Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, DEC 2015 / JAN 2016

SUBJECT: ADVANCED ENERGY MANAGEMENT [ELE 457]

REVISED CREDIT SYSTEM

Time: 3 Hours 01 January 2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.
- Support all your programs with relevant comments.

1A. Describe the function of the following ARM7 instruction

ADC {condn} {S) Rd, Rm, operand 2.

Give the details of all possible operands for operand 2. Illustrate anyone with an example, along with flags affected. (04)

1B. With the help of a an example, differentiate clearly between logical shift right (LSR) and arithmetic shift right (ASR) operations in ARM7 processor. (02)

1C. What are the key principles of energy management in industries? Describe the role of energy managers in achieving this and the strategy to be followed for efficient energy management (04)

2A. Write an ARM7 assembly program to determine the number of ones and zeroes in a 32 bit number available in memory starting at 0X00006000. Store the number of ones at 0X00006004 and number of zeroes at 0X00006005. (03)

2B. Explain the instruction of ARM7 processor used to call a subroutine and the instruction used to return from leaf (non-nested subroutine).

Write a subroutine in assembly language for ARM7 to multiply an unsigned number by 22. Pass the number to the subroutine through R1 register and return the result through R2 register. (04)

2C. Describe the functions of the following signals of ARM7TDMI processor

i. nFIQ

ii. nRESET

iii. CLK and CLKEN (03)

3A. List the various exceptions of ARM7 processor along with their vector address, new mode of operation and priority. If an exception occurs while ARM7 is executing another exception handler program, how is it handled by the processor? (03)

3B. Show the interfacing circuit to interface two common anode '7' segment display devices to ARM cortex M3 based NXPLPC1768 microcontroller using pins P8 to P15 and P20 to P27. Write a 'C' code to display numbers '00' to '99' continuously with a delay of 3.5 seconds. (03)

3C. List the salient features and specifications of Modbus protocol.

Give the details of the query and response in Modbus RTU format to write to a slave device (device ID 18H) with data 1A2DH and 0C3EH to two registers whose addresses are 40,105 and 40,106 respectively. (04)

4A Briefly explain the need for advanced computing in energy management applications. (03)

4B Write a pseudocode algorithm/flow chart to obtain the min, max, sum and average of all elements in a array in O(n) time. (03)

4C Solve the following recurrence relations:
a) $T(n) = 3T(n-1) + 1$ b) $T(n) = 2T(n-1) – 1$ (04)

5A Convert the following Infix Expression to postfix using stack. A*B-(C+D)+E, show all the important steps of push and pop operations into the stacks. (03)

5B Write a simple pseudo-code algorithms to perform PUSH ( ) and POP ( ) operations for a stack. (03)

5C Explain with suitable example how graphs are represented. (04)

6A What are the different types of database users who interact with database systems? (03)

6B What is an E-R model? What are its advantages? (04)

6C Define the following: Relation, Degree of relation, Cardinality of a relation. (03)