EC-L

Total No. of Questions: 22 Total No. of Pages: 02

Roll No. _____ Paper Code 3E1206

B.Tech. III-Sem (Main & Back) 2025-26
Aeronautical Engineering
3AN2-01 Advanced Engineering Mathematics-I
AN,AG,AE,CE,CR, EC,EI,ME,MH,PI,PT,BM
3E1206

Time : 3 Hours Maximum Marks : 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1._____ 2._____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory . T-435 **10x2=20**

1. With usual notation prove that $\mu = E^{\frac{-1}{2}} + \frac{1}{2}\delta$
2. Write Newton cotes Quadrature formula.
3. Write the corrector formula of Adam's predicator corrector method.
4. Define transcendental equation with examples.
5. Find Laplace transform of $\cos^2 2t$.
6. Write convolution theorem for Inverse Laplace transform.
7. Write Fourier sine transform of $\frac{e^{-ax}}{x}$.
8. T-435 Write Fourier cosine transform of $f(t)$.
9. Find z-transform of $cas\ h\ n\theta$.
10. Find inverse z-transform of $\frac{4z}{z-a}$, $|z| > |a|$

Part-B
T-435

(Analytical/Problem solving questions)

Attempt any five questions. **5x4=20**

1. Use stirling formula to find Y_{28}, given $y_{20}=49225, y_{25}=48316,$ $y_{30}=47236, y_{35}=45926, y_{40}=44306$.
2. Find the root of $x^4-x-10=0$ which is nearer to x=2 by Newton Raphson method.
3. Solve $\frac{d^2x}{dt^2}+9x=\cos 2t$, if $x(0)=1, x\left(\frac{\pi}{2}\right)=-1$
4. Use Euler's method to solve $\frac{dy}{dx}=\frac{y^2-x}{y^2+x}$ given y=1 at x=0 also. Find y for x=0.1, 0.2 and 0.3.
5. Find Laplace transform of $\sin\sqrt{t}$
6. Find the Fourier transform of $e^{-|x|}$ hence show that

$$\int_0^\infty \frac{x\sin mx}{1+x^2}dx=\frac{\pi e^{-m}}{2}, m>0$$

7. Find Z-transform of following - (i) n^2e^{an} (ii) $\sin(3n+5)$

Part-C
T-435

(Descriptive / Analytical / Problem Solving/ Design question)

Attempt any three questions. **3x10=30**

1. Find value of $\int_1^2 \frac{1}{x}dx$ by (i) Simpson's 1/3 rule (ii) Trapezoidal rule
2. Using fourth order Runge-Kutta method with one step, compute y(0.1) to five places of decimal, if $y'=0.31+0.25y+0.3t^2$ and $y=0.72$ when $t=0$
3. Apply convolution theorem to evaluate $L^{-1}\left[\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right]$
4. An infinite string is initially at rest and that the initial displacement is $f(x)$ $-\infty<x<\infty$. Determine the displacement y(x,t) of the string.
5. Using Z-transform solve $U_{n+2}-2U_{n+1}+U_n=3n+5$

Total No. of Questions: 22 Total No. of Pages: 04

Roll No. _____ Paper Code 3E1250

B.Tech. III-Sem (Main & Back) January-2026
Aeronautical Engineering
3AN1-02/ Technical Communication/
All Branches
3E1250

Time : 3 Hours **Maximum Marks : 70**

Attempt all Ten Questions from Part A. Five questions out of seven questions from Part-B and three questions out of five questions from Part-C

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory. **10x2=20**

Q.1 What is technical communication ?

T-435

Q.2 Identify two essential aspects of technical communication that ensure clarity and precision.

Q.3 Mention the primary communication skills for technical communication.

Q.4 What is the purpose of a technical manual ?

Q.5 Give the full form of Mom.

Q.6 Define the term "Information design."

T-435

Q.7 What do you know about the forms of technical discourse ?

Q.8 Name four different types of technical documents.

T-435

Q.9 Define the key function of technical reports in professional communication.

Q.10 What is a project proposal ?

Part B

(Analytical/Problem solving questions)

Attempt any Five questions **5x4=20**

Q.1 How can effective technical communication improve collaboration and decision - making in a workplace environment ?

Q.2 Draft an email to a company asking for more information about one of their new products. Use proper email format and polite, professional language.

Q.3 Based on the passage given below, make notes under the following heading. **The Evolution of Technical Communication**.

Technical communication has undergone significant changes over the past few decades, driven by advancements in technology and the evolving needs of industries. In the past, technical documents were often static, printed manuals with little room for updates. Today, technical communication is dynamic and interactive, often delivered through digital platforms. This shift has not only changed how information is presented but also how it is consumed.

One of the most important aspects of technical communication is clarity. Writers need to ensure that even complex information is presented in a way that is accessible to the intended audience. The requires careful consideration of language, structure, and design. Technical communicators must balance detail with simplicity, making sure that all essential information is included without overwhelming the reader.

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Moreover, the role of technical communicator has expanded. They are not just writers, but also information designers, editors, and even project mangers. With the rise of digital tools, technical communicators often collaborate with engineers, designers, and developers to create comprehensive user guides, product documentation, and online help

systems. The increased reliance on digital communication platforms, such as websites and mobile application, has also made it necessary for technical communicators to develop skills in content management, search engine optimization (SEO), and user experience (UX) design.

Q.4 Write an official note to inform all department heads about an upcoming meeting regarding the annual budget review. Include relevant information.

Q.5 Discuss effective editing strategies that can improve the clarity and professionalism of technical documents.

Q.6 Imagine you work in the It department of a company , and you need to request additional software licenses from a vendor. Write a formal letter requesting a price quote for 50 new licenses of a software product.

Q.7 Write a short article for the company newsletter about the importance of cybersecurity in today's digital world.

Part C

(Descriptive /Analytical/Problem Solving/Design question)

Attempt any three questions **3x10=30**

Q.1 Discuss how technical communication differs from general communication in detail ?

Q.2 Do as instructed :

A. Identify the grammatically correct sentence.

a. He don't have any idea about the project.

b. He doesn't has any idea about the project.

c. He doesn't have any idea about the project.

d. He doesn't having any idea about the project.

B. Choose a sentence that uses punctuation correctly.

a. Please submit your report by Monday, July 15, 2024.

b. Please submit your report by Monday July 15 2024.

c. Please submit , your report, by Monday July 15, 2024.

d. Please submit your report, by Monday, July, 15, 2024.

T-435

C. Which of the following sentences is correct ?

a. The technician fixed the printer quickly.

b. The technician quickly fixed the printer.

c. Quickly, the technician fixed the printer.

d. The technician fixed the printer that was broken in the office.

D. Select the correct passive voice form of the sentence : "the engineer completed the project".

a. The project is completed by the engineer.

b. The project has been completed by the engineer.

c. The project was completed by the engineer.

d. The project was completing by the engineer.

E. Which sentence uses a conjunction correctly ?

a. She studied hard, or she could pass the exam.

b. She studies hard, so she passed the exam.

c. She studied hard, for she could pass the exam.

d. She studied hard, nor she passed the exam.

Q. 3 Imagine you are applying for a technical writer position at a software company. Write a letter introducing yourself, explaining why you are a good fit for the role, and summarizing your skills.

T-435

Q. 4 Discuss the linguistic abilities required for effective technical communication

Q.5 Explain the steps in writing technical articles for print and online.

Total No. of Questions: 22 **Total No. of Pages: 02**

Roll No. _____ **Paper Code**
3E1222

B.Tech. III-Sem (Main & Back) January-2026
Biomedical Engg.
3BM4-04 Digital System Design
EC,EI,BM
3E1222

Time : 3 Hours **Maximum Marks : 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1._____ 2._____

Part-A
(Answer should be given up to 25 words only)
All questions are compulsory T-435 **10x2=20**

Q. 1 Convert the following code $4BAC_{10} = (....)_2$

Q.2 Convert $(1001)_2 = (....)_{Grey}$ and $(10110010)_{Grey} = (....)_2$

Q.3 Write the advantages of VHDL.

Q.4 Discuss the master Slave J-K flip flops.

Q.5 Design 16:1 Mux.

Q.6 Perform decimal substraction in 8421 code 342.7-108.9

Q.7 Compare combinational and sequential circuits.

Q.8 Compare different Logic families. T-435

Q.9 Realize X-OR gate using NAND gates only.

Q.10 Discuss the Quine McCluskey (tabulation) method.

Part B
(Analytical/Problem solving questions)

Attempt any Five questions. **5x4=20**

Q.1 Design a Mod-10 Asynchronous counter using J-K FFs.

Q.2 Implement the following function using *MUX* $F(x,y,z)=\Sigma m(0,2,3,5)$

Q.3 Explain in detail the different modelling styles of VHDL with suitable examples.

T-435

Q.4. Discuss the following in concern with Logic families and semiconductor Memories:

(i) Noise margin (ii) Propagation delay (iii) fan-in, fan-out

Q.5 Explain the (i) Encoder-Decoders (ii) BCD to 7 segment decoders.

Q.6 Draw a logic diagram of a 4-bit bidirectional shift register and explain its working.

Q.7 Draw a 4-bit binary adder subtractor and explain.

Part C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions. **3x10=30**

Q. 1 Simplify the given Boolean function in SOP or POS form using K-Map and draw the logic diagram using Only NOR gates

$$F(A,B,C,D)=\Sigma m(1,5,6,12,13,14,15)+d(2,4)$$

Q.2 Explain the Moore and Mealy Finite state machines with suitable examples.

Q.3 Discuss the following (i) Cache Memory (ii) Types of ROM (iii) FPGA.

Q.4 Write a short note on any two (a) TTL Logic (b) ECL (c) CMOS Digital logic families.

T-435

Q.5 Give the transition table and find the characteristics equation for the following flip flops:

(a) SR Flip Flop (b) J-K Flip Flop (c) D Flip Flop and briefly state the salient feature of each flip flop.

Total No. of Questions: 22 **Total No. of Pages: 02**

Roll No. _____ **Paper Code**
3E1225

B.Tech. III-Sem (Main & Back) January-2026
Biomedical Engg.
3BM4-05 Signal & Systems
EC,EI,BM
3E1225

Time : 3 Hours **Maximum Marks : 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1._____ 2. _____

Part-A
(Answer should be given up to 25 words only)

All questions are compulsory T-435 **10x2=20**

Q. 1 Classify the discrete time signals.
Q. 2 What do you mean by causality?
Q. 3 Define impulse response and step response of a system.
Q. 4 What is the difference between DTFT and DFT?
Q. 5 What is the eigen function in laplace transform?
Q. 6 Write the expression of Parseval's theorem.
Q. 7 What is the region of convergence in Z-transform?
Q. 8 Explain the state transition matric in brief.
Q. 9 Define the term Aliasing. T-435
Q.10 What is the difference between LSI and LTI system?

Part B
(Analytical/Problem solving questions)

Attempt any Five questions. **5x4=20**

Q. 1 Determine whether the following continuous time signals are periodic or not? If periodic, determine fundamental period. 2+2

(i) $x(t)=\cos 100\pi t+\sin 50\pi t$ (ii) $x(t)=\cos t+\sin\sqrt{2}t$

Q. 2 Determine whether the following discrete time systems are stable or not? 2+2

(i) $y(n)=x(n)+x(n-1)+y(n-1)$ (ii) $y(n)=r^n x(n), r>1$

Q. 3 Obtain the fourier transform of the signal, $e^{-at}u(t)$ and also calculate its magnitude and phase spectrum.

Q. 4 Obtain the DTFT of the following DT aperiodic sequence.
$x(n)=\delta(n)-3\delta(n-3)+2\delta(n-4)$

Q. 5 Determine the z-transform of the following sequence,
$(0.2)^n\{u(n)-u(n-4)\}$

Q. 6 Explain the laplace domain analysis and solution to differential equations and system behaviour. T-435

Q. 7 What do you mean by reconstruction? Explain and ideal interpolator for the reconstruction.

Part C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions. **3x10=30**

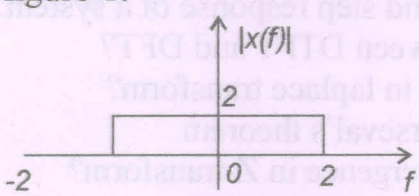
Q. 1 Determine whether the following signals are energy signals or power signals and calculate their energy or power.

(i) $x(n)=\left(\frac{1}{2}\right)^n u(n)$ (ii) $x(t)=rect\left(\frac{t}{T_0}\right)$ 5+5

Q. 2 For each of the systems, state whether the system is linear, shift invariant, stables causal.

(i) $y(n)=\log[x(n)]$ (ii) $y(n)=x(n^3)$ 5+5

Q. 3 Using Parseval's theorem the range of frequencies $(-f_1, f_1)$ where 50% of the signal energy lies. The spectrum of the signal is shown in figure-1.



(Figure-1)

Q. 4 The input and output of a causal LTI system are related by differential equation $\frac{d^2y(t)}{dt^2}+6\frac{dy(t)}{dt}+8y(t)=2x(t)$. Find the impulse response of the system.

Q. 5 Write short notes on the following (any one).

(i) The sampling theorem and its implications.

(ii) State-space analysis. T-435

(iii) Basis of eigen functions, ROC and poles & zeros of the system related to laplace transform.

Total No. of Questions: 22 **Total No. of Pages: 04**

Roll No. _____ **Paper Code**
3E1224

B.Tech. III-Sem (Main & Back) January-2026
Biomedical Engg.
3BM4-06 Network Theory
EC,EI,BM
3E1224

Time : 3 Hours **Maximum Marks : 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

(Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)
1. _____ 2. _____

Part-A
(Answer should be given up to 25 words only)
All questions are compulsory. T-435 **10x2=20**

Q.1 State the principle of Tallegen's theorem.

Q.2 A series RLC circuit has a capacitance, inductance and resistance of $0.018\mu F$, $2mH$ and 10Ω respectively. What is the resonant frequency (in kHz) of the circuit ?

Q.3 Three resistance of 6Ω are connected in parallel. What will be the equivalent resistance?

Q.4 Write the symmetry and reciprocity conditions for z-parameter of two-port network.

Q.5 Write the current relationship in time domain for a capacitive circuits.

Q.6 Write the voltage relationship in frequency domain for inductor having time domain $v(t) = Ldi/dt$.

Q.7 Write the any two properties of Laplace transforms.

Q.8 Calculate the transfer function of a system if the response is $c(t) = e^{-6t}$ for $t > 0$.

Q.9 Write the transfer function for low pass RL filter. T-435

Q.10 Find the fourier series for $f(x) = \sin^2 x$ over the range of $-\pi \le X \le \pi$.

Part-B
(Analytic/Problem solving questions)

Attempt any Five questions T-435 **5x4=20**

Q.1 Derive Transient and steady response of R-L-C circuit with Unit step functions.

Q.2 Define the terms (ii) Driving Point Impedance function (ii) Driving point admittance function.

Q.3 Find the current through the 5Ω resistor in the network of Fig.1

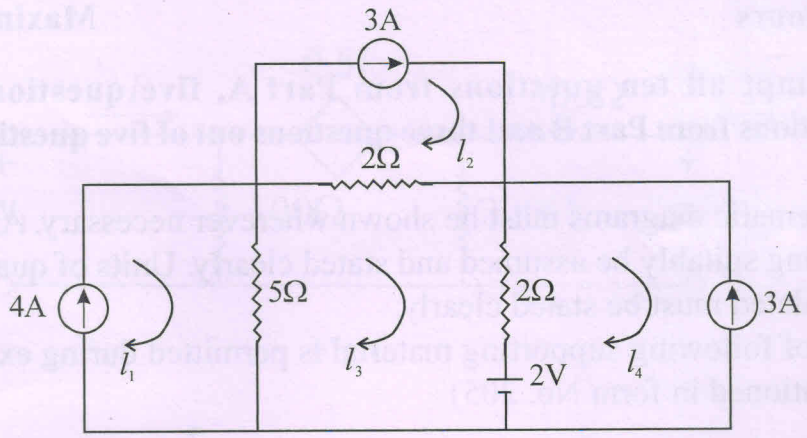


Fig.1

Q.4 State and prove the maximum power tranfer theorem. What is the condition for maximum power transfer to the load?

Q.5 What are initial conditions? Explain the initial conditions for resistor, capacitor and inductor. T-435

Q.6 The switch in network shown in Fig.2 is closed at t=0. Determine the voltage cross the capacitor.

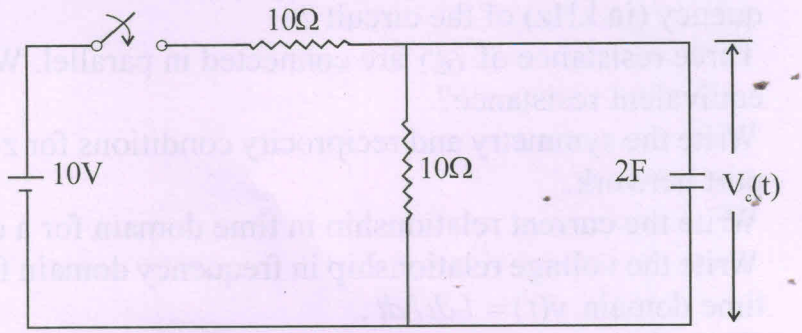


Fig.2

Q.7 Find Z parameter for the network given in Fig.3 and Determine whether the network is symmetrical and reciprocal.

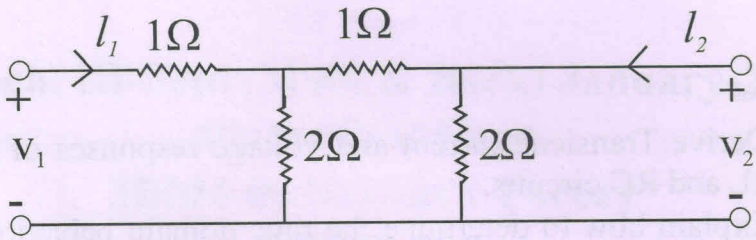


Fig.3

Part-C

T-435

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions **3x10=30**

Q.1 State the Thevenin's theorem. Also find the current in the 16Ω resistor for the network given in Fig.4

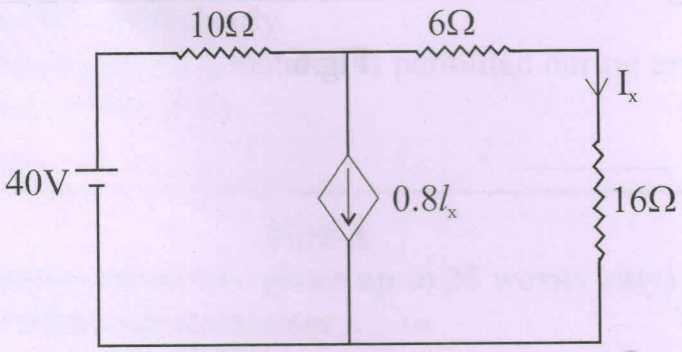


Fig.4

Q.2 Define the terms Network and Circuit. Using the nodal analysis find V_X in the circuit given in Fig. 5

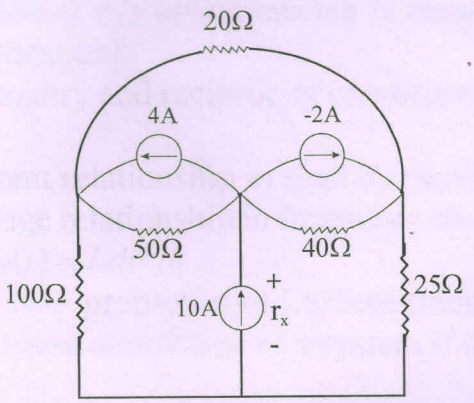


Fig.5

Q.3 State and prove time differentiation and time integration theorems in Laplace Transform. T-435

T-435

Q.4 (i) Derive Transient current and voltage responses of sinusoidal driven RL and RC circuits.

(ii) Explain how to determine the time domain behaviour from the pole-zero plots?

T-435

Q.5 Find Y parameters for the two-port network shown in Fig.6

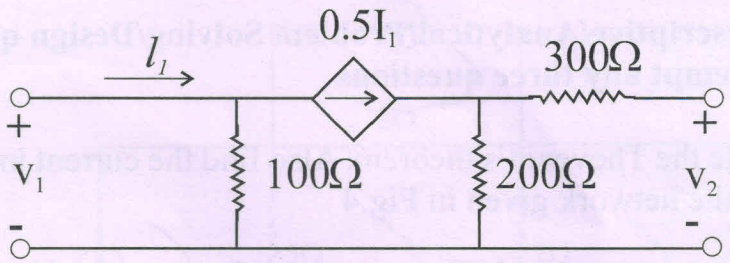


Fig.6

Total No. of Questions: 22 **Total No. of Pages: 02**

Roll No. _____ **Paper Code**
3E1223

B.Tech. III-Sem (Main & Back) January-2026
Biomedical Engg.
3BM4-07 Electronic Devices
EC,EI,BM
3E1223

Time : 3 Hours **Maximum Marks : 70**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1._____ 2._____

Part-A
(Answer should be given up to 25 words only)
All questions are compulsory **10x2=20**

Q. 1 Define direct and indirect band gap semiconductors with one example each.

Q. 2 Write two applications of Gallium Arsenide in electronic devices.

Q. 3 Write the continuity equation for carrier recombination.

Q. 4 Give two differences between LED and Photodiode.

Q. 5 What is depletion width for pn junction?

T-435

Q. 6 State the fermi-dirac distribution function and write its mathematical expression.

Q. 7 Differentiate between avalanche breakdown and Zener breakdown in a diode (any two points) T-435

Q. 8 What is sheet resistance in a thin semiconductor layer , and why is it expressed in ohms per square ($\Omega/\square$) instead of ohms?

Q. 9 Define anisotropic etching and isotropic etching with one example from each.

Q.10 Differentiate between depletion-type and enhancement - type MOSFET.

Part B
(Analytical/Problem solving questions)

Attempt any Five questions. T-435 **5x4=20**

Q.1 Describe the I-V characteristics of a PN junction diode with a neat diagram. Also explain the concepts of static resistance and dynamic resistance.

Q.2 Explain the energy band theory of solids and, based on it, distinguish between conductors, semiconductors and insulators.

Q.3 Derive the relations connecting the current gains α, β and γ for the three BJT configurations (CB, CE, CC).

Q.4. Show mathematically that, for an intrinsic semiconductor, the fermi level lies exactly in between the conduction band and the valence band.

Q.5 Explain in brief the processof photolithography used in IC fabrication. Write the key steps involved along with a neat diagram.

Q.6 Draw and explain the input and output characteristics of common base (CB) configuration and show all h-parameter on it.

Q.7 Discuss the C-V characteristics of MOS capacitor.

Part C
(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions. **3x10=30**

Q. 1 Derive the expression for the total density in a semiconductor, considering both drift and diffusion of charge carriers.

Q. 2 (a) Sketch the I-V characteristic of a solar cell and explain the meanigns of open circuit voltage and short circuit current.

T-435

(b) A solar cell produces a short circuit current of 30mA and an open-circuit voltage of 0.6 V under illumination . If the fill factor is 0.8, determine the maximum power output and the efficiency for an incident light power of 100m W/cm^2 on a 1cm^2 area.

Q. 3 Derive the Ebers-Moll equations of a BJT and explain the significance of each term. Sketch the circuit model, which satisfies these equations.

Q. 4 Describe the mechanism of carrier transport in n-channel and p-channel MOSFETs with the help of neat diagrams. Also explain the drain transfer characteristics in detail.

Q. 5 Explain the twin-tub (CMOS)fabrication process, including key steps, with a neat diagram.