**2**
15.	List out the applications of varactor diode.	**4**	**2**
16.	Expand: LASER,LDR.	**4**	**2**
17.	Draw the equivalent diagram of SCR.	**5**	**2**
18.	Determine the intrinsic standoff ratio of an UJT, whose R BB= 10KΩ and R B1 =6KΩ.	**5**	**2**
19.	Define quantum efficiency in an LED.	**5**	**2**
20.	Provide your understanding on the safe operating area of a power BJT.	**5**	**3**

PART- B (5 x 10 = 50 Marks)

			Marks	CO	RBT LEVEL
21.(a)	**(i)**	Demonstrate the action of PN junction diode under forward and reverse bias conditions.	**(7)**	**1**	**3**
	(ii)	Consider a silicon pn junction at T = 300 K so that ni = 1.5*1010 cm-3. The n-type doping is 1*1016 cm-3 and a forward bias of 0.60 V is applied to the pn junction. Calculate the minority hole concentration at the edge of the space charge region.	**(3)**	**1**	**3**
		(OR)			
(b)		Explain the switching behaviour of PN junction diode from forward to reverse bias, with diagrams illustrating minority carrier concentration and current characteristics during switching.	**(10)**	**1**	**3**
22.(a)		Explain the Gummel-Poon Model with equivalent circuit.	**(10)**	**2**	**2**
		(OR)			
(b)		Draw the Common Emitter configuration of NPN transistor and explain its input and output characteristics with suitable diagrams.	**(10)**	**2**	**2**
23.(a)		With the help of neat sketches and characteristics curves, explain the operation of junction FET .	**(10)**	**3**	**2**
		(OR)			
(b)		Explain the construction and principle of operation of Depletion mode MOSFET with the help of suitable diagram.	**(10)**	**3**	**2**
24.(a)		Examine the operation of zener diode used as voltage regulator and also draw the VI characteristics.	**(10)**	**4**	**3**
		(OR)			
(b)		Illustrate with necessary diagrams, the working mechanism of LASER diode.	**(10)**	**4**	**3**
25.(a)		With neat structure, explain the working and characteristics of SCR along with its applications.	**(10)**	**5**	**3**
		(OR)			
(b)		Examine the concept behind LCD and solar cell along with its applications.	**(10)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

			Marks	CO	RBT LEVEL
26.	**(i)**	Determine the ideal reverse saturation current density in a silicon pn junction at T = 300 K. Consider the following parameters in the silicon pn junction: $N_a = N_d = 10^{16}$ cm^{-3}, $n_i = 1.5*10^{10}$ cm^{-3}, $D_n = 25$ cm^2/s, $T_{p_0} = T_{n_0} = 5*10^{-7}$ s, $D_p = 10$ cm^2/s, $\varepsilon_r = 11.7$. Comment on the result.	**(7)**	1	**5**
	(ii)	Determine the built in potential in a silicon PN Junction with $N_a = 10^{15}$ cm^{-3} and $N_d = 2*10^{16}$ cm^{-3}, $n_i = 1.5*10^{10}$ cm^{-3} at T = 300 K.	**(3)**	1	**5**

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