



**B.E DEGREE EXAMINATIONS: NOV/DEC 2022**

(Regulation 2018)

Fifth Semester

**AUTOMOBILE ENGINEERING**

U18AUT5001: Automotive Electronics

**COURSE OUTCOMES**

- CO1:** Exposure on fundamentals of electronic components
- CO2:** Design the power supply for the given specification
- CO3:** Construct the digital circuit using logic gates for the given logical operation
- CO4:** Familiarize the student with electronic component functions involved in automotive electronic circuits
- CO5:** Explain the working principle of application specific electronic control unit
- CO6:** Construct the ECU architecture for the given application

**Time: Three Hours**

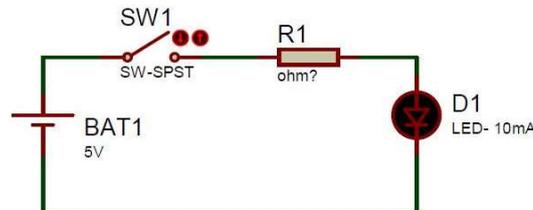
**Maximum Marks: 100**

**Answer all the Questions: -**

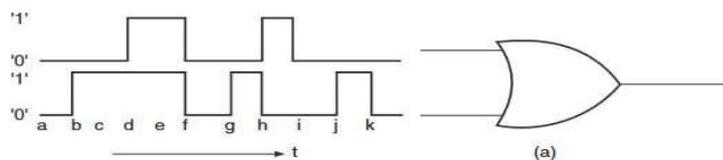
**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

1. Compare the function of active and passive components with an example. CO1 [K<sub>2</sub>]
2. In the given circuit, Design the resistor value of R1 for Green LED  $V_f = 2.2$  v. CO1 [K<sub>3</sub>]



3. Illustrate the signal flow of power supply circuit and mention the signal name on each stage. CO2 [K<sub>2</sub>]
4. Design a 9v to 3.3v converter circuit using Zener diode. CO2 [K<sub>3</sub>]
5. Draw the output waveform for the OR gate and the given pulsed input waveforms. CO3 [K<sub>2</sub>]



6. Convert  $2B_{16}$  to an equivalent binary number. CO3 [K<sub>2</sub>]
7. Design the simple adaptive lighting system using LDR. CO4 [K<sub>3</sub>]
8. What is a keyless entry system? CO4 [K<sub>2</sub>]

9. Draw the architecture of airbag ECU. CO6 [K<sub>2</sub>]
10. List the various sensors contained in engine management system. CO5 [K<sub>2</sub>]

**Answer any FIVE Questions: -  
PART B (5 x 16 = 80 Marks)  
(Answer not more than 400 words)**

11. a) For given specifications Design a switching circuit for the Green LED Load using NPN Transistor: 2N3904. Assume that Input voltage V<sub>b</sub>: 2V, Load Voltage VCC: 6V, Collector current I<sub>c</sub>: 20mA and  $\beta = 60$ , VCE= 0.3. 12 CO1 [K<sub>3</sub>]  
 b) Construct the LPF and HPF using passive components. 4 CO1 [K<sub>3</sub>]
12. a) Design a power supply using Voltage Regulator IC7805 and bridge rectifier. 12 CO2 [K<sub>3</sub>]  
 b) A power transmission line feeds input power at 230 V to a step-down transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary in order to get output power at 12 V? 4 CO2 [K<sub>2</sub>]
13. a) Explain the Logic gates and draw the equivalent circuit and truth table. 12 CO3 [K<sub>2</sub>]  
 b) List the real-life application of digital electronics. 4 CO3 [K<sub>2</sub>]
14. a) Design a circuit for speed control of DC motor using 555 timer and explain. 12 CO4 [K<sub>3</sub>]  
 b) Calculate the ON time, OFF time, Total time period, Duty cycle and Frequency of the output generated by an astable multivibrator using resistors R<sub>1</sub> = 5k, R<sub>2</sub> =5K and capacitor C = 10 $\mu$ f. 4 CO4 [K<sub>3</sub>]
15. a) Explain the architecture of battery management system (BMS) ECU with neat block diagram. 12 CO5 [K<sub>2</sub>]  
 b) Construct the architecture of generalized ECU with neat block diagram. 4 CO6 [K<sub>3</sub>]
16. a) Explain the Motor driver L293D IC (digital IC) with neat diagram. 12 CO6 [K<sub>2</sub>]  
 b) Classify the voltage regulator function and also write the output voltage of each regulator. 4 CO2 [K<sub>2</sub>]

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