4E1325

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4E1325

B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRONICS AND 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 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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Write the polar form of Cauchy Riemann equations.

Q.2. Define analytic function.

Q.3. State the maximum modulus theorem.

Q.4. Define zeros of analytic function.

Q.5. Define the Removable singularity.

Q.6. Write the Jordan lemma for complex integration.

Q.7. Write the Rodriglue's formula for Legendre function.

Q.8. Define Bessel's function of first and second kind.

Q.9. Define vector subspace.

Q.10. Define Inner product space.

PART-B **[5x4=20]**

(Analytical/Problem Solving questions)

Attempt any five questions

Q.1. Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ satisfies Laplace equation and determine the corresponding analytic function $f(z)$.

Q.2. Show that the transformation $w = \frac{2z+3}{z-4}$ changes the circle $x^2 + y^2 - 4x = 0$ into the straight lines $4u + 3 = 0$.

Q.3. Evaluate $\int_c \frac{e^{2z}}{(z+1)^4} dz$, where c is a circle $|z| = 3$.

Q.4. Expand in the series, the function $f(z)=\frac{1}{z^2-3x+2}$ in the regions

(a) $|z|<1$

(b) $1<|z|<2$

(c) $|z|>2$

Q.5. Show that $\int_0^{2\pi}\frac{d\theta}{2+\cos\theta}=\frac{2\pi}{\sqrt{3}}$

Q.6. Show that when n is a positive integer $J_{-n}(x)=(-1)^n J_n(x)$.

Q.7. Prove that the set $s\{(1,2,1);\ (2,1,0);\ (1,-1,2)$ forms a basis of the vector space $V_3(R)$.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Prove that the function $f(z)=u+iv$; where

$$f(z)=\frac{x^2y^5(x+iy)}{x^4+y^{10}},\ z\neq 0$$

$$f(0)=0$$

satisfy Cauchy- Riemann equations at origin, but $f'(0)$ does not exist.

Q.2. Use Cauchy's Residue theorem to evaluate :

$$\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)}\, dz\,;\ |z| = 3$$

Q.3. Show by contour integration!

$$\int_{-\infty}^{\infty} \frac{dx}{(x^2+1)^3} = \frac{3\pi}{8}$$

Q.4. Establish the following result for orthogonality of Legendre Polynomial

$\int_{-1}^{1} P_m(x) P_n(x)\, dx = 0$, if $m \neq n$.

Q.5. Apply the Gram-Schmidt process to the vectors $\beta_1 = (1,0,1)$, $\beta_2 = (1,0,-1)$, and $\beta_3 = (0,3,4)$ to obtain an orthonormal basis for $V_3(R)$ with the standard inner product.

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B. Tech. IV-Sem. (Main and Back) Exam, 2024

ELECTRONIC INST. AND CONTROL ENGG.

4E14-04 Analog Circuits

EC,EI

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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. How depletion layer is formed in diode ?

Q.2. Draw diode input output characteristic.

Q.3. Define concept of cascading in amplifiers.

Q.4. Differentiate frequency response of single stage and multistage amplifiers.

Q.5. Explain Barkhausen criterion for oscillations.

Q.6. What is the need of oscillator ?

Q.7. Why hysteresis is desirable in Schmitt trigger ?

Q.8. Differentiate between integrator and differentiator.

Q.9. What is the weighted register in DAC ?

Q.10. Write the formulae of reference voltage in ADC.

PART-B **[5x4=20]**

(Analytical/Problem solving questions)

Attempt any five question

Q.1. Perform the mathematical analysis of fixed biasing for NPN transistor.

Q.2. Explain the operation of class A amplifier with calculation of power efficiency.

Q.3. Draw the circuit of astable multivibrator and explain its working.

Q.4. Explain the summing amplifier in detail.

Q.5. Discuss the parallel resonant band pass filter circuit.

Q.6. How D/A converter operates in bipolar range ? Explain.

Q.7. Discuss the principle of operation of differential amplifier.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving Design/Questions)

Attempt any three questions

Q.1. How the oscillations are maintained in Hartley oscillator ? Also obtain the expression for the frequency of oscillation.

Q.2. What are the four possible topologies of a feedback amplifier ? Explain with neat sketches.

Q.3. Write a technical note on successive approximation analog to digital converter (ADC).

Q.4. Expplain the low frequency analysis of multistage amplifiers.

Q.5. For a class A amplifier, the maximum and minimum values of collector-emitter voltages are 20 volt and 4 volt respectively. Given that V_{cc} = 25 V. Determine the overali efficiency of the amplifier.

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B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRONIC INST. AND CONTROL ENGG.

4EI4-05/ Microcontroller

Time : 3 Hours Maximum Marks : 70

Instruction 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 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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What are the difference between microporcessor, microcontroller and microcomputer?

Q.2. How microprocessor and microcontroller ease our daily life?

Q.3. How many address lines in a 4096 x 8 EPROM CHIP?

Q.4. Define instruction cycle and machine cycle.

Q.5. What are the flags available in 8085? Explain.

Q.6. List the major steps in developing as assembly language program.

Q.7. What is synchronous data transfer?

Q.8. What is the use of ALE?

Q.9. What is stack? State its significance.

Q.10. Define timer operation.

PART-B **[5x4=20]**

(Analytical/Problem solving questions)

Attempt any five question

Q.1. Explain memory mapping with suitable example.

Q.2. Give the classification of interrupts? List out the maskable and non-masksble interrupt available in 8085?

Q.3. Explain the Direct Memory Access (DMA)-8257 controller.

Q.4. What is the use of addressing modes? Mention the different types in 8085 microprocessor.

Q.5. Calculate the values of LSB, MSB and full scale output for an 8 bit DAC for the 0 to 10 V range.

Q.6. Write the ALP to add two 16 bit numbers with carry in 8085 microprocessor.

Q.7. What are the different types of methods used for data transmission? Explain.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving Design/Questions)

Attempt any three questions

Q.1. Describe the architecture of 8051 with neat diagram. What are the various features of 8051 microcontroller?

Q.2. Explain the architecture of following microprocessor in detail.

(a) 8085 Microprocessor

(b) 8086 Microprocessor

Q.3. (a) What is use of cache memory? Differentiate between cache memory and virtual memory.

(b) Explain the concept of D/A converter? Interface an 8-bit D/A converter with 8085 Microprocessor.

Q.4. (a) List the basic features of 8085 and 8086 and differential with 80286.

(b) How instruction sets are classified in 8085 Microprocessor? Explain with example of each classification.

Q.5. Write short notes on following :

(a) ARM Microcontroller

(b) RISC processor

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B.Tech. IV-Sem. (Main/Back) Exam. - 2024

4EC3-06 Electronics Measurement and 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 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 **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define the accuracy and precision.

Q.2. Define repeatability and reproducibility.

Q.3. What is the difference between anolog instruments and digital instruments?

Q.4. State the working principle of analogy electronic voltmeter.

Q.5. What is grounding and how it is different from shielding?

Q.6. Differentiate the electrostatic deflection from electromagnetic deflection.

Q.7. What is astigmetism and how it is achieved in CRO?

Q.8. Write down two requirements for signal generators.

Q.9. State the "Bar Khausen Criteria" for sinusoidal oscillator.

Q.10. Differentiate the active transducer from passive transducer.

PART-B

[5x4=20]

(Analytical/Problem solving questions, Answer should be given up to 100 words)

Attempt any five questions

Q.1. Explain the normal (Gaussian) curve of errors.

Q.2. Explain the staircase ramp type Digital voltmeter with neat block diagram.

Q.3. How can we use CRO for the measurement of frequency and phase angle?

Q.4. Explain the sweep frequency signal generator with the suitable block diagram.

Q.5. Explain the transfer characteristics of transducers.

Q.6. Explain the Heterodyne harmonic Analyzer.

Q.7. Explain the RVDT (Rotational-Variable differential transformer) with suitable diagram.

PART-C **[3x10=30]**

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. Explain the reasons due to which the errors are caused in measurement by the instrument. Also explain all types of systematic errors.

Q.2. Explain the vector impedance meter with suitable diagram.

Q.3. Explain how can we observe horizontal line, vertical line, inclined lines, circle and elliptical line (waveform) on CRO?

Q.4. Explain the spectrum analyzer in detail.

Q.5. Explain the selection criteria of transducer.

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B.Tech. IV-Sem. (Main/Back) Exam. - 2024

ELECTRONIC & CONTROL ENGG.

4EI4-07 / Analog and 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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Write any two applications of FM and AM each.

Q.2 Define the frequency range use for FM.

Q.3. Give the equations of modulation index for AM.

Q.4. Draw the block diagram of communication system.

Q.5. List the name of noises encountered in digital communication.

Q.6. What is the need for time division multiplexing?

Q.7. Give the definition of VSB (Vestigial Side Band) modulation.

Q.8. List out the applications of pulse code modulation techniques.

Q.9. State Sampling Theorem.

Q.10. State Nyqist criterion.

PART-B [5x4=20]

(Analytical/Problem solving question)

Attempt any five questions

Q.1. Explain the advantages and disadvantages of Digital modulation schemes.

Q.2 An FM signal with single-tone modulation has a frequency deviation of 15 kHz and a bandwidth of 50 kHz. Find the frequency of the modulating signal.

Q.3. How to obtain zero ISI? Explain. Also, briefly describe ISI and raised cosine spectrum.

Q.4. Define the terms 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 the Superheterodyne receiver and explain its working.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem Solving question)

Attempt any three questions

Q.1. Derive the equations of Angle modulation for FM and PM. Give the name of methods of generation/demodulation of Angle modulated signals.

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. A given AM (DSB-LC) broadcast station transmits an average carrier power output of 40kW and uses a modulation index of 0.707 for sine-wave modulation. Calculate:

(a) The total average power output

(b) The transmission efficiency

(c) The peak amplitude of the output if the antenna is represented by a 50 ohm resistive load.

Q.4. Write short notes on any two of the following :

(i) Maximum likelihood sequence detection (Viterbi receiver)

(ii) Equalization Techniques

(iii) M-ary signalling scheme

Q.5. Define the noise performance of FM system. Describe the need of Pre-emphasis and De-emphasis in analog communication.

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