

Roll No. ...18034004023

Total Pages : 3

301304

December, 2019

**B.Tech. (CE/IT/CSE) 3rd SEMESTER
Mathematics-III (Calculus and Ordinary
Differential Equations) (BSC-301)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Discuss the convergence of the series : $\sum_{n=1}^{\infty} \frac{n^2}{3^n}$.
- (b) Check the convergence of $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \dots$
- (c) If $u = (x^2 + y^2 + z^2)^{-1/2}$, then prove that

$$\frac{\partial^2 u}{\partial^2 x} + \frac{\partial^2 u}{\partial^2 y} + \frac{\partial^2 u}{\partial^2 z} = 0.$$

- (d) Find the equation of the tangent plane and normal to the surface of $2xz^2 - 3xy - 4x = 7$ at $(1, -1, 2)$.
- (e) Solve $y(xy + 2x^2y^2) dx + x(xy - x^2y^2) dy = 0$.
- (f) Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$. (solve for p).
- (g) Evaluate $\int_0^5 \int_0^x \int_0^{x^2+y^2} x^2 y^2 dz dy dx$.
- (h) Solve $\int_0^1 \int_0^2 \int_0^2 x^2 y z dx dy dz$
- (i) Find the P.I. of $(D^2 + 5D + 6)y = e^x$.
- (j) Solve $(D^4 + 4)y = 0$.

(1.5×10=15)

PART-B

2. (a) Test for the convergence of the series $\sum_{n=1}^{\infty} \frac{4.7 \dots (3n+1)}{1.2 \dots n} x^n$. (8)
- (b) State, with reasons, the values of x for which the series : $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \dots$ converges. (7)
3. (a) Prove that the rectangular solid of maximum volume which can be inscribed in a sphere is a cube. (8)
- (b) Show that $\nabla^2(r^n) = n(n+1)r^{n+2}$. (7)

- (a) Evaluate $\int \int \frac{r dr d\theta}{\sqrt{a^2 + r^2}}$ over one loop of the lemniscates $r^2 = \cos 2\theta$. (8)

- (b) Apply Stoke's theorem to evaluate $\int (y dx + z dy + x dz)$, where c is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$. (7)

5. (a) Solve $(1 + y^2)dx = (\tan^{-1}y - x)dy$. (8)
- (b) Solve $y = 2px + p^r$. (7)

6. (a) Solve by the method of variation of parameters, $(D^2 - 2D + 1)y = e^x \log x$. (8)
- (b) Derive an expression for the orthogonality property of the Legendre's polynomial. (7)

7. (a) Express the vector field $2y\mathbf{i} - z\mathbf{j} + 3x\mathbf{k}$ in spherical polar coordinate system. (8)
- (b) Prove that $d/dx [x J_n(x) J_{n+1}(x)] = x [J_n^2(x) - J_{n+1}^2(x)]$. (7)

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B.Tech. (CE/IT/CSE) IIIrd Semester

MATHEMATICS-III

(Calculus And Ordinary Differential Equations)

(BSC-301)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Define Power series. Also explain the interval of convergence of power series. (1.5)
(b) Using Taylor's series expansion, expand $\tan^{-1} x$ in powers of $(x - 1)$ upto four terms. (1.5)
(c) Find the directional derivative of $f(x, y, z) = xy^2 + yz^3$ at the point $(2, -1, 1)$ in the direction of the vector $\hat{i} + 2\hat{j} + 2\hat{k}$. (1.5)

(d) Find $\text{div } \vec{f}$ and $\text{curl } \vec{f}$ if

$$\vec{f} = \text{grad } (x^3 + y^3 + z^3 - 3xyz).$$

(e) Evaluate the double integral,

$$\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dy dx.$$

(f) State Green's Theorem.

(g) Solve the given linear differential equation :

$$\sin 2x \frac{dy}{dx} = y + \tan x.$$

(h) Solve $(px - y)(py + x) = a^2p$.

(i) Write the formula for Bessel's function of first kind of order n .

(j) Solve the given Cauchy-Euler equation:

$$x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} + 2y = x^3.$$

PART-B

2. (a) Test the convergence of

$$1 + \frac{a}{b}x + \frac{a(a+1)}{b(b+1)}x^2 + \frac{a(a+1)(a+2)}{b(b+1)(b+2)}x^3 + \dots \infty,$$

(b) Expand $\log(1+x)$, $\log(1-x)$ and $\log \sqrt{\frac{1+x}{1-x}}$. $(a, b > 0, x > 0).$

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(7)

(a) Given $x + y + z = a$, find the maximum value of $x^m y^n z^p$. (8)

(b) Find the equation of tangent plane and normal to the surface $z^2 = 4(1 + x^2 + y^2)$ at $(2, 2, 6)$. (7)

(1.5) (a) Evaluate the integral $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2 + y^2}} dy dx$ by, (1.5)

changing the order of integration. (8)

(b) Using Stoke's theorem evaluate

$$\int_C [(x+y)dx + (2x-z)dy + (y+z)dz],$$

where C is the boundary of the triangle with vertices $(2, 0, 0)$, $(0, 3, 0)$ and $(0, 0, 6)$. (7)

(1.5)

5. (a) Solve the given differential equation

$$\frac{dy}{dx} + y = xy^3. \quad (8)$$

(b) Solve the given equation, $p^2 + 2py \cot x = y^2$. (7)

6.

(a) Solve the given equation using method of variation of parameters:

$$\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + y = e^x \log x. \quad (8)$$

(b) Find power series solution of the equation

$$\frac{d^2 y}{dx^2} + x \frac{dy}{dx} + x^2 y = 0 \text{ about } x = 0. \quad (7)$$

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P.T.O.

7. (a) Express the polynomial $x^3 + 2x^2 - x - 3$ in terms of Legendre's polynomials. (8)

(b) Express the vector field $2y\hat{i} - z\hat{j} + 3x\hat{k}$ in spherical polar coordinate system. (7)

Dec., 2018.

B.Tech., IIIrd Semester

DATA STRUCTURES & ALGORITHMS

(PCC-CS-301)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What is data structure? Define its types. (1.5)
(b) What do you mean by algorithm. Explain the concept of time and space complexity. (1.5)
(c) Write down the prefix and postfix notation of following:
 - $(a + (b * c)) / (d - e) * f$
 - $A / (B + C) / D - E * F$(1.5)
(d) Write the complexity of selection sort in all i.e., best, average and worst cases. (1.5)
(e) Write all applications of stacks. (1.5)

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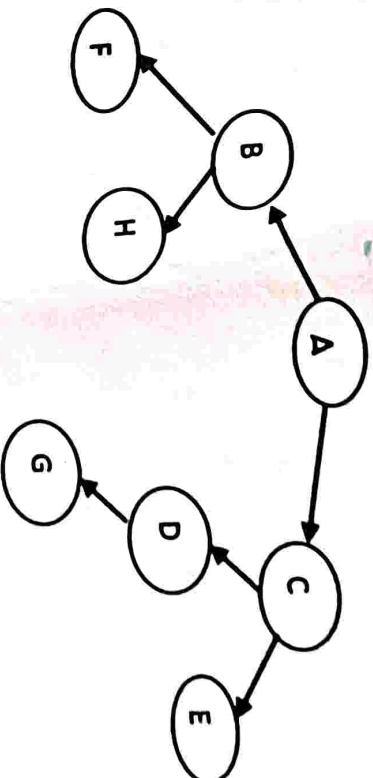
[P.T.O.]

- (f) Write down the advantages of Linked list over array. (1.5)
- (g) Write recursive algorithm for Preorder traversal in graphs. (1.5)
- (h) What do you mean by preorder traversal in representation using array. (1.5)
- (i) What is the difference between sparse matrix. Show its circular queues? (1.5)
- (j) Write the algorithm for inserting a node at first position in linked list. (1.5)

PART-B

2. (a) Write an algorithm to sort elements using Quick Sort. Explain it with an example and find its complexity. (1.5)
- (b) Write an algorithm to delete an element in circular queue using array. (1.5)
3. (a) Write an algorithm to insert an item at a specified location in linked list. (5)
- (b) Write an algorithm to evaluate a postfix expression using Stack. (5)
4. (a) Write an algorithm to search an element in an array using binary search. (5)
- (b) What is Hashing? What is complexity of hashing? Explain folding method with the help of an example. (10)

- (a) What do you mean by Graph. Explain memory representation of graph. Write an algorithm to traverse graph using BFS. (10)
- (b) Find preorder, postorder and inorder for the given tree: (5)



6. (a) Write an algorithm to insert an element in Binary search tree. (10)
- (b) Build a B-Tree of order 4 using key values : 2, 7, 6, 5, 8, 14, 12, 18, 22, 7, 9. (5)
7. Write short note on the following : (15)
- (a) Double ended queues.
- (b) Heap.
- (c) Memory representation of binary trees.

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Dec., 2018

B.Tech. (EL/EEE/CE/IT/CSE) IIIrd Semester

ANALOGUE ELECTRONIC CIRCUITS

(ELPC302/ESC301)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
- (ii) *Answer any four questions from Part-B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*
- (iv) *Assume necessary relevant data if missing.*

PART-A

1. (a) Current flowing through a PN junction diode is called Reverse saturation current. Why? (1.5)
- (b) Define Peak Inverse voltage of a diode in rectifier circuit. Give its significance. (1.5)

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[P.T.O.]

(c) Why reverse saturation current is more in configuration as compared to CB configuration?

(d) What do you mean by current mirror in BJT.

(e) How does the current vary with gate voltage saturation region of FET?

(f) Compare small signal and large signal equivalent circuit of FET.

(g) What do you mean by direct coupled amplifier? What are its applications?

(h) Differentiate between voltage and power amplifier.

(i) Define CMRR and slew rate, what should be their values. Justify your answer.

(j) Differentiate between active and passive filters. What are the advantages of increasing order of a filter?

(1.5)

PART-B

2.

(a) Draw circuit diagram of a rectifier using two diodes and one load resistance and calculate (i) V_{dc} , (ii) V_{rms} , (iii) Ripple factor and (iv) Rectification efficiency. (8)

(b) Draw outputs of the following circuits:

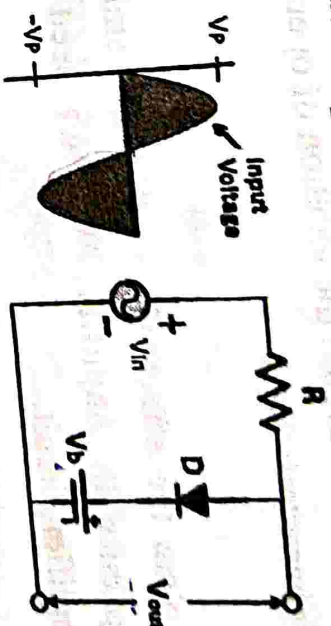


Figure 1

Clamping Networks

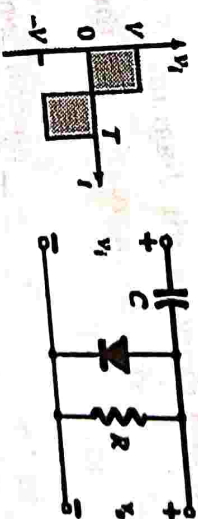


Figure 2

3.

(a) Draw input and output characteristics curve of CB configuration of BJT. Indicate Active, cut off, saturation and breakdown regions. Explain the shape of curves qualitatively. (8)

(b) Derive an expression for input resistance, current gain and voltage gain of CE amplifier. (7)

4.

(a) Explain and draw output and transfer curve characteristics of enhancement type MOSFET. What you infer from these characteristics. Explain. (8)

[P.T.O.]

- (b) Draw and explain potential divider biasing circuit of MOSFET. And find the location of operating point on its characteristics. (7)

5. (a) Explain the effect of coupling and emitter by pass capacitor in amplifier. Why we need both in an amplifier circuit. (8)

(b) Explain characteristics of an ideal Op-Amp with their significance. Draw its transfer characteristics. (7)

6. (a) Explain and draw circuit diagram of a Wein bridge oscillator. Derive an expression for the frequency of Wein bridge oscillator. (8)

(b) What do you mean by lead /lag compensator. Explain the circuit diagram and working of lead/lag compensator using Op-Amp. (7)

7. (a) Draw the diagram of triangular wave generator using Op-Amp. And find out the expression for the frequency of oscillations. (8)

(b) Draw and explain circuit diagram and waveforms of zero crossing and peak detectors using Op-Amp. (7)

Dec. 2018

B.Tech. IIIrd Semester

**EFFECTIVE TECHNICAL COMMUNICATION
(HSMC-01)**

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
- (ii) *Answer any four questions from Part -B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. Write short notes on :

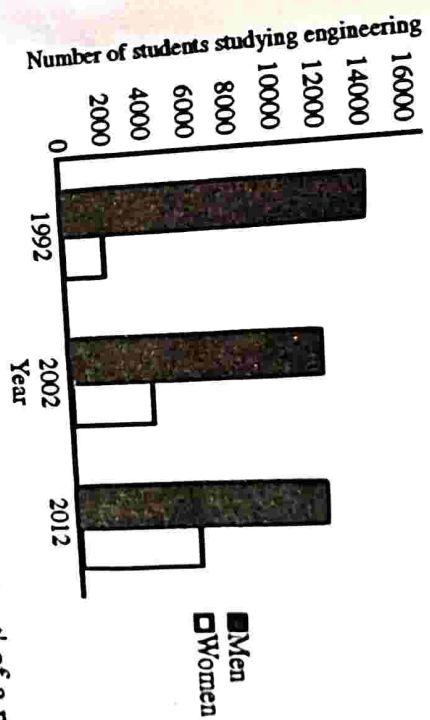
- (a) Argumentative discourse. (1.5)
- (b) Rapid reading. (1.5)
- (c) Ergonomics. (1.5)
- (d) Localization. (1.5)
- (e) Differentiate between public speech and group discussion. (1.5)
- (f) Note taking. (1.5)
- (g) Hypothesis. (1.5)

- (h) What is etiquette?
- (i) The coach (agrees, agree) that I should practice in the off-season.
- (j) Complete the sentence:
Sameer told me that _____.

PART-B

2. (a) Imagine that you are a consultant for admissions to engineering colleges. A prestigious engineering college is recently not getting sufficient admissions. The college wants to hire your services. Write a proposal detailing how you will increase admissions in the college. (15)
- (b) Draft a memo for circulation to all the students of your university/college announcing anti-ragging campaign in order to ensure a safe environment. (10)
3. (a) List the points that should be borne in mind for using visual aids in an oral presentation. (5)
- (b) The values we hold do not always align with our actions. Some values are difficult to live upto, or other priorities get in the way. Identify those values and present your arguments accordingly. (10)
4. What are the distinguishing features of written technical communication. How is it different from general writing? (15)

- (a) The bar chart below shows the number of men and women studying engineering in Australian Universities. Summarise the information in the chart by selecting and reporting the main features. Make comparisons where relevant. (5)



- (b) Discuss the format of a 'progress report' of a project. Mention its essential elements. (10)
6. (a) How should we deal with difficult callers in a telephonic conversation? (5)
- (b) Compare life in today's technological age with life two centuries ago aided only by 'very simple technology'. (250-300 words) (10)
7. Write a letter to the General Manager, Haryana Roadways, Gurugram asking him for starting a local bus from university to the city. (15)

Dec. 2018**B.Tech. (CE/IT/CSE), IIIrd Semester****DIGITAL ELECTRONICS****(ESC-302)****Time : 3 Hours]****[Max. Marks : 75****Instructions:**

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
- (ii) *Answer any four questions from Part -B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Determine the single error correcting code for the BCD number 0110 (information bits) using even parity. (1.5)
- (b) What are some of the commonly used series of TTL? (1.5)
- (c) What is meant by temporal code? (1.5)
- (d) How many address lines are required for a 4K ROM? (1.5)
- (e) Write the applications of decoder. (1.5)

- (f) What are the RAM timing parameters that determine its operating speed? (1)
- (g) What is the disadvantage of weighted resistor DAC? (1)
- (h) Find the value of x . $(786.983)_{10} = (x)_{16}$ (1)
- (i) What is meant by literal? (1)
- (j) How will you SET/CLEAR a Flip-Flop asynchronously? (1.5)

PART-B

2. (a) What is the necessity of interfacing in logic circuits? (1.5)
- Explain interface between TTL to CMOS circuit.
- (b) Draw the internal structure of a TTL Tristate gate and explain its operation. (10)

3. (a) Design an Excess-3 to BCD code converter using minimum number of NAND gates. (5)
- (b) Simplify the following Boolean function using tabulation method. (8)
- $F(A, B, C, D) = \sum m(0, 2, 3, 6, 7, 8, 10, 12, 13)$

4. (a) With the aid of diagram, explain the operation of successive approximation ADC. (7)
- (b) Explain the important specifications of DAC. (8)

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- (a) Minimize the given expression using k-map and realize with NAND gates. (7)
- $F(A, B, C, D, E) = \sum m(8, 9, 10, 11, 13, 15, 16, 18, 21, 24, 25, 26, 27, 30, 31)$ (10)
- (b) A 4-bit D/A converter produce an output voltage of 4.5 V for an input code of 1001. What will be the value of the output voltage for an input code of 0011? (5)

6. (a) Convert the RS flip-flop to JK flip-flop. (7)
- (b) Design a 3-bit up-down synchronous counter using T flip-flop. (8)

7. (a) Draw the basic circuit of a ROM cell and explain its working. (7)
- (b) Draw and explain the block diagram of PLA. (8)

Handwritten calculations:

$$10 - 10 = 0$$

$$11 - 11 = 0$$

$$12 - 12 = 0$$

$$13 - 13 = 0$$

$$14 - 14 = 0$$

$$15 - 15 = 0$$

$$16 - 16 = 0$$

$$17 - 17 = 0$$

$$18 - 18 = 0$$

$$19 - 19 = 0$$

$$20 - 20 = 0$$

$$21 - 21 = 0$$

$$22 - 22 = 0$$

$$23 - 23 = 0$$

$$24 - 24 = 0$$

$$25 - 25 = 0$$

$$26 - 26 = 0$$

$$27 - 27 = 0$$

$$28 - 28 = 0$$

$$29 - 29 = 0$$

$$30 - 30 = 0$$

$$31 - 31 = 0$$

002303**January 2023****B.Tech. - III SEMESTER****Effective Technical Communication (HSMC-01)****Time : 3 Hours]****[Max. Marks : 75****Instructions :**

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Narrative Discourse. (1.5)
- (b) Ergonomics. (1.5)
- (c) Localization. (1.5)
- (d) Abstract. [1.5]
- (e) Define Solicited Proposal. (1.5)
- (f) Define Agenda. (1.5)

002303/1395/111/541**[P.T.O.]**

- (g) Importance of Feedback.
- (h) Collaborative writing.
- (i) Minutes of Meeting.
- (j) Expand AIDA.

PART-B

2. (a) What are the distinguishing features of written technical communication? How is it different from general writing? (1)
- (b) List the points that should be borne in mind for using visual aids in an oral presentation. (10)

3. (a) Discuss email etiquettes and enlist the features of a well drafted email. (5)
- (b) Draft a memo for circulation to all the employees of an organization announcing "Swachh Bharat Abhiyan" campaign in order to ensure a cleaner and safer environment. (5)

4. You are Librarian, Pinnacle Institute of Technology, New Delhi. Draft a business letter to place an order for engineering books from Super Publishers, New Delhi stating titles, quantity, terms and conditions applicable to you. (10)

- (a) Explain the skills and personality traits assessed in group discussion. (5)
- (b) Why is body language important for the interview? What are the points that an interviewee should consider for attending the interview? (10)

- (a) Discuss various techniques to make good impression in group discussion. (10)
- (b) Explain the merits of writing effective proposals. (5)

What are the various parts of the structure of a report? Explain in detail. (15)

January 2023

B.Tech(CE/CSE/IT/CSE(AIML) -III SEMESTER
Analog Electronic Circuits (ESC-301)

Max. Marks:75

Time: 3 Hours

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- 1 (a) What is breakdown voltage? (1.5)
- (b) In a BJT, $I_{co} = I_{cbo} = 2\mu A$. Given $\alpha = 0.99$, the value of $I_{ceo} = ?$ (1.5)
- (c) A Differential amplifier has a differential gain of 20,000. CMRR=80dB. The common mode gain is given by? (1.5)
- (d) If peak voltage on a center tapped full wave rectifier circuit is 5.7V and diode cut-in voltage is 0.7, then peak inverse voltage on diode will be? (1.5)
- (e) A certain noninverting amplifier has R_i of 1Kohm and R_f of 100 K ohm. The closed-loop voltage gain is? (1.5)
- (f) What is an angle of phase shift for each designed RC network in phase shift oscillator circuit? (1.5)
- (g) What is dimension of h_{ie} parameter? (1.5)
- (h) What is Pinch off voltage in a FET? (1.5)
- (i) What is phase difference between the input and output voltages in a common emitter arrangement? (1.5)
- (j) The output of a particular op-amp increases 8V in 12 microsec. The slew rate is? (1.5)

PART -B

- 2 (a) Draw & explain the circuit diagram of clamping circuit. (10)
- (b) What is PIV? Draw and explain the working of full wave rectifiers. (5)
- 3 (a) Discuss the working of op-amps as A - D Converter (8)
- (b) Explain the circuit diagram of BJT as a Common Emitter amplifier. (7)
- 4 Explain the structure of MOSFET and its V-I characteristics. (15)
- 5 (a) Explain the characteristics of an op amp. (5)
- (b) Describe the block diagram of instrumentation amplifier and its applications. (10)
- 6 (a) Explain op-amp as an active filter. (7)
- (b) Write a short note on: (i) Ideal op-amp. (8)
- (ii) Inverting amplifier
- 7 Explain the working of (i) Hysteretic comparator (ii) Square wave generator (15)

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JANUARY- 2023

B.Tech.III SEMESTER

Digital Electronics (ESC-302/ESCH-302)

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) Define Volatile and Non-volatile memory. (1.5)
- (b) Convert $(109.125)_{10} = ()_2$ (1.5)
- (c) Give the definition of Decoder. (1.5)
- (d) What is Modulus Counter. (1.5)
- (e) What are the advantages of CMOS logic families used for implementing logic gates? (1.5)
- (f) Draw only logic diagram of 4 to 1 multiplexer. (1.5)
- (g) Enlist significant specifications of ADCs. (1.5)
- (h) Draw only logic diagram of J-K flip-flop (1.5)
- (i) An 8-bit DAC has full- scale voltage range from 0 to 5.12V. What is the output change per bit. (1.5)
- (j) What is sequential memory ? (1.5)

PART -B

- Q2 (a) Minimize the following function using K-map. (10)
- $$F(A,B,C,D) = \sum m(0,1,2,3,5,7,8,9,11,14)$$
- (b) Design half-adder and full-adder using only NAND-Gates. (5)
- Q3 (a) Convert the RS flip-flop to D flip-flop. (5)
- (b) Explain Ripple counter with suitable digram. (10)
- Q4 (1) Simplify Boolean expression using Demorgans theorem. (15)

$$Y(A,B) = \overline{(A+B)}(\overline{A+B})$$

(II) Implement Boolean expression using only universal gate.

$$Y = \overline{((A+B)C)}$$

(III) Convert Boolean function into standard SOP

$$Y(A,B,C) = AB + \overline{A}C + BC$$

(IV) Interfacing CMOS and TTL Devices.

(V) Convert $(762.231)_8 = ()_{10}$

Q5.(a) Explain programmable logic array(PLA) and give advantages of PLDs. (5)

(b) Briefly explain the working of Dynamic RAM cell. Also explain MROM, PROM, EPROM, EEPROM. (10)

Q6(a) Implement the following function using 8:1 MUX

$$F(A,B,C,D) = \sum m(0,1,3,4,7,8,9,11,14,15) \quad (10)$$

(b) Explain 4-bit SISO shift Register (5)

Q7. Explain 3-bit flash type or parallel comparator ADC. with suitable dig. And truth table. And give its advantages and disadvantages. (15)

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Sr. No. 018301

January-2023

B.Tech. Hindi (CE/IT/CSE) -3rd SEMESTER

Calculus and Linear Algebra (BSC-301/BSCH 301)

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) Find the solution of the differential equation $\frac{d^2y}{dx^2} - y = 5$. (1.5)
- (b) Write the general form of the Bernoulli's differential equation. (1.5)
- (c) Find the Maclaurin's series expansion of the function e^x . (1.5)
- (d) Define convergence of a sequence of real numbers. (1.5)
- (e) Find the solution of the differential equation $\frac{dy}{dx} - y = 5$. (1.5)
- (f) Find the gradient of the function g , where $g(x, y, z) = 3x^2y - y^3z^3$ at the point $(1, -2, 1)$. (1.5)
- (g) Find the direction derivative of the function ϕ , defined as $\phi(x, y, z) = x^2yz + 4xz^2$ at the point $(1, -2, 1)$, in the direction of the vector $2\vec{i} - \vec{j} - \vec{k}$. (1.5)
- (h) State Green's Theorem. (1.5)
- (i) Evaluate the integral $\int_0^1 \int_1^2 x(x+y) dy dx$. (1.5)
- (j) Find the Wronskian of the functions e^x and e^{3x} . (1.5)

PART -B

- Q2 (a) Find the Taylor's series expansion of the function $\cos x$ about $x = \frac{\pi}{4}$. (7)

(b)

Test the convergence of the following series

(i) $\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^{-n^2}$

(ii) $\sum_{n=1}^{\infty} (-1)^n \frac{1}{\sqrt{n}}$

Q3 (a) Find the extreme values of the function $f(x, y) = x^3 + y^3 - 12x - 3y + 20$. (7)

(b) If $u = (x - y)(y - z)(z - x)$, then prove the following: (8)

(i) $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$

(ii) $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 3u$. (7)

Q4 (a) Evaluate the integral $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$ by changing the order of integration.

(b) Using Green's theorem evaluate $\int_C (x^2 - y^2) dx + 2xy dy$, where C is the closed curve of the region bounded by $y^2 = x$ and $x^2 = y$. (8)

Q5 (a) Find the General solution of the differential equation (7)

$y'' + 16y = 32 \sec 2x$, using the method of variation of parameters.

(b) Find the solution of the differential equation (8)

$2x^2 y'' + 3xy' - 3y = x^3$. (7)

Q6 (a) Solve the following differential equation:

$p^2 + 2xp - 3x^2 = 0$,

where $p = \frac{dy}{dx}$.

(b) Solve the differential equation $(2x - y)dy + (2y + x)dx$. (8)

Q7 Find the series solution in series of powers of x of the following differential equation (15)

$4x \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + y = 0$.

January 2023
B.Tech- III SEMESTER
Data Structures & Algorithms (PCC-CS-301)

Max. Marks:75

Time: 3 Hours

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) What is time space tradeoff in algorithms? (1.5)
 (b) What are the advantages of circular linked list? (1.5)
 (c) The inorder and preorder traversal of a binary tree are d b e a f c g and a b d e c f g, respectively find the postorder traversal. (1.5)
 (d) What are the advantages of B+ Tree? (1.5)
 (e) What is bubble sort? (1.5)
 (f) What is BFS? (1.5)
 (g) What is priority queue? (1.5)
 (h) What are various data structure operations? (1.5)
 (i) What are various tree rotation techniques in AVL? (1.5)
 (j) What are the advantages of threaded binary tree? (1.5)

PART -B

- Q2 (a) Explain Linear Search and binary search technique and compare complexity of both the techniques. (10)
 (b) What are asymptotic notations? Explain different types also. (5)
- Q3 (a) What is circular queue? What are its applications? Explain the underflow and overflow conditions in circular queue. (5)
 (b) Write various steps and stack values to convert $((A + B) - C * (D / E)) + F$ expression to postfix. (10)
- Q4 (a) What are linked list. Write algorithm for insertion in link list after a specified element. (10)
 (b) Construct AVL tree for the following data 21,26,30,9,4,14,28,18,15,10,2,3,7 (5)
- Q5 (a) What are collision avoidance techniques in hashing? (5)
 (b) Explain the following: (10)
 (i) Push operation in stack
 (ii) Delete operation in Queue

Q6 (a) Write function for binary search tree inorder traversal.

(b) Write code/algorithm for doubly linked list reverse traversal.

Q7 (a) Write algorithm/code for following techniques

(i) QuickSort

(ii) MergeSort

(iii) Depth First Search

Roll No.....

Delhi College of Technology & Management, Palwal

Pre University Test, Jan 2023

CSE(3rd semester)

Subject- Analog Electronics Circuit

SET-A

Time: 3 Hrs

MM:75

Note: Attempt 5 questions in all. Q1 are compulsory. Attempt any four from remaining Six questions.

PART-A

Q1. Answer the following Questions :(1.5x10)

- (a) Write short note on BJT as a switch.
- (b) Write down ripple factor and efficiency for half wave rectifier.
- (c) Draw structure of Common Base BJT.
- (d) Write the difference between NMOS and PMOS.
- (e) Write Barkhausen criteria.
- (f) Draw internal structure of operational amplifier.
- (g) Write about inverting amplifier.
- (h) List any 5 ideal characteristics of op-amp
- (i) Explain the principle of transistor as an amplifier.
- (j) Write about non inverting amplifier.

Q2.a) write working principle of full wave rectifier with neat and clean

diagram & also find ripple factor.

(10)

b) Write short note on zener breakdown.

(5)

Q3. (a) Define clamper. Explain the working of a positive clamper with waveform (10)

b) Explain CE configuration of BJT. (5)

Q4. a) Describe the working of class-AB amplifier (5)

b) Define the following w.r.t. op-amp: (2x5)

i) input offset voltage

ii) CMRR

iii) input impedance

iv) slew rate

v) PSRR

Q5 Explain the working of Schmitt trigger circuit using op-amp; and also sketch the hysteresis plot. (15)

Q6 a) Explain the working of wean-bridge oscillator with neat diagram. (10)

b) Explain the role of RC network in RC phase shift oscillator and write and expression for frequency of oscillation (5)

Roll No.....

Delhi College of Technology & Management, Palwal

Pre University Test, Dec 2022

B.TECH CSE(3rd semester)

Subject- Data Structure & Algorithms

SET-A

Time: 3 Hrs

MM:75

Note: Attempt 5 questions in all. Q1 are compulsory. Attempt any four from remaining Six questions.

PART-A

Q1. Answer the following Questions:(1.5x10)

- (a) What is Data structure?
- (b) What do you mean by algorithm complexity ?
- (c) What is linked list?
- (d) Explain the BST?
- (e) Discuss the Types of Linked list.
- (f) What is Asymptotic Notation?
- (g) What is sorting? Also Discuss the Types of sorting techniques?
- (h) What is Hashing? Also discuss about the types of linked list.
- (i) Priority Queue?
- (j) What is Polish notation?

Q2.a) Write an algorithm to insert and delete an element from array. Explain your algorithm by suitable Representation of one-dimensional array in c?

b) Define binary search tree. Write an algorithm to search an element in Binary search tree.

Q3. a) What is linked list? How it is represented in memory?

Briefly explain header linked list.

b) Briefly explain the Bubble Sort with example.

Q4. a) What is AVL Tree? Also Explain the AVL tree with Example

b) Convert following arithmetic infix expression into post using stack :

$$A*(b+c) + (b/d) * a + z * u$$

(c) What is Circular single linked list? Explain the Basic operations with example?

Q5 a) Suppose the following list of numbers is inserted in order into empty Binary search tree. (3)

8,4,9,23,5,11,3,14,1,22,10. (10)

i) Find the final Tree T.

ii) Find the Preorder, Inorder and Post order

Level order traversal of tree.

iii) Write Algorithm for Preorder, Postorder, Inorder. (5)

b) What is Graph? Also discuss the how many ways of Graph representation? (3)

Q6 a) What is Graph? And Its Terminology.

b) What is Time Space Trade-off? And also discuss Big-oh Notation. (7)

c) Explain the DFS Algorithm with Example. (5)

Roll No.....

2019

Delhi College of Technology & Management, Palwal

Pre University Test, Jan 2023

CSE(3rd semester)

Subject- Maths-III (BSE-301)

Time: 3 Hrs

MM:75

Note: Attempt 5 questions in all. Q1 are compulsory. Attempt any four from remaining Six questions.

PART-A

Q1. (a) Define order & degree of diff. equations .

(b) What is difference between ordinary and partial differential equations

(c) Define ordinary & singular point.

- (d) Find the equation of the tangent plane and the surface of $2xz^2 - 3xy - 4x = 7$ at $(1, 1, 1)$.
- (e) Solve $y(xy + 2x^2y^2) dx + x(xy - x^2y^2) dy = 0$
- (f) Solve $\frac{dy}{dx} - \frac{dx}{dy} = \frac{x}{y} - \frac{y}{x}$. (solve for p).
- (g) Evaluate $\int_0^1 \int_0^1 \int_0^1 x(x^2 + y^2) dy dx dz$.
- (h) Solve $\int_0^1 \int_0^1 \int_0^1 x^2 y dz dy dx$
- (i) Find the P.L. of $(D^2 + 5D + 6)y = e^x$.
- (j) Solve $(D^4 + 4)y = 0$.

2. PART-B (1.5x10)

- (a) Test for the convergence of the series $\sum_{n=1}^{\infty} \frac{4.7 \dots (3n+1)}{1.2 \dots n} x^n$.
- (b) State, with reasons, the values of x for which the series $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \dots$ converges.
- (c) Prove that the rectangular solid of maximum volume which can be inscribed in a sphere is a cube.
- (d) Show that $V^2(r^n) = n(n+1)r^{n+2}$.

4. (a) Evaluate $\int_0^{\pi} \int_0^{\pi} \frac{r dr d\theta}{\sqrt{a^2 + r^2}}$ over one loop of the lemniscates $r^2 = \cos 2\theta$. (8)

- (b) Apply Stoke's theorem to evaluate $\int (y dx + z dy + x dz)$, where c is the curve of intersection of $x^2 + y^2 + z^2 = a^2$ and $x + z = a$. (7)

5. (a) Solve $(1 + y^2) dx = (\tan^{-1} y - x) dy$. (8)
- (b) Solve $y = 2px + p^2$. (7)

6. (a) Solve by the method of variation of parameters, $(D^2 - 2D + 1)y = e^x \log x$. (8)
- (b) Find series solution about $x = 0$ of the differential equations $2x(1-x)y'' + (1-x)y' + 3y = 0$. (7)
7. (a) Express the vector field $2y\mathbf{i} - z\mathbf{j} + 3x\mathbf{k}$ in spherical polar coordinate system. (8)
- (b) solve cauchy euler equation $x^2 y'' + x y' + y = \log x \sin(\log x)$. (7)

Delhi College of Technology & Management, Palwal

Pre University Test, Dec 2022

B.Tech CSE(3rd semester)

Subject- DE

SET-A

Time: 3 Hrs

MM:75

Note: Attempt 5 questions in all. Q1 are compulsory. Attempt any four from remaining Six questions.

PART-A

(1.5 X 10 =15)

1. (a) Find the gray code of the binary no. (1110111).
- (b) Find the Decimal equivalent of (111100101),
- (c) Write the range of 3 bit unsigned number and signed numbers
- (d) Explain duality with Example.
- (e) Explain the Half Adder.
- (f) Represent -222 in signed 2's complement notation.
- (g) Convert BCD 268 into binary, octal and hexadecimal representation.
- (h) Find the range of 7 bit 2's complement no.
- (i) How can the parity bit be used to check a given code word in odd parity system?

(j) Why is floating point number more difficult to represent than a fixed point integer?

(3X5)

6. Attempt any 3 Questions

PART B

2. (a) Simplify and minimize using K-Map the following a function
Draw circuit diagram of minimize expression

$$F = m(0,3,8,10) + d(2,7,11)$$

(b) Find the POS form for the boolean function $F(A,B,C,D) = (0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15)$

3. (a) Design a 16 x 1 multiplexer using 4x1 multiplexer. Explain with proper tabulation.

(b) Implement the function using Multiplexer

$$F = m(0,1,3,4,8,9,12,14,15)$$

(c) Explain Half subtractor. Design half subtractor using Nand gate.

a) Multiplexer and Demultiplexer

(3)

b) Flip-Flop and Latch.

c) Synchronous counter and Asynchronous.

5. (a) Design a 4-bit magnitude comparator with three outputs:

$A > B$, $A < B$ and $A = B$

(b) Implement a BCD to seven segment converter.

(7)

(a) Explain 7 segment display with proper Truth Table

(b) Design octal to binary encoder.

(c) Define Universal gate and prove that NOR gate is an universal gate.

(d) Explain Full Subtractor also draw the circuit diagram for borrow and difference.

(5)

7. a) Explain the Race around condition and master slave configuration.

(5)

b) Write down Excitation table of J-K flip flop and T flip flop.

(5)

c) Explain ring counter in details.

C21026

Paper Id:

Roll No:

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Delhi college of Technology & Management Palwal
B TECH (SEM III) Pre-University Test, Jan 2023
TECHNICAL COMMUNICATION

Time: 3 Hours

- Note: 1. It is compulsory to answer all the questions of Part -A in short.
- Answer any four questions Part-B in Detail.

Total Marks: 75

SECTION A

- Attempt *all* questions in brief.

1*5 x 10 = 15

Q no.	Question	Marks
a.	Define Technical Communication with example.	1.5
b.	What is thesis / project writing?	1.5
c.	Outline the structure of Technical Proposal.	1.5
d.	Presentation is a tool to inform and persuade, share your views?	1.5
e.	Inform about public speaking?	1.5
f.	Share the method to overcome stage fear?	1.5
g.	Explain the argumentation?	1.5
h.	What is socio-linguistic competence?	1.5
i.	Organization structure?	1.5
j.	Rapid Reading?	1.5

PART - B

Q2 Write a detailed note on important features of technical communication. (15)

Q3. Write a proposal for receiving government grant for setting up a Manufacturing unit for surgical appliances. (15)

Q4. a) How Focus, Content and Style make seminar/conference presentation

Skills strong? (10)

b) Describe the classroom presentation, its style and methods. (5)

Q5 a) what do you mean by public speaking. Explain the importance of public speaking for a good businessman? (7)

b) Write a short note on presentation skills. Explain oral presentation and self presentation? (8)

Q6. What do you mean by the term 'Values & belief'? Briefly explain the natural characteristics of a man with high values and belief. (15)

Q7. What do you mean by Etiquettes? Describe office etiquettes and telephone Etiquettes. (15)

Q8. Write a note on: - (5*3)

- Perception and attitude
- Self Assessment
- Minutes of meeting