

Reg.No. _____

**Karunya UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14EC2002
Sub. Name : Electron Devices

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

Q. No.	Questions				Course outcome	Marks
PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)						
1.	The conductivity of an extrinsic semiconductor				CO1	
	a. increases with temperature	b. decreases with temperature	c.remains constant with temperature	d.none		(1)
2.	For silicon the forbidden gap is				CO1	
	a. 0.25ev	b.1.1ev	c.0.5ev	d.15ev		(1)
3.	Fermi energy level for n-type extrinsic semic onductors lies				CO1	
	a.close to conduction band	b. at middle of the band gap	c.close to valence band	d.can be anywhere		(1)
4.	Semiconductor has ----- temperature coefficient of resistance				CO1	
	a. negative	b.positive	c.zero	d.none of the above		(1)
5.	The ratio of impurity atoms to intrinsic semiconductor atoms in an extrinsic semiconductor is about.				CO1	
	a. 1:10 ⁵	b. 1:10 ³	c. 1:10 ⁸	d. 1:10 ²		(1)
6.	P type semiconductor is formed by adding----- impurity with intrinsic semiconductor				CO1	
	a. Bivalent	b.pentavalent	c.trivalent	d.none		(1)
7.	Drift current in the semiconductor depends on				CO2	
	a. Only the electric field	b. Only the carrier concentration gradient	c. Both the electric field and concentration gradient	d. none		(1)
8.	P type compensated semiconductor occurs when				CO2	
	a. N _d <<N _a	b. N _d =N _a	c. N _d >>N _a	d. N _d =N _a /2		(1)
9.	In a semiconductor , current conduction is due to				CO1	
	a. only to holes	b.only to electrons	c. holes and free electrons	d.none		(1)
10.	What is the state of an ideal diode during forward bias?				CO1	
	a. A short circuit	b. An open circuit	c. Unpredictable	d.undefined		(1)
11.	How many junctions in a PN diode				CO1	
	a. single	b.double	c.triple	d.none		(1)
12.	Electric field strength related to hall voltage is given by				C03	
	a. V _H d	b. V _H +d	c. V _H E	d.V _H / d		(1)
13.	When a reverse bias is applied to a diode, it will				CO3	

	a. Raise the potential barrier	b. Lower the potential barrier	c. Increases the majority-carrier current greatly	d.none		(1)
14.	A pn junction acts as a -----				CO2	
	a. Controlled switch	b. bidirectional switch	c. unidirectional switch	d. none of the above		(1)
15.	Continuity equation governs functional relationship between carrier concentration, time and -----				CO3	
	a. voltage	b. current	c. distance	d. electric field		(1)
16.	The capacitive effect occurs under forward biased pn junction is known as				CO1	
	a. transition capacitance	b. diffusion capacitance	c. storage capacitance	d. none of the above		(1)
17.	The application of pn junction diode -----				CO2	
	a. rectifier	b.amplifier	c.oscillator	d. regulator		(1)
18.	If the arrow of crystal diode symbol is positive with respect to bar ,then diode is ----- --biased				CO1	
	a. forward	b.reverse	c.either forward or reverse	d.none		(1)
19.	Continuity equation governs functional relationship between carrier concentration, distance and -----				CO3	
	a. voltage	b. current	c. time	d. electric field		(1)
20.	Hall effect is used to determine				CO3	
	a. conductivity	b.carrier concentration	c.mobility	d.All the above		(1)
21.	Junction Field Effect Transistor is a -----				CO1	
	a. current controlled device	b.voltage controlled device	c.power controlled device	d.none		(1)
22.	β is the symbol of current gain for -----				CO3	
	a. common-base mode	b. common-emitter mode	c. common-collector mode	d.None		(1)
23.	In a transistor,------				CO3	
	a. $I_C = I_E + I_B$	b. $I_B = I_C + I_E$	c. $I_E = I_C + I_B$	d. $I_C = I_B - I_E$		(1)
24.	Find the value of collector current of a CE configuration whose current amplification factor is 0.98 and base current is 1mA.				CO2	
	a. 0.98mA	b.1mA	c.0.08mA	d.0.8mA		(1)
25.	The input characteristics of a transistor is drawn between input voltage and input current by keeping ----- constant				CO2	
	a.output current	b.output voltage	c.input current	d.Input and output current		(1)
26.	FET operation depends only on _____charge carriers.				CO2	
	a.majority	b.minority	c.majority and Minority	d.none		(1)
27.	Enhancement mode MOSFET can be operated in _____mode only.				CO2	

	a. enhancement	b. depletion	c. both enhancement and depletion	d.none		(1)
28.	The channel of a JFET is between the -----				CO2	
	a. gate and drain	b.drain and source	c.gate and source	d.input and output		(1)
29.	The UJT may be used as -----				CO2	
	a.an amplifier	b.relaxation oscillator	c.a rectifier	d.regulator		(1)
30.	Which of the following is a characteristics of UJT?				CO2	
	a. positive resistance	b.negative resistance	c.inverse resistance	d.none		(1)
31.	What does LED stand for?				CO2	
	a.light emitting display	b. light emitting diode	c. light emitting detector	d.light energy diode		(1)
32.	DIAC is a _____ silicon device.				CO2	
	a. three layer two terminal	b. two layer two terminal	c.four layer two terminal	d.none		(1)
33.	LED glows only in -----				CO2	
	a. reverse biased	b. forward biased	c.both forward and reverse biased	d.none		(1)
34.	The other name of tunnel diode is -----				CO2	
	a.shockley diode	b.zener diode	c.esaki diode	d.light emitting diode		(1)
35.	The different terminals in TRIAC is				CO2	
	a. emitter, base, collector	b. main terminal-I, main terminal-II, gate	c.anode ,cathode,gate	d.gate,source,drain		(1)
36.	A bidirectional thyristor is the -----				CO2	
	a. UJT	b.TRIAC	c.SCR	d.JFET		(1)
37.	A pn junction that radiates energy as light instead of heat is called				CO2	
	a. PN diode	b.Zener diode	c.LED	d.tunnel diode		(1)
38.	Materials used in manufacturing LED				CO2	
	a. Silicon and Germanium	b. Gallium, Arsenic and Phosphide	c. Both (a) and (b)	d.none		(1)
39.	Which device is used as a voltage regulator				CO2	
	a. PN diode	b.tunnel diode	c.zener diode	d.none		(1)
40.	Which of the following is not have a control device?				CO2	
	a. SCR	b.TRIAC	c.DIAC	d.none		(1)

PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)

41.	Draw the energy band diagram based on fermi-dirac probability distribution for n-type extrinsic semiconductor and p-type extrinsic semiconductor. Express the notations in detail	CO1	(5)
42.	Calculate the thermal equilibrium hole concentration in Silicon at T=400K. Assume	CO3	(5)

	the fermi energy is 0.27eV above the valence band energy. The value of N_v for Si at $T=300K$ is $1.04 \times 10^{19} \text{ cm}^{-3}$.		
43.	Calculate the silicon diode current for the forward bias voltage of 0.6V at room temperature, if the reverse saturation current is $10 \mu\text{A}$.	CO3	(5)
44.	Define Hall effect. Mention its applications.	CO3	(5)
45.	Compare JFET and MOSFET.	CO2	(5)
46.	Give the VI characteristics of UJT.	CO2	(5)
47.	Draw the energy band structure of open circuited pn junction and write the expression for potential energy (E_0).	CO2	(5)
48.	Draw the symbol and construction diagram of Depletion MOSFET	CO2	(5)
49.	Describe tunneling phenomenon.	CO2	(5)
50.	Draw the symbol and VI characteristic of zener diode.	CO3	(5)
PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)			
51.	With neat diagrams, explain the operation, input and output characteristics of a NPN transistor in CB configuration.	CO2	(10)
52.	Derive the expression for electron concentration (n_0) in intrinsic semiconductor under thermal equilibrium conditions.	CO3	(10)
53.	Compare SCR and TRIAC. Explain the operation of SCR.	CO2	(10)

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