G 1634 (Pages : 3) Reg. No.................................

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

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Computer Science and Engineering/Information Technology

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

(New Scheme—Prior to 2010 Admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain why we require the table size to be a prime number in double hashing ?
2. What is priority queue ?
3. What is meant by memory compaction ?
4. What is meant by path matrix representation ? Give an example.
5. Write the steps involved in selection sort.

(5 × 3 = 15 marks)

Part B

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

6. Prove that for any *two* function $f(n)$ and $g(n)$,

   $f(n) = \Theta(g(n))$ if and only if $f(n) = O(g(n))$ and $f(n) = \Omega(g(n))$.

7. Consider a 2-D array named GROUP [5] [7] is stored in row major order with base address 123. What is the address of GROUP [2] [3] ?
8. Write an algorithm for inserting an ITEM in the beginning of the linked list ?
9. Explain binary search with an algorithm
10. What is polyphase merge sort ? Explain.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. What do you mean by complexity of an algorithm ? Explain the meaning of worst case analysis and best case analysis with an example.

Or

12. The following values are to be stored in a Hash-Table : 25, 42, 96, 101, 102, 162, 197, 201. Use the Division method of Hashing with a table size of 11. Use the sequential method for resolving collision

13. Write an algorithm to convert an infix expression to a postfix expression. Execute your algorithm with the following infix expression as your input.

$(m + n) * (k + p) / (g/h) \uparrow (a \uparrow b/c)$.

Or

14. Write code to implement a queue using arrays in which insertions and deletions can be made from either end of the structure (such a queue is called deque). Your code should be able to perform the following operations

(a) Insert element in a deque. (b) Remove element from a deque.

(c) Check if deque is empty. (d) Check if it is full.

(d) Initialize it.

15. Explain how polynomials can be represented using linked lists. Write an algorithm to add two polynomials using your representation.

Or

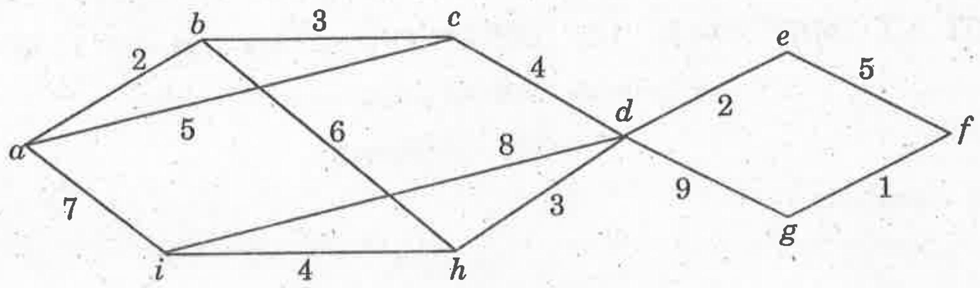
16. Explain with suitable algorithm how push and pop operations are carried in a linked stack.

17. Construct an AVL search tree for the following given operation and values.

Insert 15, 20, 24, 10, 13, 7, 30, 36, 25. Remove 24 and 20 from the AVL tree

Or

18. Discuss the Kruskal's Algorithm with its analysis and apply it to find the minimum cost spanning tree for the following undirected graph :



19. Write Quick sort algorithm and compute its worst case and best case time complexity. Illustrate the working on the array A = <5, 3, 1,9, 8, 2, 4, 7>

Or

20. Explain balanced merge sort procedure with suitable example.

(5 × 12 = 60 marks)

G 1646 (Pages : 2) Reg. No.................................

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

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Computer Science and Engineering

CS 010 404—SIGNALS AND COMMUNICATION SYSTEMS [CS]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is the effect of half wave symmetry on Fourier coefficients of a signal ?
2. In what way multi-mode and single-mode fibers differ ?
3. What is the need for modulation ?
4. What is bit-stuffing ? Why is it used ?
5. What are the key functions of error control techniques ?

(5 × 3 = 15 marks)

Part B

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

6. Define and explain CTFS.
7. What are the four category of Noise ? Explain.
8. What is OOK ? Bring out its mathematical representation.
9. Explain how packet switching takes place ?
10. Explain the need for error detection and correction.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. (a) Explain Continuous Time Fourier Transform. (6 marks)

(b) State and explain sampling theorem. (6 marks)

Or

12. Explain the characteristics of the following guided transmission media :

(a) Twisted-pair. (6 marks)

(b) Coaxial cable. (6 marks)

13. Define and explain typical parameters of communication systems.

Or

14. State and explain Shannon Hartley theorem. Derive an expression for Channel capacity of a Noisy channel.

15. Explain AM, PM and FM in detail with neat diagrams. Bring out their mathematical representations.

Or

16. Explain different aspects of ASK, FSK, PSK and QAM conversion techniques.

17. Explain FDM and WDM in detail.

Or

18. Explain how circuit switching takes place.

19. (a) Explain how cyclic redundancy check works. (6 marks)

(b) Explain how Hamming code is used to correct error. (6 marks)

Or

20. Explain EBCDIC and Baudot code.

[5 × 12 = 60 marks]

G 1432 (Pages : 3) Reg. No..............................

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

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Common to all branches)

(Old Scheme—Prior to 2010 Admissions)

[Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Each full question carries 20 marks.

Use of Statistical table is permitted.

1. (a) Find the solution of the initial value problem $y'' - y' - 2y = 0,\ y(0) = 0,\ y'(0) = 1.$ (6 marks)

   (b) Solve $x^2 \dfrac{d^2y}{dx^2} - 2x\dfrac{dy}{dx} - 4y = x^2 + 2\log x.$ (8 marks)

   (c) Find the particular integral of $y'' - 4y' + 3y = \sin 3x \cos 2x.$ (6 marks)

Or

2. (a) Using the variation of parameter, solve $y'' - 2y' + y = \dfrac{e^x}{x}.$ (8 marks)

   (b) Solve $\dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + y = xe^x \sin x.$ (8 marks)

   (c) Solve $\left(D^3 - 4D^2 + 4D\right)y = 0.$ (4 marks)

3. (a) Form the partial differential equation by eliminating the arbitrary functions from the equation $z = f(x + ay) + g(x - ay).$

   (5 marks)

   (b) Solve the partial differential equation $x\left(y^2 - z^2\right)p + y\left(z^2 - x^2\right)q - z\left(x^2 - y^2\right) = 0.$ (8 marks)

   (c) Solve $\left(D^2 + 2DD' + D'^2\right)z = e^{2x+3y}.$ (7 marks)

Or

Turn over

4. (a) Solve $2z + p^2 + qy + 2y^2 = 0$. (5 marks)

(b) Solve $xp + yq = 3z$. (5 marks)

(c) A uniform elastic string of length 60 cms. is subjected to a constant tension of 2 kg. If the ends are fixed and the initial displacement $y(x, 0) = 60x - x^2$, $0 < x < 60$, while the initial velocity is zero. Find the displacement $y(x, t)$.

(10 marks)

5. (a) Express the function $f(x) = 1, \ |x| \leq 1$
$= 0, \ |x| > 1$

as a Fourier Integral. Hence evaluate $\int_0^\infty \frac{\sin\lambda \cos\lambda x}{\lambda} d\lambda$.

(10 marks)

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

Or

6. (a) Show that the Fourier transform of $e^{-x^2/2}$ is self-reciprocal. (10 marks)

(b) Find the Fourier cosine transform of $f(x) = \cos x, \ 0 < x < a$
$= 0 \quad x > a$ (10 marks)

7. (a) The mean and variance of a Binomial Distribution are 2.5 and 1.875 respectively. Find the distribution.

(5 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.

(5 marks)

(c) In a normal distribution 7 % of the items are under 35 and, 10 %, of the items are above 55,. Calculate the mean and variance.

(10 marks)

Or

8. (a) In 8 throws of a die '5' or 6 is considered as a success. Find the mean and variance.

(6 marks)

(b) If X follows Poisson Distribution such that 3P {X = 2} = 2P {X = 1}, find (i) P {X = 0} (ii) P {X = 3}.

(6 marks)

(c) In a test on 2000 electric bulbs it was found that the life of a particular make was normally distributed with an average life of 2040 hours and standard deviation of 60 hrs. Find the number of bulbs likely to burn :

(i) More than 2150 hours.

(ii) Less than 1950 hours.

(iii) More than 1950 hours but less than 2150 hours.

(8 marks)

9. (a) A random sample of size 10 is taken from a Normal Population having variance $q^2 = 42.5$. Find approximately the probability of getting a sample standard deviation between 3.14 and 8.94.

(10 marks)

(b) A random sample of 200 villages from Coimbatore district gives the mean population per village at 485 with a S.D. of 50. Another random sample of the same size from the same district gives the mean population per village at 510 with a S.D. of 40. Is the difference between the mean values given by the two samples statistically significant ? Justify your answer.

(10 marks)

Or

10. (a) The 9 items of a sample have the following values 45, 47, 50, 52 48, 47, 49, 53 51. Does the mean of these values differ significantly from the assumed mean 47.5.

(10 marks)

(b) In a city A, 20 % of a random sample of 900 school boys had a certain slight physical defect. In another city B, 18.5 % of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant ?

(10 marks)

G 1622 **(Pages : 2)** **Reg. No...............................**

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

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Common to all branches)

[New Scheme—2010 Admission onwards]

(Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find the Fourier series to represent the function :

$$f(x) = -K \quad \text{when } -\pi < x < 0$$
$$f(x) = K \quad \text{when } 0 < x < \pi$$

2. State Fourier integral theorem.
3. Form the partial differential equation from $z = f\left(x^2 - y^2\right)$.
4. Is the function defined as follows a density function ? – $f(x) = e^{-x}$, $0 \le x \le \infty$. If so determine the probability that the variable having this density will fall in the interval (1, 2).
5. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

(5 × 3 = 15 marks)

Part B

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

6. Find the Fourier series of : $f(t) = 1 - t^2, -1 \le t \le 1$.
7. Find the Fourier sine transform of : $f(x) = 2e^{-5x} + 5e^{-2x}$.
8. Solve $zp + yq = x$.
9. Define exponential distribution. Obtain its mean and variance.
10. 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 ?

(5 × 5 = 25 marks)

Turn over

Part C

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

11. Obtain the Fourier series of the function :

$$f(x) = \pi x, \quad 0 \le x \le 1$$
$$= \pi(2-x), \quad 1 \le x \le 2.$$

Or

12. The following table gives the variation of periodic current over a period :

t (secs)	0	T/6	T/3	T/2	2T/3	5T/6	T
A (amp)	1.98	1.30	1.05	1.30	– 0.88	– 0.25	1.98

Show by numerical analysis, that there is a direct current part of 0.75 amp. in the variable current and obtain the amplitude of the first harmonic.

13. Find the Fourier cosine transform of $\frac{1}{1+x^2}$ and hence find the Fourier sine transform of $\frac{x}{1+x^2}$.

Or

14. Find the Fourier transform of

$$f(x) = e^{-x}, \quad x > 0$$
$$= 0, \quad x < 0.$$

Verify Parseval's theorem for the above function.

15. Solve $\left(D^3 - 7DD'^2 - 6D'^3\right)z = \sin(x+2y) + e^{2x+y}$.

Or

16. Solve $(y-z)\,p + (x-y)\,q = z - x$.

17. If X follows uniform distribution in (0, 12), find its (i) mean ; (ii) variance ; (iii) P {X < 2} ; (iv) ρ {X > 7}, (v) ρ {3 < X < 7}.

Or

18. The marks of 1000 students in an examination follows a Normal Distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be (i) less than 65, (ii) more than 75, (iii) between 65 and 75.

19. Samples of two types of electric bulbs were tested for life lengths and the following data were obtained :

	Type 1	Type 2
Sample size :	8	7
Mean :	1234	1036
Standard variance :	36	40

Is the difference in means sufficient to warrant that type 1 is superior to type 2 at 5 % level of significance.

Or

20. Suppose that a sample of 25 items is taken. The sample variance s^2 is to be found 0.0384. Can we reject $H_0 : \sigma = 0.01225$ in favour of $H_1 : \sigma > 0.01225$.

(5 × 12 = 60 marks)

5047

G 1627 (Pages : 2) Reg. No..............................

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

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Computer Science and Engineering

CS 010 402—OBJECT ORIENTED PROGRAMMIMG [CS]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define constructor and give example.
2. List the properties of friend functions.
3. Explain the principles of function overloading.
4. What are the advantages of templates ?
5. What are sequential access files ?

(5 × 3 = 15 marks)

Part B

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

6. Write a C++ program to demonstrate the use of bitfields.
7. Explain virtual base class with an example ?
8. What are the applications of abstract class ?
9. What is the difference between inline member function and volatile member function.
10. Compare C++ and Java.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. What is dynamic initialization of objects ? Why is it needed ? How is it accomplished in C++ ? Illustrate.

Or

12. What is encapsulation ? What are its advantages ? How can encapsulation are enforced in C++ ?

13. What are generic classes ? Why are they useful ? Explain with an example how these are implemented in C++.

Or

14. How can you pass parameters to the constructors of base classes in multiple inheritance ? Explain with suitable example.

15. What is run time polymorphism ? How it is achieved ? Explain with an example ?

Or

16. What do you mean by operator overloading ? How unary and binary operators are implemented using the member and friend functions ?

17. What is a template ? Write a template function to find the maximum number from a template array of size N.

Or

18. Discuss in detail about Exceptions are handled in C++.

19. (a) Write a C++ Program for reading the Content in the File and perform any manipulation to the content.

(8 marks)

(b) Write a brief note on different file operations. (4 marks)

Or

20. Discuss the object oriented features in java.

[5 × 12 = 60 marks]