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ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003

KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESHWARAM, BANGALORE – 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಜೂನ್ / ಜುಲೈ, 2022

S.S.L.C. EXAMINATION, JUNE / JULY, 2022

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 02. 07. 2022] ಸಂಕೇತ ಸಂಖ್ಯೆ : **73**

Date : 02. 07. 2022] **CODE NO. : 73**

ವಿಷಯ : ಎಲಿಮೆಂಟ್ಸ್ ಆಫ್ ಎಲೆಕ್ಟ್ರಾನಿಕ್ಸ್ ಇಂಜಿನಿಯರಿಂಗ್

Subject : ELEMENTS OF ELECTRONICS ENGINEERING

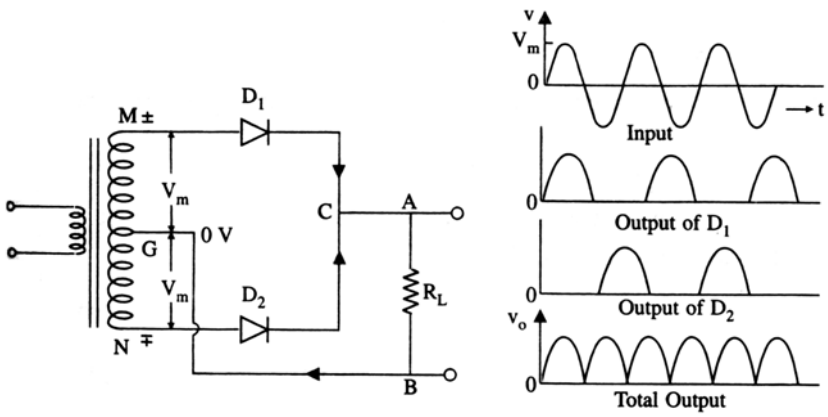
(ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ/ Regular Repeater)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : **90**

[Max. Marks : 90

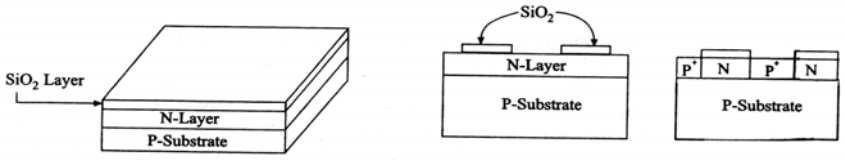
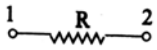
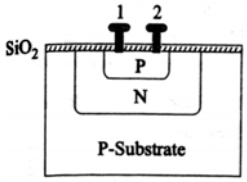
Qn. Nos.	Sub. Qn.No.	Value Points	Total
1.	i)	Normally ICs are made of (A) Brass (B) Aluminium (C) Copper (D) Silicon. *Ans.* (D) Silicon	1
	ii)	IC 741 is an example of (A) Op-Amp (B) FET (C) MOSFET (D) Diode. *Ans.* (A) Op-Amp	1
	iii)	Number of terminals in Op-Amp is (A) 2 (B) 8 (C) 5 (D) 7. *Ans.* (C) 5	1

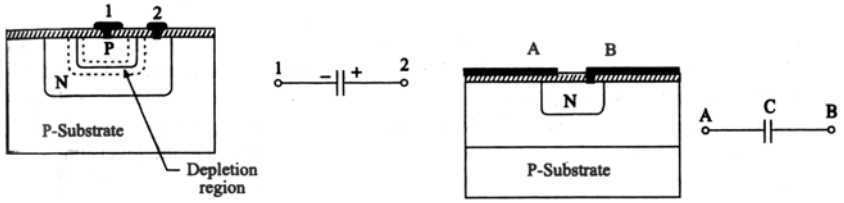
Qn. Nos.	Sub. Qn.No.	Value Points	Total
	iv)	DIL package means (A) dropped-in-line (B) dual-in-line (C) dipped-in-line (D) diffused-in-line. *Ans.* (B) dual-in-line	1
	v)	A pure semiconductor is called (A) an intrinsic semiconductor (B) an extrinsic semiconductor (C) P-type semiconductor (D) N-type semiconductor. *Ans.* (A) an intrinsic semiconductor	1
	vi)	The major component of a MOS IC is a/an (A) FET (B) bipolar (C) SCR (D) MOSFET. *Ans.* (D) MOSFET	1
	vii)	V_o means (A) input voltage (B) output voltage (C) positive voltage (D) negative voltage. *Ans.* (B) output voltage	1
	viii)	The output voltage of IC 7805 is (A) + 6·0 V (B) + 2·0 V (C) + 5·0 V (D) + 4·0 V. *Ans.* (C) + 5·0 V	1
	ix)	LED means (A) Line Emitting Diode (B) Low Light Emitting Diode (C) Laser Emitting Diode (D) Light Emitting Diode. *Ans.* (D) Light Emitting Diode	1
	x)	Number of diodes used in full-wave rectifier is (A) 2 (B) 3 (C) 1 (D) 5. *Ans.* (A) 2	1

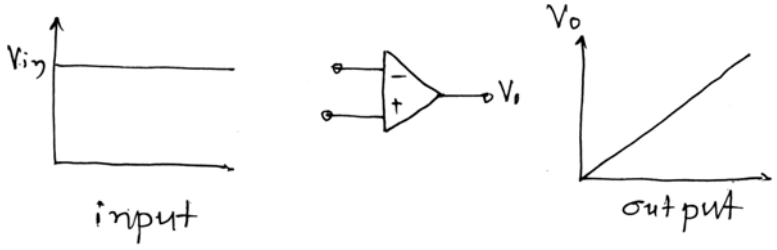
Qn. Nos.	Sub. Qn.No.	Value Points	Total
2.	a)	Name the two types of extrinsic semiconductors. 2 *Ans.* i) N-type ii) P-type	2
	b)	List the active and passive components of IC. 3 *Ans.* Active components i) Transistors ii) FETs Passive components i) Resistors ii) Capacitors iii) Inductors	3
	c)	Draw a neat diagram of full-wave rectifier and also draw its input and output wave forms. 5 *Ans.* Full-wave Rectifier  	5
3.	a)	Write the full form of SSI and MSI. 2 *Ans.* SSI — Small Scale Integration MSI — Medium Scale Integration	2
	b)	List the advantages of ICs. 3 *Ans.* Advantages of IC i) Small in size ii) Low in weight iii) Low cost iv) High reliability v) Low power consumption vi) Easy replacement	3

Qn. Nos.	Sub. Qn.No.	Value Points	Total
	c)	Give reasons why IC is extremely reliable. 5 *Ans.* In IC there has no soldered connections. Another is the need for fewer interconnections. Small temp. rise due to low power consumptions. Obviously higher reliability means that ICs will work for longer periods without giving any trouble. Something that is most desirable from both military and consumer application stand points.	5
4.	a)	Write the full form of MOSFET. 2 *Ans.* MOSFET Metal Oxide Field Effect Transistors	2
	b)	Write the level of integration of ICs. 3 *Ans.* <u>Level of Integration</u> i) SSI ii) MSI iii) LSI iv) VLSI	3
	c)	Write a short note on Monolithic IC. 5 *Ans.* <u>Monolithic IC</u> The word 'Monolithic' means single store or more appropriately 'a single-solid structure'. In this IC, all circuit components (both active and passive) are fabricated inseparably within a single continuous piece of silicon crystalline material called wafer or substrate. All components are automatically parts of the same chip.	5
5.	a)	Who first invented an IC ? 2 *Ans.* J. S. Kilby was the first to develop (in 1958) an integrated circuit.	2
	b)	Explain thin film IC. 3 *Ans.* <u>Thin film IC</u> Such ICs are constructed by depositing films of conducting material through a mask on the surface of a substrate made of glass or ceramic. The active components like transistors and diode etc. are externally added.	3

Qn. Nos.	Sub. Qn.No.	Value Points	Total
	c)	List the uses of Linear ICs. 5 *Ans.* Linear ICs are used in — Operational amplifiers — Small signal amplifiers — Power amplifiers — Multipliers — Voltage regulators — Voltage comparators	5
		OR	
	a)	How the ICs are classified ? 2 *Ans.* i) Monolithic integrated circuits ii) Thick and thin film ICs iii) Hybrid or multi chip ICs.	2
	b)	What are the drawbacks of ICs ? 3 *Ans.* The drawbacks of ICs are i) Coils or inductors cannot be fabricated ii) ICs function at fairly low voltages iii) They can handle only limited amount of power.	3
	c)	Write the disadvantages of monolithic ICs. 5 *Ans.* i) Isolation between components is poor ii) Range of values of passive components used in the circuits is comparatively small iii) Inductors cannot be fabricated iv) They offered no flexibility in circuit design because for making any changes in the circuit a new set of masks is required.	5
6.	a)	Define Epitaxy. 2 *Ans.* <u>Epitaxy</u> Epitaxy means physical replacement of materials on a given surface.	2
	b)	Explain Isolation Diffusion in IC. 3 *Ans.* <u>Isolation Diffusion</u> The wafer is next subjected to a P-type diffusion process by which N-type layer is isolated into islands on which transistor or some other component is fabricated.	3

Qn. Nos.	Sub. Qn.No.	Value Points	Total
	c)	With a neat diagram, explain the process of 'Photolithographic' in IC. 5 *Ans.* Photolithographic Process  This involves selective etching of SiO_2 layer with the help of a photographic mask photoresist and etching solution.	5
7.	a)	What do you mean by 'Diffusion' ? 2 *Ans.* Diffusion Introduction of controlled small quantities of a material into crystal structure.	2
	b)	Explain the circuit bonding of IC. 3 *Ans.* Circuit bonding of IC Each IC on the wafer is checked electrically for proper performance by placing probes on the bonding pads. Faulty chips are marked and discarded after the wafer has been scribed and broken down into individual chips.	3
	c)	Explain how resistors are fabricated in IC with a neat diagram. 5 *Ans.* IC resistors utilize the resistivity of doped silicon.  By concentration of dopping impurity and depth of diffusion, the resistance value can be controlled. For low resistance values emitter region is used.  	5
8.	a)	Define 'Wafer' IC terminology. 2 *Ans.* Wafer Wafer is a thin slice of a semiconductor material either circular or rectangular in shape.	2

Qn. Nos.	Sub. Qn.No.	Value Points	Total
	b)	List the applications of Op-Amp. 3 *Ans.* Applications of Op-Amp Op-Amp can be used as/an — Subtractor — Adder or Summer — Integrator — Comparator — Differentiator — Unity follower	3
	c)	Explain with a neat diagram, how capacitors are fabricated in IC. 5 *Ans.* Monolithic IC capacitors are formed by utilizing the transition capacitance of a reverse biased P-N junction. P and N regions form the capacitor plates and depletion region between them is the di-electric. This capacitance is dependent on the reverse voltage across the junction and its value is limited to about 100 pF. 	5
9.	a)	What is unity follower ? 2 *Ans.* <u>Unity Follower</u> Unity Follower provides a gain of unity without any phase reversal.	2
	b)	Write the formula to calculate the voltage gain of Op-Amp. 3 *Ans.* <u>Voltage Gain</u> $A_v = 1 + \frac{R_f}{R_1}$ A_v = voltage gain R_f = feedback resistor	3

Qn. Nos.	Sub. Qn.No.	Value Points	Total
	c)	Explain 'Integrator' and also draw symbol, input and output waveforms. 5 *Ans.* Integrator  The function of integrator is to provide an output voltage which is proportional to the integral of the input voltage. The circuit is similar to the scalar circuit except that the feedback component is a capacitor C instead of a resistor R_f.	5
		OR	
	a)	What is an operational amplifier ? 2 *Ans.* The operational amplifier most commonly referred as Op-Amp was introduced in 1940s. The first operational amplifier was designed in 1948 using vacuum tubes.	2
	b)	Write the features of IC 741. 3 *Ans.* i) No frequency compensation is required ii) Short circuit protection is provided iii) Offset voltage null capability iv) Large common mode and differential voltage range v) No latch up.	3
	c)	Explain 'Comparator'. 5 *Ans.* A comparator is a device which compares a signal voltage with a reference voltage. An Op-Amp comparator is an open loop Op-Amp. The reference voltage is applied to one of its input terminals and the signal to be compared is applied to the other input terminal.	5