G 6825 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Computer Science and Engineering

COMPUTER ORGANIZATION (R)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers :
   (i) How many selection inputs are there in each multiplexer?
   (ii) How many multiplexers are there in the bus?
2. Explain the stored program concept.
3. Explain bit sliced ALU.
4. Compare and contrast serial and parallel adders.
5. Explain how a micro-instruction is executed in vertical approach.
6. Explain hardwired control.
7. Define and explain associative memory.
8. Explain the terms : (a) Cache hit ; and (b) Cache miss.
9. Explain the working principle of an optical mouse.
10. Describe the GPIB standard.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) With a neat diagram, describe how the CPU, memory and control units in a digital computer interact.

Or

(b) Describe the different bus structure and their organisations in a digital computer.

Turn over

MODULE 2

12. (a) With a neat circuit diagram, explain how a two-level carry look ahead adder helps in improving the speed of addition.

Or

(b) With neat diagrams, describe the behaviour and structure of restoring division scheme with 2's complement members.

MODULE 3

13. (a) Draw and explain the organisation of nano program control. Compare the single level and two level controls.

Or

(b) With a neat flow chart, explain the fetch and execution cycle on the data path of a CPU.

MODULE 4

14. (a) Give the complete design of a 4 K × 8 memory module built out of 32 × 32 static MOS cell array chip with in-built decoders.

(i) Draw the block diagram of the memory module with the chip as the building block.

(ii) Also draw the internal block diagram of the chip and number of pins necessary on the chip.

Or

(b) Draw and explain a 3 × 2 associative memory. Explain how read/write operations are accomplished?

MODULE 5

15. (a) Describe the principle of operation of a VDU terminal specifying the RTL structure to control its operation.

Or

(b) (i) What are graphic input-output devices? Explain any *two* each, bringing out their special features.

(ii) Compare and contrast DMA and IO interrupt I/O transfer schemes.

(8 + 4 = 12 marks)

[5 × 12 = 60 marks]

G 6835 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Computer Science and Engineering

OBJECT ORIENTED PROGRAMMING (R)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient programs wherever necessary.

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Differentiate between classes and objects, with examples.
2. What are constructors and destructors? What are their uses?
3. What is the concept of inheritance? Explain with the help of an example.
4. Differentiate between multiple and multilevel inheritance.
5. Why is overloading important when considering real-life entities? Give an example.
6. Differentiate between polymorphism and inheritance.
7. What is template? What are the applications?
8. What are the special features of virtual base classes? Explain.
9. Explain dynamic memory allocation in C++.
10. Why is Java known as platform-neutral language? Explain.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) With appropriate examples, explain how the classes and objects help structured programming.

Or

Turn over

(b) (i) Explain with an example, how an object of a class is created.

(ii) List the characteristics of objects. Explain.

(6 + 6 = 12 marks)

MODULE 2

12. (a) Write a program to calculate variance and standard deviation of N numbers using object-oriented programming, in which member functions are defined as inline functions.

Or

(b) Describe friend function as a member of the class in C++. How do you utilise this? Explain with examples.

MODULE 3

13. (a) Write a program that uses an overloaded function to multiply the arguments given to it. There should be functions to square a number, multiply 2, 3, 4 and 5 numbers. No separate functions are allowed.

Or

(b) Implement an overloaded multiplication operator to return the factorial of number.

MODULE 4

14. (a) Describe a virtual base class with the help of examples. What are its merits and applications?

Or

(b) Define a function template to interchange the values of two data items. Use this function to interchange the value of two integer numbers and two real numbers.

MODULE 5

15. (a) Implement an example student database with name and marks in each subject (total 8 subjects) using dynamic data allocation.

Or

(b) With an appropriate example, explain how polymorphism is implemented in Java.

(5 × 12 = 60 marks)

G 6845 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Computer Science and Engineering

INTEGRATED CIRCUITS (R)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. What is the figure–of–merit of a logic family ? Compare it for the TTL and CMOS families :
2. Explain tristate logic, giving its practical significance.
3. What is a MUX ? Show how it can be used to realise AND function ?
4. Differentiate between volatile and non-volatile memories, giving examples.
5. How is dual slope ADC advantageous over ramp type ADC ?
6. What is resolution of an ADC ? How it is expressed ?
7. Explain what is meant by "offset" and how it is compensated ?
8. Slew rate of an op-amp is 0.7V/μS. What is the maximum frequency of an output sinusoid of peak value 5 volts at which distortion sets in due to the slew-rate limitation ?
9. Draw an op-amp circuit to get $V_0 = 4V_1 - 6V_2 + 3V_3$ where V_1, V_2, V_3 are arbitary analog input voltages.
10. Draw an inverting mode op-amp averaging circuit, to output the average of three analog inputs.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) of each module.*

Each full question carries 12 *marks.*

MODULE 1

11. (a) (i) Define the sinking current and sourcing current of an TTL NAND gate and hence calculate its Fan-Out.

(ii) Explain with a circuit diagram a two-input DTL NAND gate.

Or

Turn over

(b) (i) Define V_{IL}, V_{OL}, V_{IH}, V_{OH} of a TTL gate and hence calculate its noise margin.

(ii) Draw the circuit of a CMOS inverter and explain its working.

MODULE 2

12. (a) With a suitable diagram, explain the ROM architecture. Show how data is read from it, indicating the control lines.

Or

(b) Illustrate the principle of PLA and show how it can be used for a combination logic design with f = Σm (1, 2, 3, 4, 5). Realise the same using 3×4×2 PLA.

MODULE 3

13. (a) With neat diagram, explain a counting type ADC for 8 bit. Compare its performance with the successive approximation type ?

Or

(b) Show how an integrator can be used as dual slope ADC ? With a circuit diagram explain the conversion process.

MODULE 4

14. (a) Draw circuits to measure the following parameters of an operational amplifier ? Show the measurements.

(i) Slew rate. (ii) input bias current. (iii) CMRR.

(3 × 4 = 12 marks)

Or

(b) (i) An op-amp has a differential gain of 80dB and CMRR of 95 dB. If V_{i1} = 1.2μV and V_{i2} = 1.6μV, calculate the differential and common mode output voltages.

(ii) A square wave of peak to peak amplitude of 750 mV is to be amplified to a peak-to-peak amplitude of 3.8 V with a rise time of 4.5 μ sec or less. Can you use IC741 op-amp? Justify your answer.

MODULE 5

15. (a) Draw an op-amp integrator circuit and prove that the output is integral of input and prove that the output is integral of input. What are the limitations of this circuit ? Show the modified circuit to compensate this ?

Or

(b) With a neat circuit diagram, explain how the summing amplifier is realised using op-amp ? Derive expression for its output and show how it can be used to add three analog signals ?

(12 marks)

[5 × 12 = 60 marks]

G 6855 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Computer Science and Engineering

DATA STRUCTURES AND PROGRAMMING METHODOLOGIES (R)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks*

1. Briefly explain the phases in the process of creating a program.
2. Define "space complexity of an algorithm". Why are computer scientists interested in it?
3. Write a function to push an item into a stack which is implemented using an array of size *n*.
4. Compare and contrast array implementations of linear queue and circular queue.
5. Give a recursive procedure for making a copy of a singly linked list whose pointer to the head is given.
6. Write a function to count the number of nodes in a singly linked list whose pointer to the head node is given.
7. Define data structure Tree. Give three differences between Tree and Binary Tree.
8. Explain any two methods for representing graphs in programs.
9. What do you mean by External Sorting? Give an example. Why are most of the internal sorting algorithms not suited for external sorting?
10. Determine the number of comparisons made while searching for the numbers 10 and 17, using binary search in {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,13, 14, 15, 16}

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Give a recursive algorithm for the Tower of Hanoi problem and derive its time complexity.

Or

Turn over

12. Derive the average case time complexity of Sequential Search. Define Average, Best and Worst case time complexities. How are they computed generally?

13. Explain the row-major and column-major representation of 2D and 3D arrays. For each representation explain how the address of a particular element is computed.

Or

14. Give codes/pseudo-codes for converting an infix expression into postfix form, and evaluating a postfix expression.

15. A list of items is maintained as a doubly liked list and a pointer to the first node is given. Write codes for

    (a) Inserting a new item at the n-th position in the list

    (b) Deleting the n-th item

    (c) Traversing the list

Or

16. Explain the implementation of stack using linked lists. Compare it with the implementation using arrays.

17. Write and explain a program to implement Binary Tree using array. Also, implement methods for inorder, preorder and post order traversals.

Or

18. Explain how sets are implemented using trees. Give algorithms to

    (a) Check membership of an element in the set

    (b) Compute the union of two sets

19. Give and explain Merge Sort algorithm. Trace its working with a sample input set of 10 unsorted numbers.

Or

20. Give and explain Quick Sort algorithm. Show that it shows its worst case performance (with respect to time) when the input set is already sorted.

(5 × 12 = 60 marks)

G 6863 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

Branch : Computer Science and Engineering

ADVANCED MICROPROCESSORS AND PERIPHERALS (R)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. Write the control word format for 8255 in BSR mode.
2. Explain the bidirectional data transfer mode of 8251.
3. Write control word for 8255 and give the assignments of ports I/O for the control word data of 95 H.
4. Explain the memory system of microcontroller.
5. Explain minimum mode operation of 8086.
6. What are the roles of various flags in 8086 flag register?
7. What are the actions of 8086 when interrupt flag is set and INTR input receives a high signal?
8. What are the roles of status signals S_0, S_1, S_2 and Queue status bits QS0 and QS1 with respect to 8086?
9. Write the control register structure of 80386.
10. Draw the circuit for generating memory and I/O control signals for 80386.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) (i) Explain various modes of operations of 8251 USART.

(ii) Describe the architectural features of 8279 keyboard and display controller.

(6 + 6 = 12 marks)

Or

Turn over

(b) (i) With neat diagrams, explain the internal architecture of 8255 PPI.

(ii) Give the details of mode word, command word, and status word format of 8251 PCI.

(6 + 6 = 12 marks)

MODULE 2

12. (a) Assume that 8255 chip is assigned with the address of control register PA, PB and PC. Draw the circuit using any number of ports for two-digit seven segment display. Also write the value of control word.

(12 marks)

Or

(b) Draw the connection of 4 × 4 hex key pad using 8255 ports and draw the flow chart for the key closure.

(12 marks)

MODULE 3

13. (a) (i) Draw and explain the read and write cycle timing diagram for 8086 in minimum mode configuration.

(ii) Explain the interrupt cycle of 8088.

(8 + 4 = 12 marks)

Or

(b) Explain the maximum mode of 8086. Differentiate between maximum and minimum mode.

(12 marks)

MODULE 4

14. (a) Design a 8086 system with single seven segment display as in I/O device accessed with an address F000. Write the program to get a BCD up-count 0–9 on the seven segment display.

(12 marks)

Or

(b) What are the system requirements for implementing a multi-tasking environment? Explain the multi-tasking features of 80286.

(12 marks)

MODULE 5

15. (a) With a neat diagram, explain the architecture and memory management unit of 80386.

(12 marks)

Or

(b) Discuss the memory organisation of PENTIUM IV. Indicate how paging is done?

(12 marks)

[5 × 12 = 60 marks]

G 6820 (Pages : 3) Reg. No ..... C8 .....

Name .....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Regular/Improvement/Supplementary)

(Common for all Branches)

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Statistical tables permitted.

Module I

1. (a) Solve $\left(1+y^2\right)dx = \left(\tan^{-1}y - x\right)dy$. (7 marks)

(b) Solve $(D^2 - 2D + 1)y = e^x \log x$ by the method of variation of parameters. (9 marks)

(c) Solve $y' + y \tan x = y^3 \sec x$. (4 marks)

Or

(d) Solve $\left[\left(1+\frac{1}{x}\right)y + \cos y\right]dx + [x + \log x - x \sin y]dy = 0$. (5 marks)

(e) Solve $\left(D^2 - 3D + 2\right)y = x^2 + e^x$. (7 marks)

(f) Using method of variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$. (8 marks)

Module II

2. (a) If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$. (7 marks)

(b) Using Lagrange's undetermined multipliers find the maximum value of $x^2 + y^2 + z^2$ subject to $ax + by + cz = p$. (8 marks)

(c) Solve by Cherpit's method $(p^2 + q^2)y = qz$. (5 marks)

Or

(d) The two ends A and B of a rod 30 cm. long have the temperature at 40° C and 90° C until steady state prevails. The temperatures of the ends are changed to 50° C and 70° C respectively. Find the temperature distribution in the rod at time t. (20 marks)

Turn over

Module III

3. (a) Define Fourier transform of a function $f(x)$. Show that $F[f(x-\alpha)] = e^{i\alpha a} F(\alpha)$, where $F(\alpha)$ is the Fourier transform of $f(x)$.

(5 marks)

(b) Find the Fourier cosine transform of the function $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$. (7 marks)

(c) Verify the Parseval's identity for the function $f(x) = \begin{cases} 1, & \text{for } |x| \leq a \\ 0, & \text{for } |x| > a \end{cases}$. (8 marks)

Or

(d) Find the Fourier transform of : $f(x) = \begin{cases} 1 - x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$ (5 marks)

(e) Find the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$, $a > 0, x \neq 0$ and hence show that $\int_0^\infty \tan^{-1}\left(\frac{x}{a}\right)(\sin x)dx = \frac{\pi}{2}e^{-a}$.

(8 marks)

(f) State and prove the convolution theorem for Fourier transforms. (7 marks)

Module IV

4. (a) If a random variable X has a Poisson distribution with parameter α, then prove that $E(x) = \alpha$, and $V(x) = \alpha$.

(5 marks)

(b) The probability that a patient recovers from a disease is 0.4. If 18 persons have such a disease, determine the probability that :

(i) exactly 6 survive.

(ii) at least 10 survive.

(iii) from 3 to 9 survive.

(10 marks)

(c) If X has normal distribution with mean m and variance s^2, find $P[\mu - \sigma < X < \mu + \sigma]$.

(5 marks)

Or

(d) Small electric motors are shipped in lots of 50. Before such a shipment is accepted, an inspector chooses 5 of these motors and inspects them. If none of these tested motors are defective, the lot is accepted. If one or more are found to be defective, the entire shipment is inspected. Suppose that there are, in fact, three defective motors in the lot, what is the probability that 100 % inspection is required ?

(10 marks)

(e) Suppose that the probability that an item produced by a particular machine is defective equal 0.2. If 10 items produced from this machine are selected at random, what is the probability that not more than one defective is found ?

(6 marks)

(f) Find the probability that 5 out of 10 persons are in favour of a given pirce of legislation given tha the sample is taken from 100 persons among whom 60 are for it.

(4 marks)

Module V

5. (a) Let $\bar{X}$ be the mean of a random sample of size "n" from a distribution which is $N(\mu, 9)$. Find n such that $P[\bar{X} - 1 < \mu < \bar{X} + 1] = 0.90$.

(10 marks)

(b) A set of five similar coins is tossed 320 times and the result is :

No. of heads	:	0	1	2	3	4	5
Frequency	:	6	25	74	110	73	32

Test the hypothesis that the data follow a binomial distribution at 0.05 level of significance.

(10 marks)

Or

(c) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

x	:	0	1	2	3	4
f	:	419	342	164	54	21

(10 marks)

(d) The voltage of a voltage source is measured 100 times and the mean voltage is found to be 230.14 V, with a standard deviation of 0.6 V. Test the hypothesis that the mean voltage of the source is 230 V at 0.05 level of significance.

[5 × 20 = 100 marks]