Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

VII SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOVEMBER 2017
SUBJECT: EMBEDDED SYSTEMS (BME 4011)
(REVISED CREDIT SYSTEM)
Tuesday, 28th November 2017: 2 PM to 5 PM

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer all FIVE full questions.**
2. **Draw labeled diagram wherever necessary.**
3. **Assume suitable missing data, if any.**

1. (a) How is an embedded system different from that of a general purpose computing system? Explain. **4**

(b) What are the specialties and purposes of embedded systems? Give an example to illustrate each of the purposes. **6**

(c) Draw the structure of an OTP ROM required to implement the truth table 1(C). **6**

Truth Table: 1(C).

Inputs			Outputs	
A	B	C	Y	Z
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

(d) Compare the commonly used embedded target architectures ASIC, and FPGA in terms of the parameters ‘Performance’, ‘NRE cost’, ‘Unit cost’ and ‘Time-to-Market’. **4**

2. (a) Draw the ARM and the THUMB programmer’s model of the ARM-7 processor, and differentiate them. **6**

(b) What are the different types of Stacks possible in the ARM-7 processor? How do you implement them using the instructions STM and LDM? Illustrate. **8**

(c) What are the different methods employed in the ARM-7 processor to return from an exception handler? Explain. **6**

3. (a) For a microcontroller having a special function register "P0", write an embedded – C program to sequentially send ASCII codes corresponding to the decimal digits 0 - 9. **6**

(b) Which is the best method in embedded – C to implement bit-fields? Justify your answer with an appropriate illustration. **6**

(c) With reference to Wireless communication protocol - IrDA: **1+1+4+2**

(i) Draw the block diagram

(ii) Draw the protocol architecture

(iii) Explain different layers of the protocol architecture, and

(iv) Write its advantages and disadvantages.

4. (a) Compare the two wired communication protocols – the SPI and the RS-232. **3**

(b) With reference to RTOS: **1+3+1**

(i) Which object of the operating system causes priority inversion problem?

(ii) How does that object affect the High-priority tasks? Give an example.

(iii) What solution do you suggest to handle the problem?

(c) What is "Rate Monotonic Analysis"? How does it help a beginner to schedule the tasks in a single-CPU based embedded system? Illustrate with an appropriate example. **12**

5. (a) What is IP Phone? Explain the details pertaining to the hardware and software, required to implement an IP Phone. **8**

(b) What is a H-Bridge? How do you implement a H-Bridge using FETs to switch the direction of D.C. motor rotation? Illustrate. **6**

(c) Draw and explain the most popular EDLC model employed in embedded product industries. What are its drawbacks? **6**