4E1325

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4E1325

B. Tech. IV - Sem. (Main / Back) Exam., - 2025
Electronics & Communication Engineering
4EC2-01 Advanced Engineering Mathematics-II
EC, EI

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

Instructions to Candidates:

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 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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Write the necessary and sufficient condition for analyticity.

Q.2 What is Bilinear Transformation?

Q.3 State Cauchy's Integral formula.

Q.4 What is difference between Singular Point and Isolated Singularity?

Q.5 State Orthogonal properties of Bessel Functions.

Q.6 Write Rodrigue's formula.

Q.7 What is QR Decomposition Method?

Q.8 Define Linear Independence of Vectors.

Q.9 Determine Poles of $\frac{z}{\sin z}$.

Q.10 Determine the Residue of $\frac{z}{(z^2+1)^2\,(z+1)}$.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Expand $f(z) = \sin z$ in a Taylor's series about $z = \pi/4$.

Q.2 Evaluate the following integral by using Cauchy's integral formula -

$\oint_c \frac{e^{2z}dz}{(z+1)^4}$, where c is the circle $|z| = 3$

Q.3 Prove the recurrence relation of Bessel functions -

$\frac{d}{dx}[x^n J_n(x)] = x^n J_{n-1}(x),\ n \geq 0$

Q.4 Solve the equation $4\frac{d^2y}{dx^2} + qxy = 0$ by transformation of Bessel equations.

Q.5 Let $V_1 = (1, -1, 0)$, $V_2 = (0, 1, -1)$ and $V_3 = (0, 0, 1)$ be the element of R^3.

Show that the set of vectors $\{V_1, V_2, V_3\}$ is linearly independent.

Q.6 Show that the dot product of vectors defined on R^n is an inner product.

Q.7 Prove that the function $e^x(\cos y + i \sin y)$ is analytic and find its derivative.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 If f (z) is a regular function of z, prove that -

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4\,|f'(z)|^2$$

Q.2 Prove the relation $\omega = \frac{iz+2}{4z+i}$ transform the real axis in the z plane into a circle in the ω plane. Find the centre and radius of the circle and the point in the z plane which is mapped on the centre of the circle.

Q.3 Evaluate the real integral -

$$\int_0^{2\pi} \frac{\sin^2\theta}{5-4\cos\theta}\,d\theta$$

Q.4 Express $P(x) = x^4 + 2x^3 + 2x^2 - x - 3$ in terms of Legendre's polynomials.

Q.5 Evaluate $\oint \frac{z^2 e^{zt}\,dz}{z^2+1}$ $\quad |z| = 2$

where t is a quantity independent of z

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B. Tech. IV - Sem. (Main / Back) Exam., - 2025
Electronics & Communication Engineering
4EC2-04 Analog Circuits
EC, EI

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

Instructions to Candidates:

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 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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Define stability factor. What is the significance of it in transistor operation?

Q.2 What are the main characteristics of Cascode Amplifier?

Q.3 What is meant by power amplifier and why power amplifier is always preceded by a voltage amplifier?

Q.4 Why voltage series feedback is most commonly used in cascaded amplifiers?

Q.5 How does Hartley oscillator differ from Colpitt's oscillator in construction?

Q.6 Why does an Op-Amp have high CMRR?

Q.7 Why conversion of an analog signal into an equivalent digital signal is essential?

Q.8 What is a voltage follower?

Q.9 Op-Amp is used mostly as an Integrator than a differentiator, why?

Q.10 An amplifiers has a mid-band gain of 125 and a bandwidth of 250 kHz is 4% negative feedback is introduced, find new bandwidth and gain.

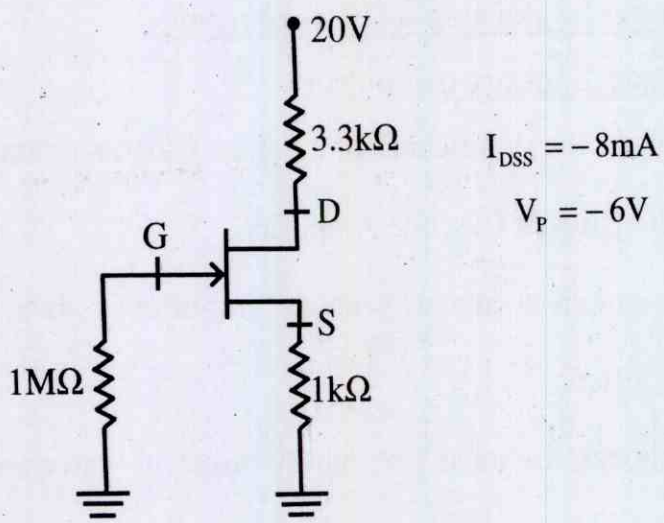
PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Determine I_D, V_{DS}, V_{GS} and V_D for the given below circuit –



Q.2 What do you understand by class A, B and C power amplifier?

Q.3 A 5 mV, 1kHz sinusoidal signal is applied to the Input of Op-Amp integrator for which R_1=100kΩ and C=1μf. Find output voltage.

Q.4 Describe Hartley oscillator circuit and explain its action.

Q.5 What do you understand by transistor biasing? Name the different methods used for transistor biasing and state their advantages & disadvantages.

Q.6 What are the different analog to digital conversion techniques? Explain any one of them in detail.

Q.7 How negative feedback in an amplifier helps in reducting the distortion and noise? Explain.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 (a) State the merits & demerits of negative feedback in amplifiers. [5]

(b) A negative feedback is reduce the noise from an amplifier by 80% - [5]

(i) What must be the percentage of negative feedback to accomplish this, if the input voltage gain is 100?

(ii) What will be the voltage gain with feedback?

Q.2 (a) Define filter. What is the difference between active & passive filter? [5]

(b) Explain switched capacitor circuits. [5]

Q.3 Draw the circuit diagram of RC phase shift oscillator and explain its operation by deriving expression for frequency of oscillation. [10]

Q.4 (a) Differentiate FET with BJT. [5]

(b) A class A power amplifier uses a transformer as a coupling device. The transformer has a turn ratio of 10 and the secondary load is 10 ohm. If the zero signal collector current is 100 mA. Find the maximum power output. [5]

Q.5 Write short notes on any two – [2×5=10]

(a) Cross over distortion

(b) Successive approximation ADC

(c) Feedback topologies

(d) Schmitt trigger and its application

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B. Tech. IV - Sem. (Main / Back) Exam., - 2025
Electronics & Communication Engineering
4EC4-05 Microcontrollers
EC, EI

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

Instructions to Candidates:

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 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 [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What is error in instruction MOVA, @R2? Explain it.

Q.2 How does an instruction differ from a directive?

Q.3 How many chips are required to make 2kB of memory with the help of 256×4 bit memory chip?

Q.4 How many address lines in a 4096×8 EPROM chip?

Q.5 Name three features of the 8051.

Q.6 Write a programme for two 16 bit addition with carry.

Q.7 Define timer operation.

Q.8 Name all software interrupts & explain in short.

Q.9 Draw timing diagram of LXI RP.

Q.10 Name the pins assigned to V_{CC} & G_{ND}. Explain the use of these pins.

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 What do you mean by Arithmetic Coprocessors?

Q.2 Discuss the need of timers in microcontrollers.

Q.3 Draw PIN diagram of 8051 microcontroller & explain following -

(A) $\overline{RD}$

(B) TXD

(C) $\overline{EA}/V_{pp}$

Q.4 With reference to 8085, explain the following -

(A) Clock signal

(B) ALE

(C) A_8–A_{15}

Q.5 Using architecture of RISC processor, explain working of it.

Q.6 Briefly explain concept & working of virtual memory & cache memory.

Q.7 Explain the architecture of following microprocessor in detail -

(A) 8085 microprocessor

(B) 8086 microprocessor

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss ARM microcontroller interface design with suitable diagram.

Q.2 How instruction sets are classified in 8085 microprocessor? Explain with suitable example of each.

Q.3 Explain in brief, working of A/D & D/A converters.

Q.4 Write an 8086 ALP to generate a delay of 1 minute if 8086 system frequency is 10 MHz.

Q.5 Compare the following pair of instructions with their opcodes, operations, instruction bytes, addressing modes, affected flags & the results -

(A) MVI A, OOH & XRA A

(B) XTHL & SPHL

(C) LDA 2000 H & LHLD 2000 H

(D) RRC & RAR

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B. Tech. IV - Sem. (Main / Back) Exam., - 2025
Electronics & Communication Engineering
4EC3-06 Electronics Measurement & Instrumentation

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

Instructions to Candidates:

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 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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Define accuracy and precision in the context of measurement.

Q.2 Differentiate between systematic and random errors.

Q.3 What is the significance of Gaussian error analysis?

Q.4 State the working principle of a Q meter.

Q.5 What is the purpose of shielding and grounding in electronic instruments?

Q.6 What is the difference between multibeam and multitrace oscilloscopes?

Q.7 Name two applications of a sweep frequency generator.

Q.8 What is the working principle of a thermocouple?

Q.9 Define the term "Probable error" in the theory of errors.

Q.10 How does a piezoelectric transducer work?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Describe the construction and working of a Cathode Ray Tube (CRT).

Q.2 Discuss the techniques used for measuring frequency and phase angle using a CRO.

Q.3 What are the advantages of a digital voltmeter over an analog voltmeter?

Q.4 Explain the working principle of a strain gauge and its applications.

Q.5 Describe the construction and working of a thermistor.

Q.6 What is a wave analyzer? Explain the working of a heterodyne wave analyzer.

Q.7 Explain the working principle of a load cell and its applications.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Explain the construction, working and applications of a vector impedance meter.

Q.2 Describe the working principle of a storage oscilloscope. How is it different from a sampling oscilloscope?

Q.3 Discuss the construction, working and applications of an LVDT (Linear Variable Differential Transformer).

Q.4 Discuss the principles of signal generation and analysis, including the working of sine wave generators and harmonic distortion analyzers.

Q.5 Explain the working principles of ultrasonic flow meters and their advantages over conventional flow measurement techniques.

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B. Tech. IV - Sem. (Main / Back) Exam., - 2025
Electronics & Communication Engineering
4EC4-07 Analog & Digital Communication
EC, EI

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

Instructions to Candidates:

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 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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Define the term white noise.

Q.2 Draw the frequency spectrum of AM waves.

Q.3 Define the frequency range use for FM.

Q.4 Give the definition of sensitivity and selectivity.

Q.5 Draw the block diagram of communication system.

Q.6 List the name of noises encountered in digital communication.

Q.7 Compare frequency modulation with phase modulation.

Q.8 Give the definition of VSB (Vestigial Side Band) modulation.

Q.9 List out the applications of pulse code modulation techniques.

Q.10 What are the advantages and disadvantages of Digital modulation schemes?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Sketch the frequency domain representation of DSB-SC and SSB-SC signals, draw and explain the principle of balance modulator.

Q.2 A mixer stage has a noise figure of 20 dB and this is preceded by an amplifier that has a noise figure of 9 dB and available power gain of 15 dB. Calculate the overall noise figure referred to input.

Q.3 Draw the block diagram of the transmitter and receiver of QPSK.

Q.4 Define the term equivalent noise figure and noise temperature, also derive an expression for equivalent noise figure and noise temperature of a cascaded amplifier.

Q.5 With a neat block diagram, explain the PCM transmitter and receiver.

Q.6 Explain the terms slope overload and granular noise in Delta modulation.

Q.7 Draw the block diagram of ADM and explain its working.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Discuss the following digital modulation schemes with signal constellations and block diagrams.

(i) BPSK (ii) QPSK (iii) ASK (iv) FSK

Q.2 Define the standard form of amplitude modulation, derive its equation and explain each term. Derive the spectral equation of AM wave and hence draw the AM spectrum. Explain the following in brief w.r.t. AM.

(i) Envelope detector (ii) Square law detector

Q.3 An angle modulated signals is of the form -

$$Xc(t) = 50\cos[2\pi \times t + 5\sin 2\pi \times 1.5 \times 10^3 t]$$

If $Xc(t)$ is a (i) frequency (ii) phase modulated signal.

Find the modulation index and the transmission bandwidth required.

Q.4 What is Inter Symbol Interference? Explain the causes, effects and remedies to reduce the ISI in communication systems. Why does raised cosine spectrum provide a means for zero ISI?

Q.5 Write a short note -

(i) Maximum likelihood sequence detection (Viterbi receiver)

(ii) Synchronization and carrier recovery for digital modulation

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