G 5491 (Pages : 2) Reg. No..................................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Computer Science and Engineering

CS 010 405—MICROPROCESSOR SYSTEMS (CS)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. List the 16-bit registers of 8085. What are the functions of an accumulator ?
2. What is a stack pointer ? Which command is used to load a stack pointer ?
3. List the salient features of 8259.
4. What is the bit reset mode of 8255 PPI ?
5. Mention the applications of 8253.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. What are the I/O and machine control instructions ? Explain briefly.
7. Explain the memory mapped I/O addressing scheme.
8. Differentiate between maskable and non-maskable interrupts.
9. Discuss briefly the various data transfer schemes.
10. Explain the block diagram of the 8279 keyboard/display interface and its operations.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain the architecture of 8085 microprocessor.

Or

12. With suitable examples, explain the 8085 addressing modes in detail.

Turn over

13. Discuss in detail how the data can be stored and retrieved from the stack.

Or

14. How can I/O devices be connected using memory mapped I/O and peripheral I/O ? Explain with suitable examples.

15. Explain various hardware and software interrupts.

Or

16. In detail discuss the various data transfer schemes in 8085 microprocessors.

17. Write a program to communicate between two microprocessors using 8255. Show the control word format of 8255 and explain how each bit is programmed.

Or

18. Draw the block diagram of the DMA controller and explain its operations.

19. With a neat block diagram, explain the 8251 programmable communication interface for asynchronous and synchronous serial data transfer.

Or

20. Discuss various operating modes of 8253 with necessary control words.

[5 × 12 = 60 marks]

G 5461 (Pages : 2) Reg. No.................................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Computer Science and Engineering

CS 010 402—OBJECT ORIENTED PROGRAMMING [CS]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Brief the various advantages of OOPS.
2. Explain the term "Inheritance" with an example.
3. What is meant by Abstract classes ?
4. What is meant by virtual destructors ?
5. What the various data file operating functions in Java ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain the evolution of object oriented languages.
7. Explain hybrid inheritance with proper example.
8. Define Polymorphism. Differentiate run time and compile time polymorphism.
9. Describe the excemption handling mechanism employed in C++ programming with example.
10. Explain the various object-oriented features in Java.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Write a program to show the implementation of constructor, copy constructor and destructor.

Or

12. What do you meant by constructors and destructors ? Explain its syntax with proper examples.

Turn over

13. With the help of examples, explain public, private and protected inheritance.

Or

14. What is meant by friend function ? Explain its syntax. Give example.

15. Explain function overloading and operator overloading with examples.

Or

16. Detail the concept of pure virtual methods.

17. With an example, demonstrate how to use arguments in function template.

Or

18. Explain the rules while using virtual functions.

19. Write a program to demonstrate the usage of atleast four commands for data file operations.

Or

20. (a) Compare the features of C++ and Java programming language. (6 marks)

(b) Write note on object-oriented design. (6 marks)

[5 × 12 = 60 marks]

G 5468 (Pages : 2) Reg. No..............................

Name..............................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 403/IT 010 405—DATA STRUCTURES AND ALGORITHMS [CS, IT]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Differentiate between Open hashing and Closed hashing.
2. What are dequeues ? Explain the various types of dequeues.
3. What are the advantages of a doubly-linked list over a singly linked list ?
4. Differentiate BFS and DFS.
5. Define heap. Give examples for max heap and min heap.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Define time complexity. Explain the concept behind big oh notation.
7. Write an algorithm to compute the transpose of a sparse matrix.
8. Write algorithms for ENQUEUE and DEQUEUE operations on a linked queue.
9. A binary tree has 9 nodes. The in-order and pre-order traversals field the following sequence of nodes :

In-order :	E	A	C	K	F	H	D	B	G
Pre-order :	F	A	E	K	C	D	H	G	B

   Draw the binary tree.
10. Write an algorithm for sorting a set of integers in descending order using heap sort.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Define a recurrence relation. Discuss how recurrence relations are used to compute the time complexity of recurrence functions using an example.

Or

12. Discuss in detail the various hash functions.

13. (a) Compare the representation of polynomials using arrays and linked list bringing out the merits and demerits of each representation.

(5 marks)

(b) What is a sparse matrix ? How are they represented using an array ? Write a algorithm to add two sparse matrices represented using arrays.

(7 marks)

Or

14. Write short notes on :

(a) Queues.

(b) Circular queues.

(c) Priority process.

(3 × 4 = 12 marks)

15. Discuss in detail garbage collection and compaction.

Or

16. Write an algorithm to add 2 polynomials represented using linked list.

17. Obtain an AVL tree starting with an empty tree on the following sequence :

December, January, April, March, July, August, October, February, November, May, June.

Define the method of rotation at each insertion step.

Or

18. Write an non-recursive algorithm for inorder traversal of a binary tree.

19. Sort the following elements using quick sort. 25, 11, 57, 47, 36, 10, 99, 85. Trace step by step working of the algorithm. Also write a recurrence algorithm to sort a set of elements in ascending order using quick sort.

Or

20. Write algorithm to sort a set of elements using bubble sort and selection sort. Also compute their best case, average case and worst case time complexities.

(5 × 12 = 60 marks)

G 5504 (Pages : 2) Reg. No.................................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

CS 010 406/IT 010 404—THEORY OF COMPUTATION [CS, IT]

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define partial recursive functions.
2. Differentiate between Moore and Mealy machine.
3. What are languages accepted by PDA ?
4. Differentiate recursive and recursively enumerable languages.
5. What does it mean by class P problem ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Prove using induction that product of 3 consecutive numbers is divisible by 6.
7. Design an NFA for the language L = {w/w contains the substring 0101} with 5 states.
8. Differentiate deterministic and non-deterministic push down automata.
9. Design a Turing machine for the regular expression aa^*.
10. What are NP-hard problems ? Give *one* example.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. What are countably infinite sets ? Using diagonalization principle, prove that N × N is countably infinite.

Or

Turn over

12. (a) Explain primitive recursive functions and prove that 'factorial' is primitive recursive. (8 marks)

    (b) Prove that $f(x) = x/2$ is a partial recursive function. (4 marks)

13. Convert the given NFA to DFA. Explain the process :

$\phi \backslash \varepsilon$	a	b
q_0	$\{q_0, q_1\}$	$\{q_2\}$
q_1	$\{q_0\}$	$\{q_1\}$
q_2	ϕ	$\{q_0, q_1\}$

Or

14. (a) State and prove pumping lemma for regular languages. (8 marks)

    (b) Show that $L = \{0^n 1^n 2^n \mid n \geq 0\}$ is not regular. (4 marks)

15. Design a PDA for the language $L = \{a^n b^{2n} / n \geq 1\}$.

Or

16. What is Chomsky Normal Form ? Convert the given CFG to CNF :

$$S \rightarrow bA/aB, \; A \rightarrow bAA/aS/a, \; B \rightarrow aBB/bS/a.$$

17. Design a Turing Machine to copy a number. Show the complete trace of an input number.

Or

18. Explain the variations of Turing Machine in detail.

19. Prove that 3-CNF SAT problem is NP=complete.

Or

20. Explain in detail the technique of polynomial time reduction with an example.

[5 × 12 = 60 marks]

G 5456 (Pages : 3) Reg. No..............................

Name..............................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Common for all Branches)

(New Scheme—2010 Admission onwards)

[Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Use of Statistical tables is permitted.

Part A

Answer **all** *questions.*
Each question carries 3 marks.

1. Find the coefficient a_n of the Fourier series for the function $f(x) = x + x^2, -\pi < x < \pi$.
2. Find the Fourier sine transform of $f(x) = 1, 0 \le x < a, f(x) = 0, x > a$.
3. Form the differential equation by the method of elimination of arbitrary constants from $\log(az - 1) = x + ay + b$.
4. Define Uniform distribution. Obtain its mean and variance.
5. Define null hypothesis and alternative hypothesis.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 marks.

6. Find the half-range cosine series of $f(x) = x, 0 < x < 2$.
7. Find the Fourier integral of $f(x) = 1, \quad 0 \le x \le 1$
   $= 0, \quad$ elsewhere.
8. Solve $p \tan x + q \tan y = \tan z$.
9. The p.d.f. of a random variable X is given by $f(x) = K(1 - x^2), 0 \le x \le 1$
   $= 0$ elsewhere.
   Find (a) the value of K ; (b) P $\{0.5 \le X \le 2\}$.
10. A sample of size 35 is taken from a population whose standard deviation is 0.010. If the sample mean is 0.343, test $H_0 : 0.340$ against $H_1 : \mu \ne 0.340$ at 5 % level of significance.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 marks.

11. Expand $f(x) = x\sin x, -\pi < x < \pi$ as a Fourier series. Deduce that $\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} + \ldots = \frac{1}{4}(\pi - 2)$.

Or

12. Find the Fourier series of $f(x) = x^2 - 2, -2 \le x \le 2$.

13. Find the Fourier sine and cosine transform of $f(x) = 2x, 0 < x < 4$.

Or

14. Find the Fourier transform of $f(x) = a - |x|$, for $|x| < a$
$= 0$, $|x| > a$

Hence evaluate $\int_0^\infty \frac{\sin^4 t}{t^4} dt$.

15. (a) Solve $\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^2 z}{\partial y^2} = e^{2x+3y}$. (6 marks)

(b) Solve $\frac{y^2 z}{x} p + xzq = y^2$. (6 marks)

Or

16. (a) Solve the equation $2(z + px + qy) = yp^2$ using Charpit's method. (6 marks)

(b) Solve $(D^3 - 7DD'^2 - 6D'^3)z = \sin(x + 2y)$. (6 marks)

17. Fit a Poisson distribution and compute the theoretical distributions :

x	:	0	1	2	3	4
f	:	122	60	15	2	1

Or

18. A sample of 100 battery cells tested to find the length of life produced the following results. $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of battery cells are expected to have life (i) more than 15 hours ; (ii) less than 6 hours ; (iii) between 10 and 14 hours.

19. A sample of 100 bulbs of brand A gave a mean life time of 1100 hours and a standard deviation of 80 hours ; another sample of 150 bulbs of brand B gave a mean life time of 1300 hours and a standard deviation of 90 hours. Examine the difference between the means is significant or not.

Or

20. Two independent samples of size 7 and 8 items have the following values :—

Sample 1	:	10	12	10	14	10	9	8	
Sample 2	:	9	11	11	13	15	9	12	14

Do the two estimates of variances of population differ significantly at 2 % level of significance.

[5 × 12 = 60 marks]

G 5511

(Pages : 3)

Reg. No..............................

Name..................................

B.TECH. DEGREE EXAMINATION, MAY 2017

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Common for all Branches)

(Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Answer **all** *questions.*
Each full question carries 20 marks.
Use Statistical table is permitted.

1. (a) Find the particular integral of $\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 + 2x + 4$. (5 marks)

   (b) Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x}$. (5 marks)

   (c) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$. (10 marks)

Or

2. (a) Solve $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = \log x \sin(\log x)$. (10 marks)

   (b) Solve the simultaneous equations $\frac{dy}{dt} + y = \sin t$ $\frac{dy}{dt} + x = \cos t$, given that $x = 2$, $y = 0$ when $t = 0$. (10 marks)

3. (a) Form the partial differential equation by eliminating the constants a and b from the equation $z = (x + a)(y + b)$. (5 marks)

   (b) Solve $y^2z\,p + x^2zq = xy^2$. (5 marks)

   (c) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cos x$. (10 marks)

Or

Turn over

4. (a) Form the partial differential equation by eliminating the arbitrary functions f and ϕ from the function :

$$z = f(x+ay) + \phi(x-ay).$$

(5 marks)

(b) Solve $(p^2+q^2)y = qz.$ (5 marks)

(c) Solve the problem of the vibrating string for the following boundary conditions :

$y(0, t) = 0, y(L, t) = 0$

$$\left.\frac{\partial y}{\partial t}\right\}_{t=0} = x(x-L), 0 < x < L$$

$$y(x,0) = x, 0 < x < L/2$$

$$= L - x, L/2 < x < L.$$

(10 marks)

5. (a) Find the Fourier integral of

$$f(x) = 0, \quad x < 0$$
$$= 1, \quad 0 \le x \le 1$$
$$= 0, \quad x > 1$$

Hence show that $\int_0^\infty \frac{\sin x/2}{x} dx = \pi/2.$

(10 marks)

(b) Find the Fourier sine transform of :

$$f(x) = x, \quad 0 < x < 1$$
$$= 2 - x, \quad 1 < x < 2$$
$$= 0, \quad x > 2$$

(10 marks)

Or

6. (a) Find the Fourier transform of $e^{-a|x|}$. Deduce that $\int_0^\infty \frac{\cos sx}{a^2+s^2} dS = \pi/2a\, e^{-ax}, x > 0.$ (10 marks)

(b) Find the Fourier cosine transform of e^{-x^2}. (10 marks)

7. (a) If the probability of a welding machine producing a welded joint with a defect is 0.1, in a random sample of 10 joints, what is the probability that the same contains (i) 5 defective joints, (ii) less than 3 defective joints.

(6 marks)

(b) If X is a Poisson variable such that P (X = 2) = 9P (X = 4) + 90 P (X = 6). Find the mean and standard deviation.

(6 marks)

(c) The time required to assemble a piece of machinery is a random variable having approximately a normal distribution with mean μ = 12.9 min. and standard deviation σ = 2 min. What are the probabilities that the assembly of machinery will take (i) at least 11.5 min ; (ii) anywhere from 11 to 14.8 min. ?

(8 marks)

Or

8. (a) Fit a binomial distribution to the following data :—

x	:	0	1	2	3	4	5	6
f	:	5	18	28	12	7	6	4

(10 marks)

(b) If 0.8 % of the fuses delivered to an arsenel are defective. Use Poisson distribution to determine the probability that 4 fuses will be defective in a random sample of 400.

(5 marks)

(c) If a random variable X has N (μ, 1) a distribution show that E (Y) = μ^2 where Y = $X^2 - 1$.

(5 marks)

9. (a) If $\overline{X}$ is the mean of the sample of size 5 from a N (0, 125) distribution, find C such that $P\{\overline{X} > c\} = 0.90$.

(6 marks)

(b) Define (i) Type I error ; (ii) Type II error ; and (iii) Level of significance. (6 marks)

(c) The average marks in Mathematics of a sample of 100 students was 50 and standard deviation 5 marks. Could this have been a random sample for a population with mean 52.

(8 marks)

Or

10. (a) In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 15. Could these samples have been drawn from the same population with S.D. 4 ?

(10 marks)

(b) The strength of 10 pieces of a metal are obtained as 578, 570, 572, 572, 568, 570, 572, 596, 570, 584. Test whether the mean breaking strength of the piece can be taken as 577 kg.

(10 marks)

[5 × 20 = 100 marks]