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18MAT31

Third Semester B.E. Degree Examination, Aug./Sept.2020 Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find $L\{e^{-2t}t \cos 2t\}$. (06 Marks)
- b. Express the function in terms of unit step function and hence find Laplace transform of :
- $$f(t) = \begin{cases} 1 & 0 \leq t \leq 1 \\ t & 1 < t \leq 2. \\ t^2 & t > 2 \end{cases}$$
- (07 Marks)
- c. Solve the equation $y''(t) + 3y'(t) + 2y(t) = 0$ under the condition $y(0) = 1, y'(0) = 0$. (07 Marks)

OR

- 2 a. Find :
- i) $L^{-1}\left\{\frac{s+3}{s^2-4s+13}\right\}$ ii) $L^{-1}\left\{\log\frac{(s^2+1)}{s(s+1)}\right\}$. (06 Marks)
- b. Find $L^{-1}\left\{\frac{s^2}{(s^2+a^2)^2}\right\}$ using convolution theorem. (07 Marks)
- c. A periodic function of period $2a$ is defined by
- $$f(t) = \begin{cases} E & 0 \leq t \leq a \\ -E & a < t \leq 2a \end{cases}$$
- Where E is a constant and show that $\text{trim } L\{f(t)\} = \frac{E}{S} \tan h\left(\frac{as}{2}\right)$. (07 Marks)

Module-2

- 3 a. Express $f(x) = x^2$ as a Fourier series in the interval $-\pi < x < \pi$. Hence deduce that
- $$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$$
- (07 Marks)
- b. Obtain the Fourier series expression of $f(x) = \begin{cases} \pi x & 0 < x < 1 \\ \pi(2-x) & 1 < x < 2 \end{cases}$. (07 Marks)
- c. Obtain the half range cosine series for the function $f(x) = (x-1)^2, 0 \leq x \leq 1$. (06 Marks)

OR

- 4 a. Obtain the Fourier series of $f(x) = \left(\frac{\pi-x}{2}\right)$ $0 < x < 2\pi$. Hence deduce that

$$1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}. \quad (07 \text{ Marks})$$

- b. Obtain the half range cosine series of $f(x) = x \sin x$ $0 \leq x \leq \pi$. (07 Marks)
 c. Express $f(x)$ as a Fourier series upto first harmonic.

x	0	1	2	3	4	5
f(x)	4	8	15	7	6	2

(06 Marks)

Module-3

- 5 a. Find the Fourier cosine transform of

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ (2-x) & \text{for } 1 < x < 2. \\ 0 & \text{for } x > 2 \end{cases} \quad (07 \text{ Marks})$$

- b. Find the Fourier transform by $f(x) = e^{-|x|}$. (07 Marks)

- c. Obtain the inverse Z - transform by $u(z) = \frac{z}{(z-2)(z-3)}$. (06 Marks)

OR

- 6 a. Find the Fourier transform by

$$f(x) = \begin{cases} 1-|x| & |x| < 1 \\ 0 & |x| > 1 \end{cases}$$

and show that $\int_0^{\infty} \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$. (07 Marks)

- b. Find the z-transform of: i) $\cos n\theta$ ii) $\sin n\theta$. (06 Marks)

- c. Solve using Z -transform $u_{n+2} - 4u_n = 0$ given that $u_0 = 0$ and $u_1 = 2$. (07 Marks)

Module-4

- 7 a. Using Taylor's series method solve $y(x) = x + y$, $y(0) = 1$ then find y at $x = 0.1, 0.2$ consider upto 4th degree. (07 Marks)

- b. Solve $y'(x) = 1 + \frac{y}{z}$, $y(1) = 2$ then find $y(1.2)$ with $h = 0.2$ using modified Euler's method. (06 Marks)

- c. Solve $y'(x) = x - y^2$ and the data is $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$ then find $y(0.8)$ by applying Milne's method and applying corrector formula twice. (07 Marks)

OR

- 8 a. Solve $y'(x) = 3x + \frac{y}{2}$, $y(0) = 1$ then find $y(0.2)$ with $n = 0.2$ using modified Euler's method. (06 Marks)
- b. Solve $y(x) = 3e^x + 2y$, $y(0) = 0$ then find $y(0.1)$ with $h = 0.1$ using Runge-Kutta method of fourth order. (07 Marks)
- c. Solve $y'(x) = 2e^x - y$ and data is

x	0	0.1	0.2	0.3
y	2	2.010	2.040	2.090

Then find $y(0.4)$ by using Adam's Bash forth method. (07 Marks)

Module-5

- 9 a. By applying Milne's predictor and corrector method to compute $y(0.4)$ give the differential equation $\frac{d^2y}{dx^2} = 1 - \frac{dy}{dx}$ and the following table by initial value. (07 Marks)

x	0	0.1	0.2	0.3
y	1	1.1103	1.2427	1.3990
y'	1	1.2103	1.4427	1.6990

- b. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$. (06 Marks)
- c. Find the extremal of the functional $\int_{x_1}^{x_2} (y' + x^2 y'^2) dx$. (07 Marks)

OR

- 10 a. By Runge Kutta method solve $\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2$ for $x = 0.2$ correct to four decimal places. Using initial condition $y(0) = 1$, $y'(0) = 0$. (07 Marks)
- b. Prove that the shortest distance between two points in a plane is a straight line. (06 Marks)
- c. Find the curve on which the functional $\int_0^1 [y'^2 + 12xy] dx$ with $y(0) = 0$, $y(1) = 1$. (07 Marks)

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18MATDIP31

Third Semester B.E. Degree Examination, Aug./Sept.2020 Additional Mathematics - I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Prove that $(1+i)^n + (1-i)^n = 2^{n/2+1} \cos \frac{n\pi}{4}$ (08 Marks)
- b. Express the complex number $(2+3i) + \frac{1}{1-i}$ in the form $a+ib$. (06 Marks)
- c. Find the modulus and amplitude of the complex number $1 - \cos\alpha + i \sin\alpha$. (06 Marks)

OR

- 2 a. If $\vec{A} = i + 2j - 3k$, $\vec{B} = 3i - j + 2k$ show that $\vec{A} + \vec{B}$ is perpendicular to $\vec{A} - \vec{B}$. Also find the angle between $2\vec{A} + 3\vec{B}$ and $\vec{A} + 2\vec{B}$. (08 Marks)
- b. Show that the vectors $i - 2j + 3k$, $2i + j + k$, $3i + 4j - k$ are coplanar. (06 Marks)
- c. Find the sine of the angle between $\vec{A} = 4i - j + 3k$ and $\vec{B} = -2i + j - 2k$. (06 Marks)

Module-2

- 3 a. Obtain the Maclaurin's series expansion of $\sin x$ upto term containing x^4 . (08 Marks)
- b. If $u = \sin^{-1} \left[\frac{x^2 + y^2}{x - y} \right]$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$. (06 Marks)
- c. If $u = f(x - y, y - z, z - x)$ prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. (06 Marks)

OR

- 4 a. Prove that $\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ by using Maclaurin's series. (08 Marks)
- b. If $x = r \cos \theta$, $y = r \sin \theta$ find $\frac{\partial(x,y)}{\partial(r,\theta)}$. (06 Marks)
- c. If $z = e^{ax+by} f(ax-by)$ then show that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$. (06 Marks)

Module-3

- 5 a. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at the point $(2, -1, 2)$. (08 Marks)
- b. Find the unit vector normal to the surface $x^2y + 2xz = 4$ at $(2, -2, 3)$. (06 Marks)
- c. Show that the vector $(-x^2 + yz)i + (4y - z^2x)j + (2xz - 4z)k$ is solenoidal. (06 Marks)

OR

- 6 a. A particle moves along the curve $x = t^3 + 1$, $y = t^2$, $z = 2t + 3$ where t is the time. Find the components of its velocity and acceleration at $t = 1$ in the direction $i + j + 3k$. (08 Marks)
- b. Find the values of a , b , c such that $\vec{F} = (x + y + az)i + (bx + 2y - z)j + (x + cy + 2z)k$ is irrotational. (06 Marks)
- c. Find $\text{div} \vec{F}$ and $\text{curl} \vec{F}$ where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (06 Marks)

Module-4

- 7 a. Obtain the reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$, $n > 0$. (08 Marks)
- b. Evaluate $\int_0^1 \frac{x^9}{\sqrt{1-x^2}} \, dx$ (06 Marks)
- c. Evaluate $\iint xy(x+y) \, dx \, dy$ over the area between $y = x^2$ and $y = x$. (06 Marks)

OR

- 8 a. Obtain the reduction formula for $\int_0^{\pi/2} \sin^n x \, dx$, $n > 0$. (08 Marks)
- b. Evaluate $\int_0^{\infty} \frac{x^2}{(1-x^2)^{7/2}} \, dx$ (06 Marks)
- c. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} \, dz \, dy \, dx$ (06 Marks)

Module-5

- 9 a. Solve $y(\log y)dx + (x - \log y)dy = 0$ (08 Marks)
- b. Solve $x \frac{dy}{dx} + y = x^3 y^6$ (06 Marks)
- c. Solve $(xy^2 - e^{1/x^3})dx - x^2 y \, dy = 0$ (06 Marks)

OR

- 10 a. Solve $(5x^4 + 3x^2 y^2 - 2xy^3) \, dx + (2x^3 y - 3x^2 y^2 - 5y^4) \, dy = 0$ (08 Marks)
- b. Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ (06 Marks)
- c. Solve $(xy^3 + y)dx + 2(x^2 y^2 + x + y^4) \, dy = 0$ (06 Marks)

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18CS32

Third Semester B.E. Degree Examination, Aug./Sept.2020 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define data structures. List and explain the different operations that can be carried on arrays. (10 Marks)
- b. Define pointers. List the advantages of pointers over arrays. (04 Marks)
- c. Define dynamic memory allocation. List and write with explanation the syntax of dynamic memory allocating functions. (06 Marks)

OR

- 2 a. Define strings. List and explain any 5 operations with example. (12 Marks)
- b. Is it possible to store the contents of an array into a points? Justify your opinion and with suitable C-statements. (08 Marks)

Module-2

- 3 a. Define a stack. Explain the different operation that can be performed on stack using C-functions and show them using diagrammatic representations. (10 Marks)
- b. Write an algorithm to convert a parenthesized infix expression to postfix. Apply the algorithm and show the contents of stack during conversion for the expression :
 $(A + B * C) * ((D + E - F)/J)$. (07 Marks)
- c. Differentiate recursion and iteration process. (03 Marks)

OR

- 4 a. Write a C-recursive function for
 - i) Adding n-odd natural numbers
 - ii) Adding n-even natural numbers. (08 Marks)
- b. Define a queue. List the different types of queues. State the limitation of ordinary queue. Explain how do you overcome the limitation by specifying the required C-statements and diagrammatic representation using an example. (12 Marks)

Module-3

- 5 a. With the C-statements, explain how do you create a node, add and delete on Singly Linked List (SLL) with proper message where each node is containing the details of employee in the form of EmpId, EmpName, Empaddr and Empsalary as data fields. (10 Marks)
- b. Write and explain how do you implement the operations of stack using Singly Linked List (SLL) with the help of C-statements. (10 Marks)

OR

- 6 a. Differentiate Single (SLL) and Doubly (DLL) linked lists. (04 Marks)
- b. State the advantage of Doubly Linked List over Singly Linked List. (02 Marks)
- c. Implement addition and deletion of a NODE on a Doubly Linked List (DLL) with required C-statements. (14 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Define a binary tree. Explain how do you construct and add a NODE to binary tree using C-statements. Also explain how do you represent a binary tree using arrays. (09 Marks)
- b. Define binary tree traversal method. List and explain the different binary tree traversal methods along with C-functions. (08 Marks)
- c. Find the INORDER, PREORDER and POSTORDER for the following :

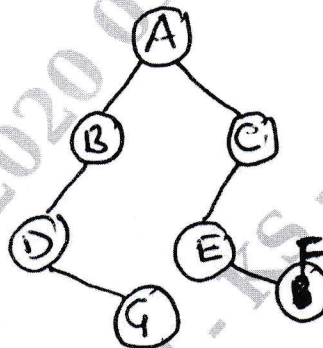


Fig.Q7(c)

(03 Marks)

OR

- 8 a. Define expression tree. Using a C-function, explain how do you construct a expression tree. Construct an expression tree for : $a + b * c / f^g - h$. (10 Marks)
- b. With diagrammatic explanation, explain how do you create and construct a BST. Also write C-functions for the same. (10 Marks)

Module-5

- 9 a. Define a graph and its traversal methods. List and explain the different graph traversal methods. Find the resultants of the types of graph traversal methods on the following graph : (consider 'a' as starting vertex).

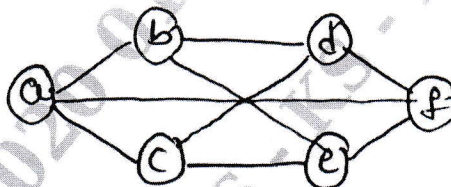


Fig.Q9(a)

(12 Marks)

- b. Write address calculation sort algorithm. Sort Z, A, P, B, Q, I, J, K using the address calculation sort algorithm. (08 Marks)

OR

- 10 a. Define file. List basic file operations. Explain any four operations with syntax and example. (10 Marks)
- b. Define Hashing. Explain the method of sorting data using a Hash function in a Hash table. Identify the problem that occurs during the value storage. Explain how do you resolve the problem using Hashing technique. (10 Marks)

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18CS33

Third Semester B.E. Degree Examination, Aug./Sept.2020 Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1. a. With a neat diagram, explain the working principle of photocoupler. (08 Marks)
- b. List the different types of BJT biasing. Derive the expression for collector emitter voltage (V_{CE}) for fixed bias circuit. (08 Marks)
- c. Write a note on light emitting diode. (04 Marks)

OR

2. a. Explain with neat diagram, the construction, working principle and characteristics equation of photodiode. (08 Marks)
- b. With a neat waveform and circuit diagram, explain the working of monostable multivibrator. (06 Marks)
- c. Explain with neat diagram R-2R ladder type DAC and derive the expression for V_0 . (06 Marks)

Module-2

3. a. Minimize the following function for SOP using K-map and implement it using basic gates:
 $f(a, b, c, d) = \Pi M(5, 7, 13, 14, 15) + d(1, 2, 3, 9)$ (06 Marks)
- b. Design the function EX-OR using (i) NAND gates only (ii) NOR gates only (06 Marks)
- c. A switching circuit has two control inputs (C_1 and C_2), two data inputs (X_1 and X_2) and one output Z. The circuit performs one of the logic functions such as OR, XOR, AND, EQU for control inputs combination C_1, C_2 as 00, 01, 10, 11 respectively:
 - (i) Derive the truth table for Z
 - (ii) Use a K-map to find minimum AND-OR gate circuit to realize Z. (04 Marks)

OR

4. a. Minimize the following function for POS using Kmap and realize it by using basic gates:
 $f(a, b, c, d) = \Pi M(0, 1, 6, 8, 11, 12) + d(3, 7, 4, 15)$ (06 Marks)
- b. Plot the following function on a K-map (Do not expand to minterm before plotting):
 $F(A, B, C, D) = \overline{A} \overline{B} + \overline{C} \overline{D} + ABC + \overline{A} \overline{B} \overline{C} \overline{D} + ABC \overline{D}$, find the minimum sum of products. (06 Marks)
- c. A digital system is to be designed in which the month of the year is given as I/P is four bit form. The month January is represented as '0000', February as '0001' and so on. The output of the system should be '1' corresponding to the input of the month containing 31 days or otherwise it is '0'. Consider the excess number in the I/P beyond '1011' as don't care condition:
 - (i) Write truth table, SOP Σm and POS ΠM form
 - (ii) Simplify for SOP using K-map
 - (iii) Realize using basic gates (08 Marks)

Module-3

- 5 a. Explain with neat diagram static hazard 0 and its recover method. (06 Marks)
 Implement the following function using $3 \times 4 \times 2$ PLA:
 b. $A(x, y, z) = \sum m(0, 1, 3, 4)$; $B(x, y, z) = \sum m(1, 2, 3, 4, 5)$ (08 Marks)
 Using EVM method simplify the following function and implement it by using 8:1 MUX
 c. $F(a, b, c, d) = \sum m(0, 1, 2, 4, 5, 6, 9, 10, 12, 13, 14, 15)$ (06 Marks)

OR

- 6 a. With a neat diagram, explain 3 to 8 line decoder. (04 Marks)
 b. Construct 32:1 MUX using 8:1 MUX and 2:4 decoder. (08 Marks)
 c. Design 7 segment decoder and realize using PLA. (08 Marks)

Module-4

- 7 a. Explain with a neat diagram, VHDL program structure. (06 Marks)
 b. Construct SR gates latch using NAND gates and derive the characteristics equation for the same. (08 Marks)
 c. Explain T-flipflop with characteristics equation. (06 Marks)

OR

- 8 a. Explain with neat diagram, working of JK flipflop and derive its characteristic equation. (08 Marks)
 b. Write VHDL code for 4 bit adder. (06 Marks)
 c. Explain the application of SR latch in switch debouncing technique. (06 Marks)

Module-5

- 9 a. With neat diagram, explain 4 bit parallel adder with accumulator. (08 Marks)
 b. With diagram explain 4 bit SISO register. (08 Marks)
 c. Write a note on Johnson tail counter. (04 Marks)

OR

- 10 a. Design Mod 5 counter using JK flipflops. (10 Marks)
 b. Explain 4 bit PIPO shift register with block diagram. (06 Marks)
 c. Write a note on ring counter. (04 Marks)

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Third Semester B.E. Degree Examination, Aug./Sept.2020 Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, analyze the basic operational concepts of a computer. Give the operating steps. (10 Marks)
- b. Analyze Big Endian and Little Endian methods of byte addressing with proper example. (05 Marks)
- c. Explain SPEC rating of computer. (05 Marks)

OR

- 2 a. What is an Addressing mode? Explain any four types of addressing modes, with suitable example. (10 Marks)
- b. What is a Subroutine? Analyse the use of call (or) Return Instructions in a subroutine with assembly language program code. (10 Marks)

Module-2

- 3 a. With neat sketches, explain various methods for handling multiple Interrupts requests raised by Multiple devices. (10 Marks)
- b. What is DMA Bus Arbitration? Briefly explain different bus arbitration techniques. (10 Marks)

OR

- 4 a. Explain Synchronous Bus and Asynchronous Bus with neat Timing diagrams. (10 Marks)
- b. Enumerate the features of Universal Serial Bus. (05 Marks)
- c. Describe how a read operation is performed in a PCI bus. (05 Marks)

Module-3

- 5 a. With a neat diagram, explain the Internal Organization of 128×8 memory chip. (10 Marks)
- b. Describe the working of Static RAM memories. (05 Marks)
- c. Analyze the working mechanism of Asynchronous DRAMS. (05 Marks)

OR

- 6 a. Analyze how data are written into Read Only Memories (ROM). Discuss different types of Read Only Memories. (10 Marks)
- b. What is Cache memory? Analyze the three mapping functions of Cache memory. (10 Marks)

Module-4

- 7 a. Design a logic circuit to perform addition and subtraction of two 'n' – bit numbers X and Y. This circuit can be suitably modified to perform $Y - X$ operation. (08 Marks)
- b. Design an 'n' bit carry propagation adder circuit to add 'K' – 'n' bit numbers. (07 Marks)
- c. Subtract – 5 from -7 using Two's complement subtraction. (05 Marks)

OR

- 8 a. Analyze the design of Carry Look Ahead adder circuit suitable logic circuit diagram. (10 Marks)
- b. Explain Booth Multiplication Algorithm. Apply Booth Multiplication Algorithm to multiply the signed number – 5 and 4. (10 Marks)

Module-5

- 9 a. Explain the working of single bus organization of data path. (07 Marks)
- b. Write the sequence of control steps to execute the Instruction Add (R_3), R_1 on single bus architecture. (05 Marks)
- c. Analyze how does execution of a complete instruction carry out. (08 Marks)

OR

- 10 a. What is the purpose of Control unit? With neat sketches, explain the organization of Hardwired control unit in detail. (10 Marks)
- b. What is Pipelining? Explain the five stage Instruction pipeline with timing diagram. (10 Marks)

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18CS35

Third Semester B.E. Degree Examination, Aug./Sept.2020 Software Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Software Engineering. Bring out the differences between generic and bespoke software. List Software Engineering attributes. (10 Marks)
b. Explain Incremental Development process model with a neat block diagram. List its benefits and problems. (10 Marks)

OR

- 2 a. Illustrate Requirement Engineering process with a neat block diagram. (10 Marks)
b. Explain the IEEE standard requirement document with its structure. (10 Marks)

Module-2

- 3 a. Define object orientation, list and explain the aspects of object oriented approach. (10 Marks)
b. List and explain the object oriented theories which supports object oriented technology. (10 Marks)

OR

- 4 a. Briefly explain Links, Associations, Ordering, Bags and Sequences with an example each. (10 Marks)
b. Explain Generalization and Inheritance with an example each. (10 Marks)

Module-3

- 5 a. What is system modeling? Explain the different perspective that the system model developed. (10 Marks)
b. Illustrate sequence diagram with an example to view patient information. (10 Marks)

OR

- 6 a. Explain Event-driven model with a state diagram of microwave oven application. (10 Marks)
b. Define design patterns. Briefly explain the essential elements of design patterns. (10 Marks)

Module-4

- 7 a. Discuss Test Driven Development (TDD) with its process and list its benefits. (10 Marks)
b. Explain software evolution process with neat block diagram. (10 Marks)

OR

- 8 a. Discuss Lehman's laws of program evolution dynamics. (10 Marks)
b. Explain Reengineering process with a neat block diagram. (10 Marks)

Module-5

- 9 a. Discuss project plan. Explain the various section of project plan. (10 Marks)
b. With a neat diagram explain project scheduling process. (10 Marks)

OR

- 10 a. Discuss software quality and its attributes. Explain process based quality. (10 Marks)
b. Explain software reviews and inspections of Quality Assurance. (10 Marks)

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18CS36

Third Semester B.E. Degree Examination, Aug./Sept.2020 Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define proposition, tautology, contradiction. Determine whether the following compound statement is a tautology or not.
 $\{ (p \vee q) \rightarrow r \} \leftrightarrow \{ \neg r \rightarrow \neg(p \vee q) \}$ (06 Marks)
- b. Using the laws of logic, show that
 $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \leftrightarrow \neg(q \vee p)$ (07 Marks)
- c. Establish the validity of the following argument :
- $$\begin{array}{l} \forall x, p(x) \vee q(x) \\ \exists x, \neg p(x) \\ \forall x, \neg q(x) \vee r(x) \\ \forall x, s(x) \rightarrow \neg r(x) \\ \therefore \exists x, \neg s(x) \end{array}$$
- (07 Marks)

OR

- 2 a. Define Converse, Inverse and Contrapositive of a conditional. Find converse, inverse and contrapositive of $\forall x, (x > 3) \rightarrow (x^2 > 9)$, where universal set is R. (06 Marks)
- b. Test the validity of the following arguments:
- (i) If there is a strike by students, the exam will be postponed but the exam was not postponed

- \therefore there was no strike by students
- (ii) If Ram studies, then he will pass in DMS. If Ram doesn't play cricket, then he will study. Ram failed in DMS.

- \therefore Ram played cricket (06 Marks)
- c. Let $p(x) : x \geq 0$
 $q(x) : x^2 \geq 0$ and $r(x) : x^2 - 3x - 4 = 0$, then
for the universe completing of all real numbers, find the truth value of
(i) $\exists x \{p(x) \wedge q(x)\}$ (ii) $\forall x \{p(x) \rightarrow q(x)\}$ (iii) $\exists x \{\phi(x) \wedge r(x)\}$ (06 Marks)
- d. Define dual of logical statement. Write the dual of the statement
 $(p \vee T_0) \wedge (q \vee F_0) \vee (r \wedge s \wedge T_0)$ (02 Marks)

Module-2

- 3 a. Define well ordering principle and prove the following by mathematical induction.
- (i) $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$
- (ii) $1*3 + 2*4 + 3*5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$ (12 Marks)
- b. Find the coefficients of
- (i) $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$
- (ii) $a^2 b^3 c^2 d^5$ in the expansion of $(a + 2b - 3c + 2d + 5)^{16}$ (08 Marks)

OR

- 4 a. Prove that for any positive integer n ,

$$\sum_{i=1}^n \frac{f_{i-1}}{2^i} = 1 - \frac{f_{n+2}}{2^n}, \quad f_n \text{ denote the Fibonacci number.} \quad (06 \text{ Marks})$$

- b. Determine the coefficient of xyz^2 in the expansion of $(2x - y - z)^4$. (07 Marks)
 c. How many positive integers n , can we form using the digits 3, 4, 4, 5, 5, 6, 7, if we want n to exceed 5,000,000? (07 Marks)

Module-3

- 5 a. If $A = \{1, 2, 3, 4, 5\}$ and there are 6720 injective functions $f: A \rightarrow B$, what is $|B|$? (03 Marks)
 b. Six books each of Physics, Chemistry, Mathematics and four books of Biology totally contains 12225 pages. Find the least number of pages contained in a book. (05 Marks)
 c. The set $A = \{1, 3, 4, 7, 9\}$ and $B = \{2, 4, 6, 7, 8\}$ and $f: \mathbb{R} \rightarrow \mathbb{R}$ is given by $f(x) = 2x + 5$. Verify the following results for
 (i) $f(A \cup B) = f(A) \cup f(B)$
 (ii) $f^{-1}(A \cup B) = f^{-1}(A) \cup f^{-1}(B)$
 (iii) $f^{-1}(A \cap B) = f^{-1}(A) \cap f^{-1}(B)$ (12 Marks)

OR

- 6 a. Let $A = \{1, 2, 3, 6, 9, 12, 18\}$ and define R on A by xRy if "x divides y". Draw the Hasse diagram for the poset (A, R) . Also write the matrix of relation. (08 Marks)
 b. Consider poset whose Hasse diagram is given below. Consider $B = \{3, 4, 5\}$. Find the upper and lower bounds of B , least upper bound and greatest lower bound of B (Refer Fig.Q6(b)).

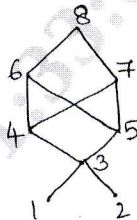


Fig.Q6(b)

- c. Let $f, g, h: \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = x^2$, $g(x) = x + 5$ and $h(x) = \sqrt{x^2 + 2}$. Show that $(h \circ g) \circ f = h \circ (g \circ f)$. (08 Marks)

Module-4

- 7 a. In how many ways can the 26 letters of English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs? (08 Marks)
 b. There are eight letters to eight different people to be placed in eight different addressed envelopes. Find the number of ways of doing this so that atleast one letter gets to right person. (04 Marks)
 c. Solve the recurrence relation $a_n - a_{n-1} - 12(n+1)^3$, $n \geq 1$, $a_0 = 3$. (08 Marks)

OR

- 8 a. A person invests some amount at the rate of 11% annual compound interest. Determine the period for this principal amount to get doubled. (06 Marks)
 b. How many permutations of 1, 2, 3, 4, 5, 6, 7, 8 are not dearrangements? (07 Marks)
 c. Find the rook polynomial for 3×3 board using the expansion formula. (07 Marks)

Module-5

- 9 a. Merge sort the list $-1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3$. (06 Marks)
 b. Determine whether the following graphs are isomorphic or not. [Refer Fig.Q9(b)]

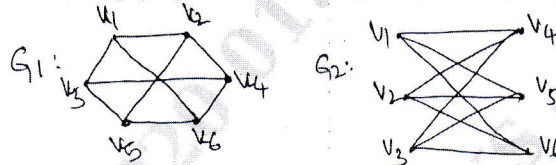


Fig.Q9(b)

(06 Marks)

- c. Define the following with an example to each :
 (i) Simple graph (ii) Complete graph (iii) Tree (iv) Regular graph
 (v) Spanning subgraph (vi) Induced sub graph (vii) Complete Bipartite graph
 (viii) Complement of graph. (08 Marks)

OR

- 10 a. Let $G : (V, E)$ be a connected undirected graph, what is the largest possible value for $|V|$ if $|E| = 19$ and $\deg(v) \geq 4$ for all $v \in V$? (06 Marks)
 b. Construct an optional prefix code for the letters of the word ENGINEERING. Hence deduce the code for this word. (08 Marks)
 c. $T : (V, E)$ is a complete m -ary tree with $|V| = n$, if T has ℓ leaves and i internal vertices, prove the following results:
 (i) $n = mi + 1$
 (ii) $\ell = (m - 1)i + 1$
 (iii) $i = \frac{\ell - 1}{m - 1} = \frac{n - 1}{m}$ (06 Marks)

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Question Paper Version : A

Third Semester B.E. Degree Examination, Aug./Sept.2020
Constitution of India, Professional Ethics and Cyber Law
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the Hundred questions, each question carries **ONE** mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. Chairman of the Constituent assembly was _____ and _____ was the chairman of drafting committee.
 - a) Dr. Rajendra Prasad and Dr.B.R. Ambedkar
 - b) Dr.B.R. Ambedkar and Dr. Rajendra Prasad
 - c) Jawaharlal Nehru and Dr.B.R. Ambedkar
 - d) Sardar Vallabhbhai Patel and Dr.B.R. Ambedkar
2. Which of the following writ is issued by the court in case of an illegal detention of a person by police.
 - a) Certiorari
 - b) Mandamns
 - c) Habeas Corpus
 - d) Quo-Warranto.
3. Who are not permitted to organize unions or associations?
 - a) Armed forces
 - b) Government Servants
 - c) Unemployed Graduates
 - d) Farmers.
4. Right against exploitation seeks to protect the weaker sections of the society by
 - a) Giving equal pay for equal work for men and women
 - b) Prohibiting human trafficking and Beggar
 - c) Providing compulsory education for children below the age of 14 years
 - d) None of the these.
5. Which one of the following is a feature common to both the Indian federation and the American federation?
 - a) A single citizenship
 - b) Three lists in the constitution
 - c) Dual Judiciary
 - d) A federal Supreme Court to interpret the constitution.

6. Which of the following laws exercised the most profound influence in framing Indian constitution?
 a) British Constitution
 b) US Constitution
 c) Irish Constitution
 d) The Government of India Act, 1935
7. Who headed the Interim Cabinet formed in the 1946?
 a) Rajendra Prasad
 b) Jawaharlal Nehru
 c) Sardar Vallabai Patel
 d) Rajagopala Chari.
8. The preamble in the constitution of independent India is modified version of which of the following?
 a) Bill of Rights in USA
 b) Objectives resolutions moved by Jawaharlal Nehru
 c) British Magna Carta
 d) Ideals of Communism.
9. Which one of the following determines that the Indian Constitution is federal?
 a) A Written and rigid constitution
 b) An Independent judiciary
 c) Vesting of residuary powers with the centre
 d) Distribution of powers between the centre and the states.
10. As per Indian protocol, who among the following ranks the highest in the order of precedence?
 a) Deputy Prime-minister
 b) Former President
 c) Governor of a state within his state/the state
 d) Speaker of Loka-Sabha
11. Which of the following constitutional provision strengthens Indian federalism?
 a) Single Citizenship
 b) Written Constitution
 c) Rigidity of Constitution
 d) Emergency provisions in the constitution.
12. The concept of public interest litigation originated in
 a) UK
 b) Australia
 c) USA
 d) Canada
13. Which of the following is/are the constitutional provisions facilitating union control over the states?
 i) All India services ii) Unified Judiciary iii) Officers of Governor iv) Grants-in-aid
 Select the answer which is correct using the code given below.
 a) 1 only b) 1 and 4 only c) 2 and 4 only d) 1, 3 and 4 only
14. In which of the following countries, the no-confidence motion to bring down the Government is adopted only when the confidence motion is passed in the alternate council of ministers?
 a) France
 b) Germany
 c) Italy
 d) Portugal
15. Indian Parliamentary system is different from the British parliamentary system in which of the following respects?
 a) Both a real and a nominal executive
 b) A system of collective responsibility
 c) Bicameral legislature
 d) A different judicial review
16. Which one of the following words was not contained in the original preamble to the Indian Constitution?
 a) Sovereign
 b) Secular
 c) Democratic
 d) Republic

17. Consider the following statements regarding “Economic Justice” as enshrined in the preamble to the Constitution of India.
- It refers to absence of unemployment in India
 - It refers to equal wealth with everyone in India
 - It refers to possession of all forms of wealth under public sector
 - It refers to equal opportunity to everyone to raise one’s standard of living.
18. In the Indian constitution, the right to equality is granted by
- Article 16 to 20
 - Article 15 to 19
 - Article 14 to 18
 - Article 13 to 17
19. An American citizen staying in India can not claim right to
- Freedom of trade and profession
 - Equality before the law
 - Protection of life and property, personal liberty
 - Freedom of Religion
20. The Constitution of India recognizes
- Only religious minorities
 - Only linguistic minorities
 - Linguistic and religious minorities
 - Religious, Linguistic and Ethnic minorities
21. Which one of the following rights was described by Dr.B.R. Ambedkar as the heart and soul of the constitution?
- Right of freedom of religion
 - Right to property
 - Right to Equality
 - Right to constitutional remedies
22. Which one of the following comes under the jurisdiction of both the High Court and the Supreme Court?
- Disputes between the centre and the state
 - Disputes between the states inter-states
 - Protection of the fundamental rights
 - Disputes on inter-state rivers
23. Which one of the following article of the directive principles of state policy deals with the promotion of International peace and security?
- 51
 - 48A
 - 43A
 - 41
24. The purpose of the inclusion of directive principles of the state policy in the Indian Constitution is to establish.
- Political Democracy
 - Legal democracy
 - Gaudian Democracy
 - Social and Economic democracy
25. Uniform Civil code is the proposal to replace the personal laws with a common set governing every citizen. The uniform civil code does not pertain to which of the following matters.
- Marriage
 - Inheritance
 - Maintenance
 - Defamation
26. The ideal of “Welfare State” in the Indian Constitution is enshrined in its.
- Preamble
 - Directive Principles of state policy
 - Fundamental rights
 - 7th schedule of the constitution
27. For a citizen of India, the duty to pay taxes is a
- Fundamental duty
 - Legal obligation
 - Constitutional obligation
 - Moral obligation

28. Fundamental Duties enshrined in our constitution are inspired from which of the following countries?
a) Ex-USSR b) Swedan c) Norway d) USA
29. The president can be impeached for
a) Violating the constitution
b) Disregarding the parliament
c) For not abiding by the advice of the Prime-Minister
d) All of the above
30. The Chief-minister of a state in India is not eligible to vote in the presidential election if
a) He himself is a candidate
b) He is yet to prove his majority on the floor of the lower house of the state legislature
c) He is a member of the upper house of the state legislature
d) He is a caretaker chief-minster
31. Consider the following acts of parliament. Which of the following is not undertaken as per the discretionary power of the president?
a) President asks the leader of a political party to form Government who enjoys majority in Lok-Sabha
b) President asks the parliament to reconsider the financial bill
c) President calls the session of the parliament when he has not been asked to do so
d) President warns the council of ministers on their recommendation to appoint a particular person as CAG of India
32. In which of the following elections does the Vice-President participate?
a) President b) Chairperson of Rajys Sabha
c) Deputy chairperson of a Rajya Sabha d) None of the above
33. The Tenure of the Vice-president is ____
a) 06 years b) 05 years
c) 03 years d) Till he enjoys the support of the party
34. Who is the head of the council of ministers in the Union Cabinet/Ministers?
a) Home minster b) Prime-Minister
c) Speaker of parliament d) President
35. Who is the chief Advisor to President of India from the parliament?
a) President b) Prime Minister
c) Speaker of Parliament d) Vice-President
36. Council of Ministers is headed by the _____ and are appointed by president on the advice of _____
a) Prime Minister and Prime Minister b) President and Prime Minister
c) Prime Minister and President d) President and chief justice of India
37. The Cabinet includes only the _____ ministers.
a) Prime Minister b) Cabinet
c) State d) Union and State Rank

38. _____ cabinet comprises Prime Minister and very close associates of Prime Minister.
a) General b) Kitchen c) Particular d) House
39. Who is the highest law officer in the country?
a) Additor General b) Chief Justice
c) President d) Attorney General
40. According to Article 88, _____ has the right to take part in parliamentary proceedings including right to speak.
a) Vice-President b) Attorney General
c) Advisor of parliament member d) Speaker of Loka Sabha
41. In India, the Union Legislature is called
a) Lokasabha b) Rajyasabha c) Parliament d) Vidhana Sabha
42. Rajyasabha is also known and called as
a) Council of States b) Council of the Lokasabha
c) Council of cabinet d) Council of Union Administration
43. Vice President of India is Ex-Officer Chairperson of
a) Lokasabha b) Rajyasabha c) Supreme Court d) President office
44. The life of the Lokasabha shall not exceed 06 months after the end of
a) War b) National Emergency c) States term d) President power
45. The minimum attendance of the members required for a proceedings of any house to begin is known as
a) Assembly b) Parliament c) Quorum d) Legislature
46. Presiding officer of Lokasabha is
a) Prime Minister b) Home Minister c) Speaker d) President
47. Leader of opposition in Lokasabha enjoys a statutory status equal to that of a _____
a) Speaker b) Deputy Prime Minister
c) Cabinet Minister d) Ministers of State Ranking
48. Delimitation of constituencies refers to redrawing of constituencies based on the latest _____
a) Census figures b) MP seats c) MLA/MLC seats d) People
49. As per convention, there are _____ sessions of parliament
a) Three regular b) Four regular c) Five regular d) Two regular
50. If refers to the end of session of parliament. Pending bills do not lapse by the act of _____
a) Adjournment b) Session c) Prorogation d) Parliament
51. Which article provides the information for the disqualification of the members of parliament?
a) 100 b) 101 c) 102 d) 103

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52. Which hour starts immediately after the end of question hour and lasts until the agenda for the day i.e regular business of the house is taken up
a) Question b) Notice c) Zero d) Replay
53. Any matter which is not covered under money, financial, or constitution amendment bill is covered under
a) Money bill b) Ordinary bill c) Financial bill d) Parliament bills
54. Joint sitting/session is conveyed by the _____ and presided by the speaker of Lokasabha.
a) Prime minister b) President c) Vice-President d) Deputy speaker
55. The maximum life of an ordinance can be
a) 06 weeks b) 06 months
c) 06 months and 06 weeks d) Till the parliament disapproves the ordinance
56. Who is not eligible to be a member of Departmental standing committee?
a) Prime minister b) Minister c) Speaker d) President
57. Which article deals with the appointment of High Court Judges?
a) 117 b) 217 c) 317 d) 417
58. 99th Amendment Act has provided the information about the creation/establishment of
a) NHRC b) NJAC c) VICE d) NTSC
59. Under article 129, _____ court has been declared as a court of Record.
a) District b) Regional c) High d) Supreme
60. The CAG is appointed by the president of India on the advice of
a) President b) Chief Justice c) Speaker d) Council of Ministers
61. Who/which of the following is the custodian of the constitution of India?
a) President of India b) Prime Minister of India
c) Loka Sabha secretariat d) Supreme Court of India
62. The Governor shall hold office for a period of 05 years, subject to _____
a) Pleasure of CM b) Pleasure of Chief Justice
c) Pleasure of central ministers d) Pleasure of President
63. Article 164 states that _____ shall be appointed by the governors.
a) KPSC president b) Aditor general
c) Chief justice of High Court d) Chief ministers
64. In India, the Advocate general is a legal advisor to the
a) Central Government b) State Government
c) PM d) CM
65. At the state level, bills are divided into _____ categories
a) 01 b) 02 c) 03 d) 04

66. Who is the chief patron of NALSA (National Legal Service Authority)?
 a) President
 b) Vice-President
 c) Prime Minister
 d) Chief Justice of India
67. Article 326 of the constitution prescribes for elections to the lokasabha and legislative assemblies
 a) Universal Adult Franchise
 b) Voting powers of Foreigners
 c) Not vote in the elections
 d) Removal of name from the voters list.
68. The election commission is a _____ members body
 a) 02
 b) 03
 c) 05
 d) 09
69. _____ ensures free and fair elections in the country (during elections time) from the date of announcement.
 a) Moral code of conduct
 b) More rules to vote
 c) Constitution
 d) Supreme Court to vote
70. What is considered as an alternative to an earlier procedure to reject all Candidates-section 49(0), Conduct of Election Rules, 1961?
 a) VVPT
 b) MCC
 c) NOTA
 d) NLSA
71. Right to vote in Lokasabha and state assembly elections is a _____ right
 a) Constitutional
 b) Statutory
 c) Moral
 d) Fundamental
72. Who is responsible for proper conduct of elections at a polling booth? And he/she is appointed by district election officer?
 a) Polling officer
 b) Returning officer
 c) Tahasildhar
 d) Presiding officer
73. 73rd Amendment Act, 1992 provides information about _____ bodies and added part IX and 11th schedule.
 a) Rural local
 b) Urban local
 c) Municipalities
 d) BBMP
74. Parliament approves National Emergency for period of _____ months. And it is required to approve emergency within a month by special majority.
 a) 03 Months
 b) 06 Months
 c) 01 year and 06 months
 d) 05 years and 06 months
75. Under article 360, when the president is satisfied that either financial stability of India or credit of India or any part of its territory is under threat, president can proclaim emergency.
 a) National Emergency
 b) States Emergency
 c) President Rules Emergency
 d) Financial Emergency
76. What is the minimum age for contesting in the elections of panchayaths?
 a) 18 years
 b) 21 years
 c) 25 years
 d) 30 years
77. 97th Amendment Act provided constitutional status to
 a) Rural Panchayath system
 b) Town Municipal Councils
 c) CO-operative societies
 d) Zilla panchayaths

78. Planning is defined as the process of
a) Organizing
b) Management
c) Forecasting future problems
d) Objective
79. The process of implementing the objective into actual practice becomes the executive
a) Function of workers
b) Function of Management
c) function of unions
d) Labours
80. One of the characteristics of profession is
a) It gives scope to exercise one's skill
b) It gives monopoly on service
c) It provides opportunity to help the poor and needy
d) It demands high standard of honesty
81. Engineering Ethics is _____
a) A macro ethics
b) Business ethics
c) A preventive ethics
d) A code of scientific rules based on ethics
82. Conflict of Interest may be _____
a) False
b) Imaginary
c) Created
d) Potential
83. Good work means _____
a) Superior work done with great care and skill
b) Responsible work
c) Work above and beyond the call of duty
d) Work involving high risk
84. The code of ethics can be taken as guidelines by Engineers to _____
a) Overcome the work pressure
b) Resolve the conflicts
c) Formulate the problem
d) Escape from the Responsibility
85. This is not dishonesty in Engineering.
a) Trimming
b) Blending
c) Negligently
d) Intentionality
86. The formula of MTR Sambar Masala in an example of
a) Patent
b) Trademark
c) Copyright
d) Trade Secret
87. Corrupt professional judgement leads to _____
a) Integrity in R and D
b) Reliability
c) Conflict of Interest
d) None of these
88. Which of the following is not preserved as an Intellectual property?
a) Trade Secret
b) Government Regulations
c) Formulae
d) Patents
89. These are not trade secrets
a) Formulas
b) Principles
c) Patterns
d) Devices

90. Which of the following is not a type of cyber crime?
a) Data theft
b) Forgery
c) Damage to data and systems
d) Installing Antivirus for protection
91. Which of the following is not a type of peer-to-peer cyber-crime?
a) Phishing
b) Injecting Trojans to a target victim
c) MiTM
d) Credit card details leak in deep web
92. All of the following are examples of real security and privacy threats except:
a) Hackers
b) Virus
c) Spam
d) Worm
93. Unsolicited commercial email is known as _____
a) Spam
b) Malware
c) Virus
d) Spyware
94. Which of the following is a class of computer threat?
a) Phishing
b) Soliciting
c) DoS attacks
d) Stalking
95. The way of manipulating data into information is called as
a) Storing
b) Processing
c) Deletion
d) Organizing
96. Pharming is also known as:
a) Black hat
b) Web Jacking
c) Crackers
d) None of them
97. When a person is harassed repeatedly by being followed, called or be written to he/she is target of
a) Bullying
b) Stalking
c) Identity theft
d) Phishing
98. Which of the following is not an external threat to a computer or a computer networks?
a) Ignorance
b) Trojan horses
c) Adware
d) Crackers
99. Firewall is a type of _____
a) Virus
b) Security threat
c) Worm
d) None of the above
100. Viruses are _____
a) Man Made
b) Naturally occur
c) Machine made
d) All of the above

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