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

**KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESWARAM, BANGALORE – 560 003**

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಜೂನ್ — 2018

**S. S. L. C. EXAMINATION, JUNE, 2018**

ಮಾದರಿ ಉತ್ತರಗಳು

# MODEL ANSWERS

ದಿನಾಂಕ : 23. 06. 2018 ] ಸಂಕೇತ ಸಂಖ್ಯೆ : **73**

Date : 23. 06. 2018 ] **CODE NO. : 73**

## ವಿಷಯ : ಎಲಿಮೆಂಟ್ಸ್ ಆಫ್ ಎಲೆಕ್ಟ್ರಾನಿಕ್ಸ್ ಇಂಜಿನಿಯರಿಂಗ್

## Subject : ELEMENTS OF ELECTRONICS ENGINEERING

**( ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus )**

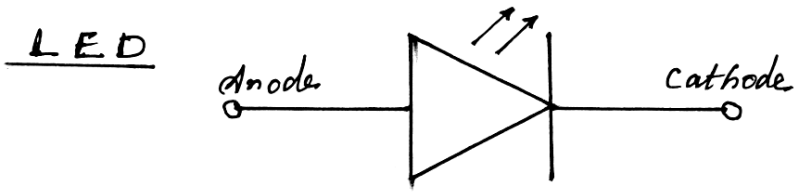
**( ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ/ Regular Repeater )**

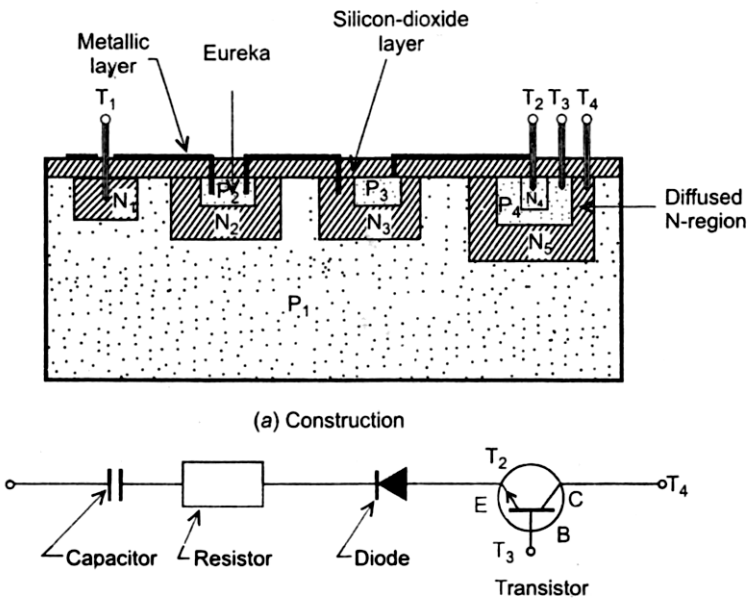
[ ಗರಿಷ್ಠ ಅಂಕಗಳು : **90**

**[ Max. Marks : 90**

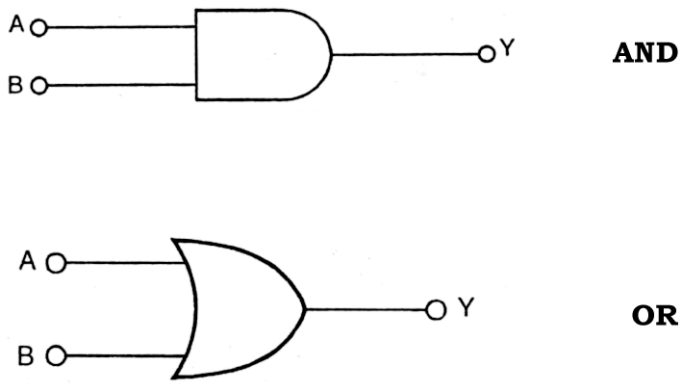
| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 1. | | Fill in the blanks with the appropriate figure/word(s) by selecting from the choices given in the brackets :<br>10 × 1 = 10 | |
| | i) | Oscilloscope is used to measure ..... .<br>( *a.c. voltage, d.c. voltage, both a.c. & d.c. voltages* )<br>*Ans.* both a.c. & d.c. voltages | |
| | ii) | Truth table can only be used for ..... circuits.<br>( *digital, combinational, synchronous* )<br>*Ans.* digital | |

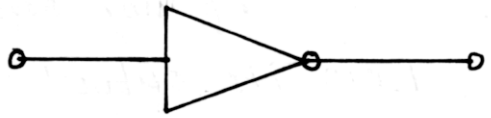
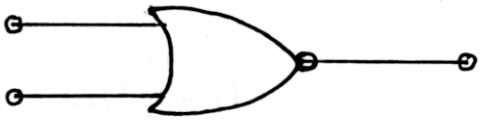
| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | iii) | MSI contains ..... .<br>( *12-100 gates, less than 12 gates, more than 100 gates* )<br>*Ans.* 12-100 gates | |
| | iv) | Intel 8085 is a ..... .<br>( *microprocessor, transistor, diode* )<br>*Ans.* microprocessor | |
| | v) | Flip-flop is a bistable circuit which has ..... .<br>( *2 stable states, 3 stable states, 4 stable states* )<br>*Ans.* 2 stable states | |
| | vi) | Counter is a special type of ..... .<br>( *Register, Inverter, Converter* )<br>*Ans.* Register | |
| | vii) | Non-linear IC is also known as ..... .<br>( *digital I.C., monolithic I.C., hybrid I.C.* )<br>*Ans.* digital I.C. | |
| | viii) | The cost of Op-Amp is ..... .<br>( *less, medium, high* )<br>*Ans.* less | |
| | ix) | Binary number system consists only two digits, they are ..... .<br>( *0 & 1, 1 & 2, 0 & 8* )<br>*Ans.* 0 & 1 | |
| | x) | An IC whose output is proportional to its input is known as ..... .<br>( *linear IC, non-linear IC, none of these* )<br>*Ans.* linear IC | 10 × 1 = 10<br>(each 1) |

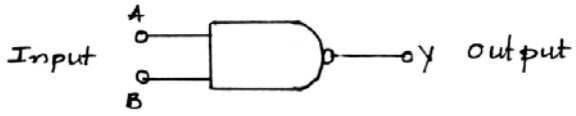
| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 2. | a) | What is an IC ? 2<br>*Ans.*<br>An IC (Integrated Circuit) is an electronic circuit in which both the active and passive components are fabricated on an extremely small chip of silicon. | 2 |
| | b) | What are the salient features of an IC ? 3<br>*Ans.*<br>*Features of an IC :*<br>— small size<br>— light weight<br>— low power consumption<br>— high reliability<br>— working capacity at a higher temperature<br>— wiring becomes very simple. | 3 × 1 = 3 |
| | c) | Draw a symbol of LED and explain briefly. 5<br>*Ans.*<br>  <br><br>LED (Light Emitting Diode) is a special type of semiconductor diode. It emits light when it is forward biased. It operates on the principle of injection luminescence. This device is used as a light indicator in electronic equipment for various visual display purpose.<br>The LED radiates light in different colours such as red, green, blue, orange etc. Colour of the light depends upon the semiconductor materials used. | Figure - 1<br>Parts - 1<br>Explanation-3 |

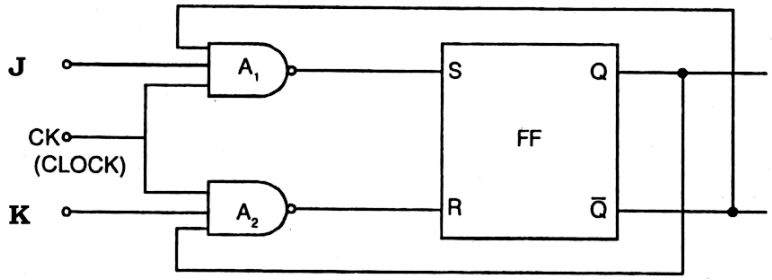
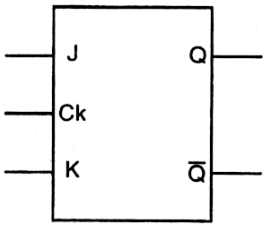
| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 3. | a) | Define SSI. 2<br>*Ans.*<br>SSI (Small Scale Integration) refers to ICs which contains less than 12 logic gates on the same chip.<br>Examples include flip-flops. | 2 |
| | b) | List various applications of ICs. 3<br>*Ans.*<br>Applications of ICs :<br>Integrated circuits are exclusively used in,<br>— Military equipment<br>— Aviation equipment<br>— Navigation equipment<br>— Consumer equipment like TV, Radio, Computer, amplifiers, calculators, digital clocks etc.<br>— Medical equipment. | 3 |
| | c) | Draw the constructional diagram of monolithic IC. 5<br>*Ans.*<br>Diagram of Monolithic IC<br>  <br> | Parts - 2<br>Diagram - 3 |

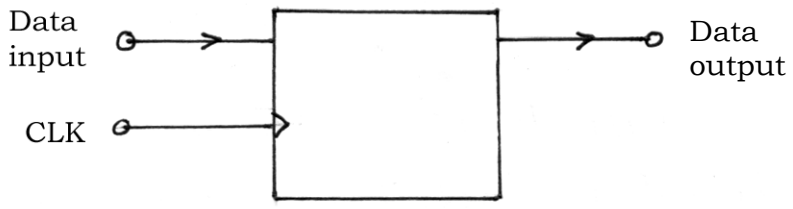
| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 4. | a) | What is an Op-Amp ? 2<br>*Ans.*<br>Op-Amp :<br>An operational amplifier is a direct-coupled high voltage gain amplifier. It is used to amplify *ac* as well as *dc* input signals. | 2 |
| | b) | What are the ideal characteristics of an Op-Amp ? 3<br>*Ans.*<br>Characteristics of an Op-Amp (ideal) :<br>→ Infinite voltage gain $A$<br>→ Infinite input resistance $R_i$<br>→ Zero output resistance $R_o$<br>→ Infinite bandwidth<br>→ Infinite CMRR<br>→ Infinite slew rate<br>→ zero PSRR | $3 \times 1 = 3$ |
| | c) | Explain the functions of input stage and output stage of an Op-Amp. 5<br>*Ans.*<br>Input stage :<br>It is the dual input, balanced output differential amplifier. This stage generally provides most of the voltage gain of the amplifier and also establishes the input resistance of an Op-Amp.<br>Output stage :<br>This stage increases the output voltage swing and raises the current supplying capability of the Op-Amp. | $2\frac{1}{2} + 2\frac{1}{2} = 5$ |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 5. | a) | Name different types of number systems used in digital systems. 2<br>*Ans.*<br>Different types of number systems :<br>— Decimal Number System<br>— Binary Number System<br>— Octal Number System<br>— Hexadecimal Number System | 2 |
| | b) | Convert decimal 33 into its binary equivalent. 3<br>*Ans.*<br>2 \| 33<br>2 \| 16 — 1<br>2 \| 8 — 0<br>2 \| 4 — 0<br>2 \| 2 — 0<br>1 — 0<br>$\therefore 33_{10} = 100001_2$ | 3 |
| | c) | Draw the symbols of AND, NAND, OR, NOR & NOT logic gates. 5<br>*Ans.*<br>Symbols of logic gates<br>  <br> | |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | |  NAND<br>  NOT<br>  NOR | 5 ( each 1 ) |
| 6. | a) | Define rectifier. 2<br>*Ans.*<br>The device which converts AC into DC is called a rectifier. | 2 |
| | b) | Explain decimal number system. 3<br>*Ans.*<br>Decimal Number System :<br>The number system with base 10 is the decimal number system. It uses ten distinct numerals 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. In general decimal number is the sum of products of each digit value and its positional value. | 3 |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | c) | Explain NAND gate and verify its truth table. 5<br>*Ans.*<br>  <br><br>IN PUT A B / OUTPUT Y<br>0 0 1<br>0 1 1<br>1 0 1<br>1 1 0<br>NAND gate is a Universal gate which performs complement of AND gate. The output of a NAND gate is Low only when all of its inputs are High, if any one or more inputs are Low its output is High. The Boolean expression is given by $Y = \overline{AB}$. | 5<br>(Symbol-1<br>Table-2<br>Explanation-2) |
| 7. | a) | What is meant by flip-flop ? 2<br>*Ans.*<br>A flip-flop is a simple two-state device capable of storing single bit information. It has two outputs. | 2 |
| | b) | What are the uses of flip-flops ? 3<br>*Ans.*<br><u>Uses of flip-flops :</u><br>— Used for temporary storing data in frequency counters and digital voltmeters<br>— Used in digital instruments<br>— Used to construct various registers in microprocessors, microcontrollers<br>— Used in measuring systems and in electron organs<br>— Used in *A* to *D* converters. | 3 |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | c) | Explain JK flip-flop with a neat symbol and verify its truth table. 5<br>*Ans.*<br>**J K Flip–Flop**<br>  <br><br>(a) JK Flip-Flop<br>J K $Q_{n-1}$ Action<br>0 0 $Q_n$ No change<br>0 1 0 RESET<br>1 0 1 SET<br>1 1 $Q_n$ Toggle<br>(b) Truth table<br>  <br><br>(b) Symbol<br>The JK flip-flop is the most widely used flip-flop which has no forbidden condition that exists in the SR flip-flop. When $J$ and $K$ are both low, $Q$ retains its last value. When $J$ is low and $K$ is high $A_1$ is disabled, $A_2$ is enabled. When $J$ = 0, $K$ = 1 the next clock pulse resets the flip-flop. | 5<br>(Symbol-1<br>Table-2<br>Explanation-2) |
| 8. | a) | Define register. 2<br>*Ans.*<br>A register simply a group of flip-flops that can be used for storing a binary number. | 2 |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | b) | Explain shift register. 3<br>*Ans.*<br>Shift Register<br>Shift register shifts data stored at a particular bit location to some other bit location within the same register or into some other register on the occurrence of clock pulse.<br>There are two ways to shift data in a register *i.e.,* serial or parallel. There are four types of shift registers —<br>i) Serial in - serial out<br>ii) Serial in - parallel out<br>iii) Parallel in - parallel out<br>iv) Parallel in - serial out. | 3 |
| | c) | Draw the block diagram of SISO shift register and explain briefly. 5<br>*Ans.*<br>**SISO Shift Register**<br>  <br><br>The SISO shift register accepts data serially (*i.e.,* one bit at a time on a single line) and produces the stored information on its output also in the serial form. Initially all the flip-flops are cleared (or reseted) by applying '0' to the clear input. This makes every output becomes zero or low. | 5<br>( Parts-1<br>Symbol-1<br>Explanation-3) |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| 9. | a) | Define counter. 2<br>*Ans.*<br>Counting number of clock pulses arriving at its input is called counter. | 2 |
| | b) | Explain microprocessor and name the microprocessor which has 40 pins. 3<br>*Ans.*<br>Microprocessor is a simgle chip which contains the entire central processing unit (CPU) of a computer. It consists of electronic logic circuits fabricated by using either a large scale or very large scale integration technique. It is capable of performing computing functions and main decisions to change the sequence of program execution. Intel 8085 microprocessor has 40 pins. | 3 |
| | c) | Write short notes on the following : 5<br>i) LCD<br>ii) Binary system.<br>*Ans.*<br>i) <u>LCD</u> :<br>Liquid Crystal Display (LCD) is an electronic display device that operates by applying a varying electric voltage to the layer of liquid crystal. LCD consists of a thin layer of NLC fluid, sandwiched | |

| Qn. Nos. | Sub. Qn.No. | Value Points | Marks |
|---|---|---|---|
| | | between two glass plates having electrodes at least one of which is transparent.<br><br>LCDs are widely used in calculators, electronic watches, digital clocks, portable electronic games etc.<br><br>ii) Binary system :<br><br>A number system that uses only two numbers 0 and 1 is called binary number system. The base of this system is two, which can be represented by two stable states which can be low level (0) or high level (1) no pulse (0) and pulse (1). | 5<br><br>( each $2\frac{1}{2}$ ) |