MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

**SEVENTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER
EXAMINATION - NOV/DEC 2016
SUBJECT: ADV. EMBEDDED SYSTEM DESIGN (ECE - 421)**

TIME: 3 HOURS   **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Explain grep, gv, vim and lpr commands of Linux. Write a shell script to print all the script files starting with letter 'f' in the current directory.

1B. Assume the script in **Fig.Q1B** is written and saved in a file "*AESD.sh*"
>   i). Write the command to execute the script by providing suitable parameters.
>   ii). Explain the behaviour of script at each line and write corresponding output for the
parameters given in part (i).

1C. What is shell? Write the differences between interactive shell program and shell scripting.

                                                                                                          (5+3+2)

2A. List out the areas where there are differences between original BeagleBone with BeagleBone black along with the reasons.

2B. Explain the following Boot modes of BBB

    i). eMMC Boot   ii) SD Boot   iii) Serial Boot

2C. Explain the functionality of power button on BeagleBone Black.

                                                                                                          (5+3+2)

3A. Write Linux commands to do the following

    i). To shutdown BBB

    ii). To ssh BBB root from Putty

    iii). To make */tmp/main.c* file executable

    iV). To install i2ctools on BBB

    V). To edit */etc/sources.list* file of BBB

3B. Write the advantages and disadvantages of BBB internet-over-USB

3C. Write the commands to transfer a file *C:/temp/test.txt* from local machine(PC) to remote machine(BBB) using *psftp*.

                                                                                                          (5+3+2)

4A. Draw the architecture of PRU-ICSS of BBB and explain the function of each block.

4B. Write BBB's PRU program to flash the LED connected to *GPIO0[30]* until a button connected to *GPIO0[31]* is pressed.

4C. Explain the possible ways of achieving real-time capability for BBB.

5A. Write a socket client program *client.c* to create an unnamed socket, connect it to a server socket called *server_socket* and write into and read from *server_socket*.

5B. Explain the syntax of following Linux system calls and write a C program to copy first 128 bytes of the standard input to the standard output

i). size_t read(int fildes, void *buf, size_t nbytes);
ii). size_t write(int fildes, const void *buf, size_t nbytes);

5C. Write the series of commands need to be executed to replace bone101 with custom webserver on BBB.

(5+3+2)

6A. Write independent C++ functions to do the following

i). To export GPIO pin of BBB   ii). To set the direction of GPIO pin of BBB

iii). To set the value of GPIO pin of BBB

By utilizing above functions, write a program to blink an LED connected to GPIO1[17] for 10 times.

6B. Assume *bone_pwm_P9_22* is the DTO of PWM output through P9_22. Write the procedure to load this overlay and to generate a PWM wave of 100Khz period with 50% duty cycle.

6C. Write the significance of following BBB Linux commands

i). hcitool scan   ii). pasm −b ledbutton.p

iii). dtc −O dtb −o EBB-GPIO.dtbo −b 0 -@ EBB-GPIO.dts

iV). i2cget −y 1 0x53 0x00

(5+3+2)

```
#!/bin/sh
salutation= "Hello"
echo $salutation
echo "$0"
echo "$2"
echo "$1"
echo "$*"
echo "$#"
echo "$HOME"

echo "Please enter a new greeting"
read salutation
echo $salutation
echo "The script is now complete"
exit 0
```

Fig.Q1B