

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2018**  
**SET-1**

**Course: Advanced Microcontroller for Auto Systems**

**Semester: VII**

**Programme: B. Tech ADE**

**Time: 03 hrs.**

**Max. Marks: 100**

**Instructions: Attempt all the questions as per instructions provided.**

**SECTION A**

S. No.	Answer All the questions	Marks	CO
1	In ATmega8, how many general and special purpose registers are present. What is their size? What does number 8 in ATmega8 signify?	5	CO3
2	What is the difference between Harvard and Von-Neuman memory organization?	5	CO1
3	In AVR microcontroller draw and explain the internal memory organization	5	CO2
4	In embedded systems, what is NRE and RE cost? Explain with an example	5	CO1

**SECTION B**

S.No	Answer any Four	Marks	CO
5	SREG is the status register of AVR microcontroller. Draw its structure and explain the function of each flag	10	CO2
6	What is hardware-software co-design? Draw and explain a typical co-design process and enlist the main advantages of co-design process in embedded systems	10	CO1
7	What is TIMSK register? Draw its internal structure and explain the function of each bit.	10	CO3
8	In ADC of AVR, what are ADMUX and ADCSRA registers? Identify their role while interfacing ADC to AVR microcontrollers. Write a sample C code for the same.	10	CO4
9	Write a C code to interface DC motor to rotate it in clockwise and counter clockwise direction with AVR microcontroller using L293D. Draw a neat sketch of the complete set-up.	10	CO4

**SECTION-C**

S.No	Answer any Two	Marks	CO
10	Design a LED pattern display system with AVR microcontroller. 8 LEDs are to be connected to PORTD of AVR. Provide a delay of one second between each pattern. The patterns to be displayed are i) ODD & EVEN ii) Left Shift & Right Shift	20	CO3

	iii) Rotate left & Rotate right iv) Half ON & Half OFF		
11	Design a counter system by using 7-segment with AVR microcontroller. The counter should count from 0000 to 9999 in an incremental manner. After 9999, the counter should reset to 0000. Provide a delay of one second between each count. Use multiplexed 7-segment, draw the complete circuit and write the algorithm used.	<b>20</b>	<b>CO4</b>
12	Design the A to D converter using AVR with the following specifications i) $A_{ref} = V_{cc}$ ii) Division factor of prescaler = 128 Write the complete algorithm and its equivalent C code to convert the analog value to its digital equivalent and display the same on LCD. Also draw the complete schematic.	<b>20</b>	<b>CO2</b>

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**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2018**  
**SET-2**

**Course: Advanced Microcontroller for Auto Systems**

**Semester: VII**

**Programme: B. Tech ADE**

**Time: 03 hrs.**

**Max. Marks: 100**

**Instructions: Attempt all the questions as per instructions provided.**

**SECTION A**

S. No.	Answer All the questions	Marks	CO
1	In ATmega8 i) How many timers are present? What is the size of each? ii) How many channels are present in ADC? iii) What is the size of SRAM and EEPROM	5	CO3
2	What are the special functions of PORTB, PORTC and PORTD of ATmega8	5	CO2
3	In AVR microcontroller draw and explain the internal memory organization	5	CO2
4	What is the role of busy flag while interfacing LCD with microcontrollers	5	CO4

**SECTION B**

S.No	Answer any Four	Marks	CO
5	Draw the functional block diagram of ATmega8 and explain the function of each block	10	CO3
6	What is TIFR register? Draw its internal structure and explain the function of each bit.	10	CO3
7	Consider a 16x2 LCD. Highlight the data pins and explain the function of control pins	10	CO4
8	What is pipelining? With a neat sketch, highlight the differences between 3-stage and 5-stage pipelining.	10	CO1
9	Explain the terms with circuit diagram: a. Pull up and Pull down register of At MEGA 16 b. ADC port of AVR Microcontroller c. Reset circuitry d. External & Internal Interrupt	10	CO1

**SECTION-C**

S.No	Answer any Two	Marks	CO
10	Design a LED pattern display system with AVR microcontroller. 8 LEDs are to be connected to PORTD of AVR. The patterns to be displayed are converging and	20	CO4

	diverging with a delay of one second for between ON and OFF state of each LED. The pattern should be of non-overlap type. Draw the complete circuit and write the algorithm.		
11	Design a notice board system using 32x4 LCD with AVR microcontroller. The data to be displayed on middle of first line is “B.Tech ADE”, data to be displayed on middle of second and third line is “Dept. of Mechatronics” and “**UPES**” respectively.	20	CO4
12	<p>A. In AVR while interfacing LCD explain what should be the values of DB0-DB7 bits and values of RS and R/w bits in order</p> <ul style="list-style-type: none"> <li><b>i) Write data to CG or DD RAM</b></li> <li><b>ii) Read data from CG or DD RAM</b></li> <li><b>iii) Shifting the cursor and Display</b></li> <li><b>iv) Display ON/OFF control</b></li> </ul> <p>B. In AVR write a C code to control the brightness of LED using timers in PWM mode. Also, comment on the format of registers used.</p>	20	CO2