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Periyanaickenpalayam, Coimbatore – 641020

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

II YEAR

SEMESTER – 04

ACADEMIC YEAR: 2025 – 2026 (EVEN)

INDEX

24ESBS401

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

UNIT I

ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Environment**:** Definition, scope and importance of the environment.
Ecosystem**:** Definition, structure and function of an ecosystem (Forest ecosystem and River ecosystem) – producers, consumers and decomposers - Ecological succession.
Biodiversity**:** Introduction, Definition and Types – values of biodiversity – threats to biodiversity-habitat loss and poaching of wildlife, case study of man-wildlife conflicts – conservation of biodiversity.
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Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is an ecosystem and what are the components of ecosystem?	CO1	RE	2
2.	What are biotic and abiotic components of an ecosystem?	CO1	RE	2
3.	What do you mean natural resources? Give examples.	CO1	RE	2
4.	What are food chains and food webs and give their significance?	CO1	RE	2
5.	Define Ecological succession.	CO1	RE	2
6.	Differentiate between endangered and endemic species.	CO1	UN	2
7.	Define primary succession and secondary succession	CO1	RE	2
8.	Define key stone species with a suitable example.	CO1	RE	2
9.	List out the effect of habitat loss on biodiversity.	CO1	RE	2
10.	What are the major causes of man-wildlife conflict?	CO1	RE	2
	PART B			
1.	Define ecosystem. What are the classification of ecosystem and explain in detail?	CO1	AP	16
2.	Discuss in detail about the threats faced by Indian biodiversity.	CO1	AP	16
3.	Name and briefly describe two how spots of biodiversity that extent in India.	CO1	AN	16
4.	Write about In-situ and Ex-situ conservation of biodiversity.	CO1	AP	16

5.	Explain in detail about the endangered and endemic species of India.	CO1	AN	16
6.	Define Ecological succession. Classify the types of succession and explain in detail.	CO1	AP	16

UNIT II

ENVIRONMENTAL POLLUTION AND WASTE MANAGEMENT

Pollution - definition –causes, effects and control measures of (a) air pollution (b) water pollution- Solid and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS)

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Differentiate between primary and secondary air pollutants.	CO2	UN	2
2.	Define photochemical smog.	CO2	RE	2
3.	What are point and non -point sources of water pollution?	CO2	RE	2
4.	Define e-waste management.	CO2	RE	2
5.	Name any four environmental protection acts in India.	CO2	RE	2
6.	Define hazardous waste management.	CO2	RE	2
7.	What are the effects of noise pollution?	CO2	RE	2
8.	Write any two causes and sources of soil pollution.	CO2	UN	2
9.	List out sources of toxic pollutants in water?	CO2	RE	2
10.	Define OHASMS.	CO2	RE	2
	PART B			
1.	Define air pollution .What are the sources of air pollution? Explain the approach to control air pollution.	CO2	AP	16
2.	Demonstrate with a flow sheet and explain the steps involved in Solid waste management.	CO2	AN	16

3.	What is OHASMS? Explain it with any one case study	CO2	AP	16
4.	Write a detailed note on solid, hazardous, and e-waste management.	CO2	AP	16
5.	Explain the causes, effects and control measures of water pollution.	CO2	AP	16
6.	Give a comparative account of urban and industrial wastes in terms of their sources, characteristics and management and disposal methods.	CO2	AN	16

UNIT III

NATURAL RESOURCES

Forest resources-use and over-exploitation, deforestation, Water resources- use and over utilization of surface and ground water, drought, Dams benefits and problems, Food resources-changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, role of an individual in conservation of natural resources

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define sustainable forestry	CO3	RE	2
2.	Mention any two causes of over-exploitation of forests	CO3	RE	2
3.	What are the effects of dams on tribal communities?	CO3	UN	2
4.	What is water logging?	CO3	RE	2
5.	Define overgrazing.	CO3	RE	2
6.	What is meant by soil erosion?	CO3	RE	2
7.	What is desertification?	CO3	RE	2
8.	Write any two adverse effects caused by overgrazing.	CO3	UN	2
9.	What are the types of agriculture?	CO3	RE	2
10.	What are the preventive measures for protecting natural resources?	CO3	UN	2

PART B

1.	Explain in detail the role of an individual in the conservation of natural resources.	CO3	AP	16
2.	Describe the major causes of deforestation. Discuss its consequences and suggest measures to overcome it.	CO3	AN	16
3.	Write a brief note on the environmental impacts of modern agriculture with reference to: (i) Fertilizers (ii) Pesticides	CO3	AP	16
4.	Elaborate the changes caused by modern agriculture and overgrazing.	CO3	AN	16
5.	Explain in detail about the over-utilization of surface water and groundwater.	CO3	AP	16
6.	Discuss the various factors influencing soil degradation.	CO3	AN	16

UNIT IV

SUSTAINABILITY AND MANAGEMENT

Development, GDP, Sustainability- concept, needs and challenges-millennium development - indicators and intervention areas -Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study

Q.No	Question	CO	BTL	Marks

PART A

1.	What is GDP?	CO4	RE	2
2.	List out any four millennium development goals.	CO4	UN	2
3.	Define carbon credit.	CO4	RE	2
4.	What are the sources of carbon foot print?	CO4	RE	2

5.	Define environmental management.	CO4	RE	2
6.	Mention any five important needs of sustainability.	CO4	UN	2
7.	Enlist the advantages of carbon credits.	CO4	RE	2
8.	Mention some effects of climate change.	CO4	UN	2
9.	Write any 4 millennium development goals.	CO4	RE	2
10.	Define Sustainability.	CO4	RE	2

PART B

1.	Write brief notes on (i) Millennium Development Goals (ii) Sustainability protocols.	CO4	AP	16
2.	What is environmental management? Explain the various steps of environmental management.	CO4	AP	16
3.	Analyze the concept, goal and aim of sustainable development.	CO4	AN	16
4.	What are the causes, effects and possible solutions of climate change? What is carbon credit? Explain the types and merits.	CO4	AP	16
5.	Explain the sources, causes and remedy measures of carbon foot print.	CO4	AN	16
6.	Analyze the sustainable development indicators.	CO4	AN	16

UNIT V

SUSTAINABILITY PRACTICES

Sustainable targets and goals (STG), Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Sustainable transports, Sustainable urbanization- Socio-economical and technological change.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is zero waste and R concept?	CO5	RE	2
2.	Define circular economy.	CO5	RE	2
3.	What are the key elements of ISO14000?	CO5	RE	2
4.	Mention the objectives of EIA.	CO5	UN	2
5.	What is green engineering?	CO5	RE	2
6.	What is meant by energy cycles?	CO5	RE	2
7.	What is sustainable urbanization?	CO5	RE	2
8.	Define carbon sequestration.	CO5	RE	2
9.	How do you calculate energy efficiency?	CO5	UN	2
10.	What are the harmful effects of carbon emission?	CO5	RE	2
	PART B			
1.	Explain the various steps to achieve zero waste? Mention advantages and disadvantages of zero waste.	CO5	AP	16
2.	Determine the concept and advantages of R concept.	CO5	AN	16
3.	What are green materials? Explain important green building materials. (8) What is sustainable transport? Discuss the key elements of sustainable transport. (8)	CO5	AP	16
4.	What is sustainable urbanization? Explain the rules to develop sustainable urban.	CO5	AN	16

5.	Write notes on socio-economical change on sustainable urbanization.	CO5	AP	16
6.	Explain methods of achieving energy efficiency.	CO5	AP	16

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24ECPC401

ANALOG COMMUNICATION

UNITED INSTITUTE OF TECHNOLOGY

UNIT I

FUNDAMENTALS OF AMPLITUDE MODULATION

Introduction – AM: Time Domain description –. Frequency Domain description – Power relations - Generation and Detection of AM wave, Comparison of Suppressed carrier systems

Q. No	Question	CO	BTL	Marks
	PART A			
1.	What is modulation and why modulation required?	1	RE	2
2	Define carrier signal and baseband signal.	1	RE	2
3.	Define Signal to Noise ratio.	1	RE	2
4.	Give examples of analog communication.	1	RE	2
5.	Define amplitude modulation.	1	RE	2
6.	What is modulation index in AM?	1	RE	2
7.	What is over modulation and under modulation?	1	RE	2
8.	What is DSB-LC and DSB-SC?	1	RE	2
9	What is power efficiency of AM? And mention its disadvantages.	1	RE	2
10	What is envelope detector?	1	RE	2
	PART B			
1.	Construct under-modulation, critical modulation and over-modulation in AM with time-domain waveforms.	1	AP	16
2.	Develop the expression for total power in an AM wave. Show the power distribution in carrier and sidebands.	1	AP	16
3.	Briefly Explain the generation of AM waves using Linear and Non-linear Modulation.	1	UN	16
4	Explain the principle and working of an envelope detector with circuit diagram and waveforms.	1	UN	16
5	Explain Double Sideband Suppressed Carrier (DSB-SC) and Single Sideband Suppressed carrier modulation with generation and detection techniques.	1	UN	16

6	A DSB-SC Signal is to be generated with a carrier frequency f_c=1MHz using a non-linear device with input-output relation given by $V_o=aV_i+bV_i^3$, where a and b are constants. The output of the non-linear device is filtered by a band pass filter. Let the $V_i=A_c^i\cos(2\pi f_c^i t)+m(t)$,where m(t) is the message signal.then , calculate the value of f_c^i.	1	EV	16

UNIT II

ANGLE MODULATION SYSTEMS

Introduction – Narrow band FM – Wideband FM Generation and Detection of FM and PM - Comparison of FM, PM and AM.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define frequency modulation and Phase modulation?	2	RE	2
2.	Define modulation index of FM.	2	RE	2
3.	What is narrowband and Wideband FM?	2	RE	2
4.	What is Carson's rule?	2	RE	2
5.	Define pre-emphasis and De-emphasis.	2	RE	2
6.	What is FM demodulation?	2	RE	2
7.	What is capture effect?	2	RE	2
8.	Give application of FM.	2	RE	2
9	State advantages and disadvantages of FM.	2	RE	2
10	Name few FM Detector	2	RE	2
	PART B			
1	Identify modulation index for FM and PM. Explain their significance in angle modulation systems.	2	AP	16
2	Explain Narrowband Frequency Modulation (NBFM). Derive the expression for an NBFM signal and explain its spectrum.	2	UN	16
3	An analog message signal is given by: m(t)=5cos(2000πt)	2	AP	16

	(i)Determine the Hilbert Transform of m(t). (ii)Using the message signal and its Hilbert Transform, construct the Upper Sideband (USB) SSB-SC signal. (iii)If the carrier frequency is fc=100 kHz, write the final expression for the SSB signal. (iv)Sketch the frequency spectrum of the generated USB signal.			
4	Explain PLL-based FM detection with block diagram and working.	2	UN	16
5	Examine the detection of Phase Modulated (PM) signals with necessary block diagram.	2	AN	16
6	Compare FM, PM and AM in terms of bandwidth, noise immunity, power efficiency and applications.	2	AN	16

UNIT III

TRANSMITTERS AND RECEIVERS

AM broadcasting Transmitter, FM Transmitter, Receiver Characteristics, Superhetrodyne receiver, Automatic Gain Control (AGC), Automatic Frequency Control(AFC),TDM ,FDM

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Name the main stages of an AM transmitter.	3	RE	2
2	What is the function of RF amplifier in AM transmitter?	3	RE	2
3.	Name the basic blocks of FM transmitter.	3	RE	2
4.	Why is buffer amplifier used in FM transmitter?	3	RE	2
5.	What is a superheterodyne receiver? And state one advantages.	3	RE	2
6.	Define Intermediate Frequency.	3	RE	2
7.	What is AGC and state one advantages	3	RE	2
8.	What is AFC and why it is required in FM receivers.	3	RE	2
9	Define TDM and state one advantage.	3	RE	2
10	How Signals are separated in FDM and give one application.	3	RE	2
	PART B			
1.	Illustrate the working of a superheterodyne receiver. State its advantages and disadvantages.	3	UN	16
2.	Illustrate the need for Automatic Gain Control (AGC). Describe the working of AGC with block diagram.	3	UN	16

3.	Identify the causes of frequency drift and explain how AFC helps in frequency stabilization.	3	AP	16
4	Explain the principle of Time Division Multiplexing (TDM) with block diagram. Discuss its advantages, disadvantages and applications.	3	EV	16
5	Explain the principle of Frequency Division Multiplexing (FDM) with block diagram. Discuss its advantages, disadvantages and applications.	3	EV	16
6	Compare AM and FM transmitters and receivers in terms of power efficiency, noise performance and applications.	3	UN	16

UNIT IV

NOISE PERFORMANCE OF AM AND FM

Sources of noise and its types, Gaussian and White noise Characteristics, Noise margin, Noise temperature, Noise Figure, Noise performance in AM systems, Noise performance in FM systems, pre- emphasis and de-emphasis

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Noise and mention main sources of noise.	4	RE	2
2	What is internal and external noise and name its type.	4	RE	2
3.	State one characteristics of Gaussian noise and why it is important in communication system?	4	RE	2
4.	State one characteristic of white noise and why it is called so.	4	RE	2
5.	Define Noise margin and what happens if noise margin is low.	4	RE	2
6.	Define Noise temperature and noise figure.	4	RE	2
7.	Define pre-emphasis and De-emphasis.	4	RE	2
8.	What is threshold effect and capture effect in FM.	4	RE	2
9	What is the effect of noise at low modulation index in AM.	4	RE	2
10	Why is pre-emphasis and De-emphasis necessary in FM?	4	RE	2

PART B

1.	Explain white noise. Compare Gaussian noise and white noise with characteristics and applications.	4	UN	16
2.	Explain noise in communication systems. Describe various sources of noise and classify noise with suitable examples.	4	UN	16
3.	Explain noise performance of FM systems. Derive the expression for SNR in FM receivers and explain threshold effect.	4	UN	16
4	With neat diagrams, explain how pre-emphasis and de-emphasis improve the SNR in FM communication systems.	4	UN	16
5	Explain noise figure, noise temperature and noise margin. Discuss their role in evaluating receiver performance.	4	UN	16
6	(i)An Amplifier has a bandwidth of 4 MHZ with 10K Ohm as input resistor. Calculate RMS Noise voltage at the input to this amplifier if the room temperature is 25^{o}c (ii) Determine the RMS noise voltage arising from thermal noise in two resistors 100 and 150 respectively.at T=300^{o} K within a bandwidth of 1MHZ if a. Resistors are connected in series b. Resistors are connected in parallel.	4	EV	16

UNIT V

ANALOG PULSE MODULATION

Sampling and Reconstruction, Aliasing, Uniform and Non Uniform Quantization ,Pulse amplitude modulation (PAM), Pulse Width Modulation (PWM),Pulse Position Modulation (PPM)-Spectra of pulse modulated signals-SNR calculations for pulse modulation systems-Digital representation of Analog signal

Q.No	Question	CO	BTL	Marks
	PART A			
1.	State the sampling theorem.	5	RE	2
2	What is Nyquist rate?	5	RE	2
3.	Define aliasing and how can aliasing be avoided.	5	RE	2
4.	Define quantization.	5	RE	2
5.	Define PAM and mention its types.	5	RE	2

6.	Define PWM and mention one advantage of PWM.	5	RE	2
7.	Define Pulse Position Modulation and state one disadvantage.	5	RE	2
8.	How does sampling affect signal spectrum?	5	RE	2
9	How does quantization affect SNR and Which pulse modulation gives highest SNR?	5	RE	2
10	How is an analog signal represented digitally and Give one application of digital representation?	5	RE	2

PART B

1.	Explain the Sampling Theorem. Describe the process of signal sampling and reconstruction with necessary mathematical expressions and diagrams	5	UN	16
2.	What is aliasing? Explain the aliasing effect in sampled signals with frequency spectrum and methods to avoid aliasing.	5	UN	16
3.	Examine quantization noise. Derive the expression for signal-to-noise ratio (SNR) due to quantization.	5	AN	16
4	Compare PAM, PWM, and PPM in terms of bandwidth, noise immunity, power efficiency and applications.	5	AP	16
5	Build the expression for signal-to-noise ratio (SNR) in PAM system. Explain the factors affecting SNR.	5	AP	16
6	Identify the Nyquist sampling rate for the signal given below x(t)=$\frac{\sin(100\pi t).sinc(200t)}{\pi t}$)	5	AP	16

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24ECPC402

DIGITAL SIGNAL PROCESSING

UNIT I

DISCRETE FOURIER TRANSFORM: PROPERTIES, APPLICATIONS AND COMPUTATION

The Discrete Fourier Transform, Need for DFT, DFT as a linear transformation. Properties of DFT, Linear Filtering based on DFT-Circular Convolution, Efficient Computation of DFT – Radix-2 FFT algorithm, Applications of FFT algorithm**.**

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define DFT and IDFT.	1	RE	2
2	List any four properties of DFT.	1	UN	2
3.	Find the 4-point DFT of the sequence x(n) = {1, 1, -1, -1}.	1	UN	2
4.	Obtain the circular convolution of $x(n)$ = {1,2,3,1} ; $h(n)$ = {4, 3, 2, 1}	1	UN	2
5.	State about overlap save method.	1	UN	2
6.	Why FFT is needed?	1	RE	2
7.	What are the applications of FFT algorithms?	1	UN	2
8.	Draw the basic butterfly diagram of radix-2 DIT FFT.	1	UN	2
9	What are the advantages of FFT algorithm over direct computation of DFT?	1	RE	2
10	List the differences and similarities between DIT and DIF.	1	RE	2
	PART B			
1.	Summarize the following properties of DFT: a. Periodicity (4) b. Time Reversal (4) c. Circular Convolution (4) d. Multiplication of two DFT and convolution (4).	1	AP	16
2.	a) Find the 4-point DFT of x(n)= {1, -1, 2, -2} b) Find the 4-point IDFT of x(k)= {4, 2, 0, 4}	1	AP	16
3.	Perform circular convolution using DFT and IDFT of two finite duration sequences $x_1(n)$ = {2, 1, 2,1}; $x_2(n)$ = {1,2,3,4}.	1	AN	16
4	Find the DFT for the sequence x(n)={1,2,3,4,4,3,2,1} using Radix-2 DIT(Decimation in TIME) algorithm.	1	AP	16

5	Find the IDFT of the sequence X(K)={4,1-j2.414,0,1-j0.414,0,1+j0.414,0,1+j2.414} using DIF((Decimation in FREQUENCY) algorithm.	1	AP	16
6	Determine the output y(n) of a filter whose impulse response h(n) = {1,2} and input signal x(n) = {1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1} using overlap save method and overlap add method.	1	AP	16

UNIT II

DESIGN OF IIR FILTERS

Introduction filters, General consideration in the design of digital filters, Design of analogue Butterworth and Chebyshev Filters. Design of IIR digital filters using impulse invariance technique, bilinear transform. Realization of IIR filters using direct, cascade and parallel forms.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What are the different types of structures for realization of IIR systems?	2	UN	2
2.	List the different types of filters based on frequency response.	2	RE	2
3.	Write the properties of Butterworth filter.	2	UN	2
4.	List the parameters that can be obtained from Chebyshev filter specification.	2	RE	2
5.	How to represent the frequency warping in IIR filter?	2	UN	2
6.	Write the frequency response of an odd and even order Chebyshev low Pass filters.	2	UN	2
7.	Why impulse invariant method is not preferred in the design of IIR Filter other than LPF?	2	UN	2
8.	Write the expression for location of poles of normalized Butterworth filter.	2	UN	2
9	What is the relation between digital and analog frequency in bilinear transformation?	2	UN	2
10	Write the steps in design of a digital filter from analog filters.	2	UN	2
	PART B			
1	Obtain the direct form I, direct form II and cascade form realization of the following system functions $y[n]=0.1y[n-1]+0.2y[n-2]+3x[n]+3.6x[n-1]+0.6x[n-2]$	2	AP	16

2	Design a Chebyshev filter with a maximum passband attenuation of 2.5db at Ω_p =20 rad/sec and stopband attenuation of 30db at Ω_s = 50rad/sec.	2	AP	16
3	Design an analog Type-I Chebyshev filter for the given specifications $\frac{1}{\sqrt{2}} \leq \lvert H(j\Omega)\rvert \leq 1; 0 \leq \Omega \leq 0.2\pi$ $\lvert H(j\Omega)\rvert < 0.2; 0.4\,\pi \leq \Omega \leq \pi$ For the given specifications, find the order and design an analog Butterworth filter α_p =3db ; α_s =18db f_p=1k Hz; f_s=2k Hz	2	AP	16
4	For the given specifications , design an analog filter $0.9 \leq \lvert H(j\Omega)\rvert \leq 1; 0 \leq \Omega \leq 0.2\pi$ $\lvert H(j\Omega)\rvert < 0.1; \Omega \geq 4$	2	AP	16
5	The Butterworth filter and Chebyshev filter. (8) The Chebyshev Type-I and Type-II filter approximations. (8)	2	UN	16
6	Write the design concepts/steps of Chebyshev and Butterworth filter	2	UN	16

UNIT III

DESIGN OF FIR FILTERS

Linear phase FIR filters, Design of FIR Filters, Frequency sampling technique, Windowing technique. Design of FIR Differentiators, Realization of FIR filters, Direct and Linear phase realization structures

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is an FIR system?	3	RE	2
2	List the advantages of FIR filters.	3	RE	2
3.	Mention the necessary and sufficient condition for the linear phase characteristic of an FIR filter.	3	RE	2
4.	Write the condition for the impulse response of FIR filter to satisfy for constant phase delay and for only constant group delay.	3	RE	2
5.	What is Window? Why it is necessary?	3	UN	2
6.	Describe the properties of FIR filter.	3	UN	2

7.	What is the impulse response condition for a FIR filter to have linear Phase characteristics?	3	RE	2
8.	Write the advantages and disadvantages of window.	3	RE	2
9	Write about phase delay and group delay.	3	UN	2
10	Define Gibbs phenomenon	3	RE	2

PART B

1.	Design an ideal lowpass filter with a frequency response $H_d(e^{j\omega})\begin{cases}1\ for\ \frac{-\pi}{2} \le \lvert\omega\rvert \le \frac{\pi}{2}\\ 0\ for\quad otherwise\end{cases}$ Find the value of h(n) for N=11. find H(Z) ?	3	AP	16
2.	Design an ideal filter with the frequency response $H_d(e^{j\omega}) = \begin{cases}e^{-j3\omega}\ for\ \frac{-\pi}{4} \le \omega \le \pi\\ 0\ for\quad \text{for otherwise}\end{cases}$ Determine h(n) for N=7 using Hamming Window.	3	AP	16
3.	Design an ideal high pass filter with a frequency response $H_d(e^{j\omega})\begin{cases}1\ for\ -\frac{\pi}{4} \le \lvert\omega\rvert \le \pi\\ 0\ for\ -\lvert\omega\rvert \le \frac{\pi}{4}\end{cases}$ Find value of h(n) for N=11. Find h(n) for N=11. Find H(Z) using Hanning window.	3	AP	16
4	Design an ideal high pass filter with a frequency response $H_d(e^{j\omega})\begin{cases}1\ for\ \frac{-\pi}{2} \le \lvert\omega\rvert \le \pi\\ 0\ for\ -\lvert\omega\rvert \le \frac{\pi}{2}\end{cases}$ Find value of h(n) for N=11. Find h(n) for N=11. Find H(Z) using Hamming window.	3	AP	16
5	Design a Bandpass filter using Rectangular window for N=11 samples. $H_d(e^{j\omega})$ $=\begin{cases}1\ for\ \frac{\pi}{4} \le \lvert\omega\rvert \le \frac{3\pi}{4}\\ 0\quad otherwise\end{cases}$.	3	AP	16
6	The desired frequency response of a low pass filter $H_d(e^{j\omega}) = \begin{cases}e^{-j3\omega}\ for\ \lvert\omega\rvert \le \frac{\pi}{4}\\ 0\quad for\ -\frac{\pi}{4} \le \lvert\omega\rvert \le \pi\end{cases}$ Determine the filter coefficients h(n), if h(n)= $h_d(n)\omega(n)$	3	AN	16

Using Hamming window. Determine the response H(z) and magnitude response

UNIT IV

FINITE WORD LENGTH EFFECT IN DIGITAL FILTERS

Fixed Floating Point Number Representation, Quantization Noise, Finite Word Length Effects in Digital Filters, Input Quantization, Product Quantization, Coefficient quantization error, Limit Cycle Oscillations, Scaling

Q.No	Question	CO	BTL	Marks
	PART A			
1.	List the different types of number representations in digital systems.	4	RE	2
2	Define Finite word length effect.	4	RE	2
3.	List out the some of the finite word length effects in digital filters.	4	RE	2
4.	Mention the different formats of fixed-point representation.	4	RE	2
5.	State the advantages of floating-point representation.	4	RE	2
6.	List the two types of quantization employed in digital system.	4	RE	2
7.	Why rounding is preferred over truncation in relating digital filter?	4	RE	2
8.	What is quantization?	4	RE	2
9	What is quantization error?	4	RE	2
10	What is the effect of quantization on pole location?	4	RE	2
	PART B			
1.	(i)The input to the system y(n)=0.999y(n-1)+x(n) is applied to an ADC. What is the power produced by the quantization noise at the output of filter if the input is quantized to (a) 8 bit (b) 16 bits(8mark) (ii)Find the characteristics of a limit cycle oscillation of the system (first order digital system) y(n)=0.95y(n-1)=x(n), where x(n)=$\begin{cases} 0.875 & n-0 \\ 0 & otherwise \end{cases}$ also determine the deadband of the filter (8mark)	4	AP	16
2.	Explain the characteristics of limit cycle oscillations with respect to the system described by the difference equation y(n)=Q[(ay(n − 1)] + $x(n)$, where y(n) is the output of the filter and Q[.] is the quantization. Assume a=7/8 , x(0)=3/4 for n>0 and choose 4 bit sign magnitude.	4	AN	16

3.	Consider a second order FIR Filter with system Transfer function H(Z)= $\frac{1}{1-0.85z^{-1}+0.17z^{-2}}$ Determine the effect of Quantization on Poles location of the given system function is (i) Direct form (ii) Cascade form with b=4 bits.	4	AN	16
4	A Cascade structure has a two individuals section $H_1(z)=\frac{1}{1-0.3z^{-1}}$ and $H_2(z)=\frac{1}{1-0.2z^{-1}}$ Determine the overall output Noise Power by product Quantization noise model.	4	AP	16
5	The Output of A to D converter is applied to a digital filter with system function H(Z)= $\frac{0.5z}{z-0.5}$ Determine output noise power when the input signal is quantized 8 bits.	4	AP	16
6	(i)Find the effect of coefficient Quantization on poles locations for the given second order IIR filter using Direct form-1 H(Z)= $\frac{1}{(1-0.5z^{-1})(1-0.4z^{-1})}$ (8mark) (ii)Derive the expression for Quantization noise power and steady state output noise power.	4	AP	16

UNIT V

DIGITAL SIGNAL PROCESSORS

Introduction to Digital Signal Processors, Basic Classification, Features. TMS320C6713 Architecture, Functional Unit Pipelining, Addressing Modes, Instruction set, Simple Assembly Language Program

.Q.No	Question	CO	BTL	Marks

PART A

1.	List the applications of DSP.	5	RE	2
2	What is the role of the pipeline operation in a Digital Signal Processor?	5	RE	2
3.	Mention the buses used in digital signal processors.	5	RE	2
4.	Difference between Von Neumann architecture & Harvard architecture.	5	RE	2
5.	List out the classification of instruction set in Digital Signal Processor.	5	RE	2
6.	What are the important elements of program controller?	5	RE	2
7.	Write the features to select digital signal processor.	5	RE	2

8.	Mention the need of accumulator.	5	RE	2
9	What are the features of MAC unit?	5	RE	2
10	Define circular buffering.	5	RE	2

PART B

1.	Explain in detail about Addressing modes of TMS32050	5	UN	16
2.	(i)Explain in detail about von-neumann architecture (8mark) (ii) Explain in detail about Harvard architecture(8mark)	5	UN	16
3.	(i) Explain the architecture of VLIW? write its advantages and disadvantages(8mark) (ii) Give a Short note on MAC Unit and its Functions(8mark)	5	UN	16
4	What are the factors that influence the selection of a DSP Processor For a given application and explain briefly.	5	UN	16
5	Explain the architecture of TMS320C50 Processor and its functions with a neat block diagram	5	UN	16
6	Describe the principle of operation of floating point architecture with neat diagram	5	UN	16

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24ECPC403 – ELECTROMAGNECTIC FIELDS

UNIT I

INTRODUCTION

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Coulomb's Law.	1	RE	2
2.	Explain divergence theorem.	1	UN	2
3.	Define Stokes theorem.	1	RE	2
4.	What are surface and volume integrals?	1	RE	2
5.	Relate the transformation between spherical and Cartesian coordinates.	1	UN	2
6.	Identify the unit vector and its magnitude corresponding to the given vector A=5 ax + ay + 3 az.	1	AP	2
7.	Compare orthogonal and non-orthogonal coordinate systems.	1	UN	2
8.	Find a differential volume element in spherical coordinates (r, θ, φ) resulting from differential charges in the orthogonal coordinate systems.	1	AN	2
9.	Construct and Convert the point P (5, 1, 3) from Cartesian to spherical coordinates.	1	AP	2
10.	Classify the distance between the given vectors A (1, 2, 3) and B (2, 1, 2).	1	AP	2
	PART B			
1.	Explain in detail about Electromagnetics model with its corresponding units and constants.	1	UN	16
2.	Compare and contrast Cartesian, cylindrical, and spherical coordinate systems with diagrams with examples.	1	UN	16
3.	(i) Identify the expression for the curl of a vector and write its significance. (ii)Develop and formulate Stokes theorem to relate line integral and surface integral.	1	AN	8 8
4.	Develop and construct divergence theorem for a given differential volume element.	1	AP	16
5.	Explain and derive Gauss's Law. Use it to find the electric field due to an infinite line charge.	1	UN	16
6.	Construct the spherical coordinates of A and Cartesian coordinates of B for the two given points A (x = 2, y = 1, z = 3) and B (ρ= 1, φ = 450, z = 2)	1	AN	16

UNIT II

ELECTRO STATICS

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Electrostatics boundary value problems, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define electric field intensity.	2	RE	2
2.	What is the difference between potential and potential difference?	2	RE	2
3.	Outline any two sources of electromagnetic fields.	2	UN	2
4.	List the properties of conductor and dielectric materials.	2	RE	2
5.	Define Gauss law.	2	RE	2
6.	Develop the energy stored in a 10 μF capacitor which has been charged to a voltage of 400V.	2	AP	2
7.	Solve the values of D at a distance r = 5m for the uniformly charged sphere of radius 2m with charge density of 20 nC/m3.	2	AP	2
8.	Develop the energy stored in a 10 μF capacitor which has been charged to a voltage of 400V.	2	AP	2
9.	Compare Poisson's and Laplace's equation.	2	AN	2
10.	Construct the current density of copper wire having conductivity of 5.8 *107 S/m and magnitude of electric field intensity E is 20V/m.	2	AP	2
	PART B			
1.	(i)Analyze coulomb's law and deduce the vector form of force equation between the two-point charges. (ii)Analyze electric potential and explain its relation with electric field. Illustrate your answer with suitable equation and diagram.	2	AN	10 6
2.	(i) Examine the statement of Gauss law and also prove Gauss law. (ii) List out the point form of gauss law.	2	AN	8 8
3.	Explain the concept of electric potential and derive the	2	UN	16

	expressions for capacitance in parallel plate, cylindrical, and spherical capacitors.			
4.	Construct the boundary conditions for electrostatic fields and explain their significance.	2	AP	16
5.	Demonstrate the expression for the electric field due to a charge circular ring of radius r placed in xy plane with center at origin having charge density of ρL C/m. Find E at the point (0, 0, 5) m from the circular ring of charge with radius 5 m lying in z = 0 plane with center at origin and having ρL = 10 nC/m.	2	UN	16
6.	Demonstrate Poisson's and Laplace's equations and discuss their applications in electrostatics.	2	UN	16

UNIT III

MAGNETO STATICS

Lorentz force equation, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Calculation of magnetic field intensity for various current distributions Magnetic circuits, Behaviour of magnetic materials, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Lorentz force and write its equation.	3	RE	2
2.	Outline Biot-Savart law with its applications.	3	UN	2
3.	Define Ampere's Circuital law and its applications	3	RE	2
4.	What is vector magnetic potential?	3	RE	2
5.	Explain about inductance and write the formula for self-inductance	3	UN	2
6.	Write about magnetic flux and flux density.	3	RE	2
7.	Differentiate between electric and magnetic fields.	3	AN	2
8.	Outline the physical significance of permeability.	3	UN	2
9.	Define magnetic field and magnetic lines of force.	3	RE	2
10.	Explain about magnetization.	3	UN	2
	PART B			

1.	Develop the expression for magnetic field intensity at a point P and distance R from the infinitely long straight current carrying conductor using Biot- Savart's law.	3	AP	16
2.	Construct the magnetic boundary condition at the interface between two magnetic medium and derive the necessary boundary conditions.	3	AP	16
3.	Develop the expression for Ampere circuital law. Apply the law for any two applications with necessary illustrations.	3	AP	16
4.	Explain the concept of inductance and derive an expression for the inductance of different geometries.	3	UN	10
5.	(i) Explain about the force on a straight and long current carrying conductor placed in the uniform magnetic field. (ii) Explain with neat diagram about magnetic torque.	3	UN	8 8
6.	i) Develop the expression for inductance of a toroidal coil carrying current I, with N turns and the radius of toroid 'r'. ii) Identify the expression for inductance of a coaxial cable.	3	AP	8 8

UNIT IV

TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Lenz's law.	4	RE	2
2.	Identify the Maxwell's expression for free space.	4	AP	2
3.	Define Poynting theorem.	4	RE	2
4.	Explain phase velocity with necessary equation.	4	UN	2
5.	What is the difference between conduction current and displacement current?	4	RE	2
6.	Identify the relationship between average power density and amplitude of electric field.	4	AP	2
7.	Write the phenomenon of electromagnetic induction.	4	RE	2

8.	Explain about Faraday's law of electromagnetic induction.	4	UN	2
9.	Define magnetic circuit.	4	RE	2
10.	Outline the retarded electric scalar potential and retarded magnetic vector potential.	4	UN	2

PART B

1.	Solve the Maxwell's equation for a time varying are modified for time varying from fundamental laws of electric and magnetic fields.	4	AP	16
2.	Explain in detail on retarded scalar and vector potential and derive the generalized wave equation in free space.	4	UN	16
3.	Analyze the maximum emf induced in a coil of 4000 turns of radius of 12 cm rotating at 30rps in a magnetic field of 0.05 Wb/m2.	4	AN	16
4.	i) Outline the concept of transformer EMF which is induced in a stationary closed path in a time varying B field?	4	UN	8
	ii) Explain in detail about the motional EMF induced in moving closed path in static B field.			8
5.	i) Electric flux density in a charge free region is given by D=10xax+5yay+kzazμC/m2. Find the constant k.	4	AP	8
	ii) If the magnetic field H= (3xcosβ+6ysinα) az, Determine the current density J if fields are invariant with time.			8
6.	Illustrate the integral and point form of Maxwell's equations for static fields.	4	UN	16

UNIT V

PLANE ELECTRO MAGNETIC WAVES

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

Q.No	Question	CO	BTL	Marks

PART A

1.	Define plane waves and their characteristics.	5	RE	2
2.	Outline the differentiate between lossless and lossy media.	5	UN	2
3.	What is the significance of the Poynting vector?	5	RE	2
4.	Define group velocity and its importance in wave	5	RE	2

	propagation.			
5.	Explain the concept of normal incidence at a plane dielectric boundary.	5	UN	2
6.	What is meant by wave attenuation in lossy media?	5	RE	2
7.	What is meant by good conductor approximation?	5	RE	2
8.	Write the equation for electromagnetic power flow.	5	RE	2
9.	What is meant by wavelength?	5	RE	2
10.	Identify the depth of penetration.	5	AP	2

PART B

1.	Explain the behaviour of plane waves in lossless and lossy media with necessary equations.	5	UN	16
2.	Develop the Poynting theorem and explain its significance in energy transfer.	5	AP	16
3.	Explain the concept of normal incidence at a plane conducting boundary and dielectric boundary.	5	UN	16
4.	Identify the concept of electromagnetic power flow and group velocity with examples.	5	AP	16
5.	Examine in detail about intrinsic impedance, wavelength, attenuation, phase, and propagation constant for electromagnetic waves in any medium.	5	AN	16
6.	Explain the condition under which the magnitude of the reflection coefficient equals that of the transmission coefficient for a uniform wave at normal incidence on an interface between two lossless dielectric medium.	5	UN	16

24ECPC404 - LINEAR INTEGRATED CIRCUITS

UNIT I -OPERATIONAL AMPLFIER AND ITS CHARACTERISTICS

Introduction, ideal op-amp, Op-amp-internal circuit, Inverting, non-inverting and DC and AC characteristics, slew rate, frequency compensation techniques

Q.No	Question	CO	BTL	Marks
	PARTA			
1.	Draw the equivalent circuit of practical op-amp.	1	RE	2
2.	Define an operational amplifier.	1	RE	2
3.	Mention the limitations of practical op-amps.	1	RE	2
4.	Recall the ideal op-amp characteristics.	1	RE	2
5.	State the assumption of ideal op-amp used in analysis.	1	RE	2
6.	What is meant by virtual ground in op-amp circuits?	1	RE	2
7.	Define input offset voltage.	1	RE	2
8.	Define slew rate.	1	RE	2
9.	Why is frequency compensation required in op-amps?	1	UN	2
10.	Name any two frequency compensation techniques.	1	RE	2
	PARTB			
1.	Explain with a neat block diagram of an op-amp. Discuss the functions of each stage in detail.	1	UN	16
2.	Explain the working of inverting and non-inverting amplifiers using operational amplifiers with neat circuit diagrams. Derive the expressions for their output voltages.	1	UN	16
3.	Using the DC characteristic curves of an operational amplifier, apply the necessary formulas to evaluate its performance parameters.	1	AP	16
4.	Apply the AC characteristics of an operational amplifier to evaluate its frequency response and predict output performance.	1	AP	16
5	Define slew rate. Derive an expression for slew rate and explain its significance in op-amp performance with a suitable example.	1	UN	16
6	Explain the need for frequency compensation in operational amplifiers. Discuss any two frequency compensation techniques with neat diagrams.	1	UN	16

UNIT II APPLICATIONS OF OPERATIONAL AMPLFIER

Differential amplifiers, Instrumentation amplifiers, integrator and differentiator, summing amplifier, precision rectifier Schmitt trigger, comparator and their applications, oscillators and multivibrator. Active filters: Low pass, high pass

Q.No	Question	CO	BTL	Marks
	PARTA			
1.	Define a differential amplifier.	2	RE	2
2.	List any two characteristics of an ideal instrumentation amplifier.	2	RE	2
3.	Draw the diagram of op-amp as an integrator and differentiator.	2	RE	2
4.	Write the expression for output of an inverting summing amplifier.	2	RE	2
5.	How does a precision rectifier differ from an ordinary rectifier?	2	UN	2
6.	Define Schmitt trigger.	2	RE	2
7.	What is an op-amp comparator?	2	RE	2
8.	State Barkhausen criterion for oscillation.	2	RE	2
9.	Name the types of multivibrators.	2	RE	2
10	Difference between active filter and passive filter.	2	RE	2
	PART B			
1.	(i) Describe the operation of a differential amplifier with neat sketch.	2	UN	8
	(ii) Draw the circuit of integrator using op-amp and explain.			8
2.	With a suitable diagram, explain the operating principle of an Instrumentation amplifier and derive its gain.	2	AP	16
3.	(i) Apply the working principle of an op-amp Schmitt trigger to determine the upper and lower threshold voltages for given component values.	2	AP	8
	(ii) Apply the concept of a precision rectifier using an op-amp to determine the output waveform for a given input signal.			8
4.	(i) Analyze the operating principle of oscillators and determine the conditions required for sustained oscillations.	2	AN	8
	(ii) Inspect the working of an op-amp based RC oscillator and differentiate how the Barkhausen conditions are satisfied within the circuit.			8
5	Design an op-amp astable multivibrator and calculate its time period and frequency. Explain its working with circuit diagram and waveforms.	2	AP	16
6	(i) Analyze the frequency response of an active low-pass filter	2	AN	8

	and justify the derivation of its cut-off frequency expression. (ii) Analyze the frequency response of an active high-pass filter and justify the derivation of its cut-off frequency expression.			8

UNIT III ANALOG MULTIPLIER AND PLL

Analog Multiplier using Emitter Coupled Transistor pair, Gilbert Multiplier cell, Operation of the basic PLL, closed loop analysis, Voltage controlled oscillator, application of PLL for AM detection, FM detection, FSK modulator and demodulator, Frequency synthesizers

Q.No	Question	CO	BTL	Marks
	PARTA			
1	Why emitter-coupled pairs are preferred for analog multiplication?	3	UN	2
2	What is Gilbert multiplier cell.	3	RE	2
3	Define capture range and lock range.	3	RE	2
4	List the basic building blocks of PLL.	3	RE	2
5	What is meant by closed-loop operation of PLL?	3	UN	2
6	Define Voltage Controlled Oscillator (VCO) and write the expression for its output frequency.	3	UN	2
7	Write the applications of PLL.	3	RE	2
8	Draw the circuit of AM detector using PLL.	3	UN	2
9	State the principle of FM detection using PLL.	3	UN	2
10	What is the role of PLL in frequency synthesizers?	3	UN	2
	PARTB			
1.	(i) Explain the operation of an analog multiplier using emitter-coupled transistor pair	3	UN	8
	(ii) Describe the construction and operation of a basic Phase Locked Loop (PLL) and explain the function of each internal block with a neat diagram.			8
2.	Explain the construction and operation of a Gilbert multiplier cell with neat circuit diagram and derive the expression for output current.	3	AP	16
3	Explain the operation of IC565 analog with AM and FM detection.	3	UN	16
4.	Illustrate the operation of VCO with neat block diagram. Also derive an expression for f_o. Give the pin details of IC565.	3	AP	16

5	In a FSK based satellite communication system, how could the PLL design be configured to perform both FSK modulation and demodulations?	3	AP	16
6	Design a PLL-based frequency synthesizer for generating a range of frequencies. Explain the selection of each block and justify design choices.	3	AP	16

UNIT IV DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, Analog to-digital converters (ADC): Single slope, dual slope, successive approximation, flash type

Q.No	Question	CO	BTL	Marks
	Part A			
1.	List the important specifications of digital to analog converter	4	UN	2
2.	Define resolution of a data converter.	4	RE	2
3.	Define settling time.	4	RE	2
4.	An 8 bit D/A converter has an output voltage ranging from 0 to 2.55 V. Find the resolution of the system.	4	AP	2
5.	Why inverted R-2R DAC is preferred than R-2R DAC	4	UN	2
6.	What is quantization?	4	RE	2
7.	List any two methods to improve the performance of an Analog-to-Digital Converter (ADC).	4	UN	2
8.	What is aliasing?	4	RE	2
9.	What is a dual-slope ADC?	4	RE	2
10.	What is the function of SAR in successive approximation ADC?	4	RE	2
	Part B			
1.	Draw the circuit of 4 bit binary weighted resistor DAC and explain with its input output timing diagram.	4	UN	16
2.	Explain the working of R-2R ladder DAC with a circuit schematic. And list converter characteristics.	4	UN	16
3.	Explain the construction and working of Single slope ADC.	4	UN	16
4.	With the block diagram explain the working of Dual slope ADC.	4	UN	16
5.	Explain the successive approximation ADC with block diagram.	4	UN	16
6.	Explain the working of a flash type ADC with neat diagram.	4	UN	16

UNIT V SPECIAL FUNCTION ICS

Timer IC 555, IC Voltage regulators: Three terminal fixed and Adjustable voltage regulators, IC 723 general purpose regulator, Monolithic switching regulator. IC LM358,TL082,TL081. Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Optocouplers and fibre optic IC.

Q.No	Question	CO	BTL	Marks
	Part A			
1.	What is IC 555 timer? List the operating modes of IC 555.	5	RE	2
2.	Name any two fixed voltage regulator ICs.	5	RE	2
3.	Why IC 723 is called a general-purpose regulator?	5	UN	2
4.	What is a monolithic switching regulator?	5	RE	2
5.	What is the difference between TL081 and TL082?	5	UN	2
6.	How current boosting is done in voltage regulator?	5	UN	2
7.	What is an audio power amplifier?	5	RE	2
8.	Mention the features of isolation amplifier.	5	RE	2
9.	State the function of optocoupler.	4	RE	2
10.	Why fibre optic systems are immune to electromagnetic interference?	4	UN	2
	Part B			
1.	Draw the block diagram of IC 555 timer and explain the working of IC 555 in astable and monostable modes with circuit diagrams and timing waveforms.	5	UN	16
2.	What are the types of regulators? Discuss the operation of fixed and adjustable voltage regulators.	5	AP	16
3.	With a neat circuit diagram explain the operation of frequency to voltage and voltage to frequency converter using op-amp.	5	UN	16
4.	(i) Explain the working of monolithic switching regulators with a neat block diagram.	5	UN	12
	(ii) List advantages over linear regulators and mention typical applications.			4
5.	Illustrate and explain the functional diagram of audio power amplifier and video amplifier along with its features.	5	UN	16
6.	(i) Explain the construction and working of isolation amplifier with applications.	5	UN	8
	(ii) Explain the working of an opto coupler and list its applications.			8

***** END *****

24ECPC405

MICROPROCESSOR AND MICROCONTROLLER

UNITED INSTITUTE OF TECHNOLOGY

UNIT I

THE 8086 MICROPROCESSOR

Introduction to 8086 – Microprocessor architecture – Addressing modes Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is an assembler?	CO1	RE	2
2.	What are called as assembler directives? Give two examples.	CO1	RE	2
3.	Compare Macro and Procedure.	CO1	UN	2
4.	What do you mean by Segment override prefix?	CO1	RE	2
5.	Draw the 8086 flag register format.	CO1	RE	2
6.	What is Tristate bus?	CO1	RE	2

7.	Identify the addressing modes in the following instruction
	AND AL, BL
	SUB AL, 24H
	MOV AL, (BP)
	MOV CX, 1245H.
		CO1	AP	2

8.	List the different types of 8086 hardware interrupts.	CO1	RE	2
9.	What are the advantages of using memory segmentation in 8086?	CO1	RE	2
10.	How the 20-bit effective address is calculated in an 8086 processor?	CO1	RE	2
	PART B			
1.	With a neat diagram explain the bus interfacing unit and execution unit in 8086 microprocessor.	CO1	UN	16
2.	Explain the Interrupt architecture of 8086 microprocessor.	CO1	UN	16
3.	Explain the various addressing modes of 8086 processor with suitable examples.	CO1	UN	16
4.	Explain Data transfer, arithmetic and logical group instructions of 8086 microprocessor.	CO1	UN	16
5.	Explain the 8086 Bit manipulation instructions with an example for each.	CO1	UN	16
6.	a) Write an ALP Program to arrange the elements in an array of 10 elements in ascending order. b) Write an 8086 ALP program to find the sum of numbers in the array of 10 elements. c) Write an 8086 ALP to find the largest element in an array of elements.	CO1	AP	16

UNIT II

8086 SYSTEM BUS STRUCTURE

8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, closely coupled and loosely Coupled configurations – Introduction to advanced processors.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	When the 8086 processor in Minimum mode and maximum mode?	CO2	RE	2
2.	Compare closely coupled configuration features with loosely coupled configuration features.	CO2	UN	2
3.	Mention the need for co- processor in a microprocessor-based system**.**	CO2	RE	2
4.	What are the two internal sections of 8087 architecture?	CO2	RE	2
5.	How does Coprocessors identify the instructions meant for it?	CO2	RE	2
6.	List any four 8087 data formats	CO2	RE	2
7.	What is the role of CCP in 8089 architecture?	CO2	RE	2
8.	What is non-pre-emptive and pre-emptive allocation?	CO2	RE	2
9.	What is Translation Lookaside Buffer?	CO2	RE	2
10.	What is Bus snooping?	CO2	RE	2
	PART B			
1.	Draw and explain the Minimum Mode system configuration of 8086.	CO2	UN	16
2.	Discuss the maximum mode configuration of 8086 by with a neat diagram. Mention the function of the various signals.	CO2	UN	16
3.	Draw the architecture of 8089 I/O processor and explain its functionalities.	CO2	UN	16
4.	With a neat sketch explain the general interconnections between 8086 and 8089.	CO2	UN	16
5.	Explain the salient features of 8087 Co-processor units in architectural diagram.	CO2	UN	16
6.	a) Give two examples of 8087 data transfer instructions, arithmetic instructions, processor control instructions and transcendental instructions. b) Explain the Pipelining stages of Floating-Point Unit for various Processors.	CO2	UN	16

UNIT III

I/O INTERFACING

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is the difference between Memory Mapped I/O and I/O Mapped I/O?	CO3	UN	2
2.	What is Key debouncing? What are the methods to detect the debouncing?	CO3	RE	2
3.	What is Sample and Hold circuit?	CO3	RE	2
4.	What is the difference between 2-key lockout and N-Key rollover modes in 8279?	CO3	RE	2
5.	Define: Resolution of A to D converter.	CO3	RE	2
6.	Mention any two applications that uses ADC and DAC	CO3	RE	2
7.	What is Direct Memory Access?	CO3	RE	2
8.	Show how many address lines and data lines are necessary for accessing 32Kx8 memory?	CO3	UN	2
9.	List the applications of programmable interval timer.	CO3	RE	2
10.	What are the various modes of operation of 8259?	CO3	RE	2
	PART B			
1.	Explain in detail about the 8257 DMA Controller with a neat block diagram.	CO3	UN	16
2.	Draw and explain the block diagram of 8254 Programmable Interval Timer. Also explain the various .Modes of operation.	CO3	UN	16
3.	With neat block diagram explain the 8255 Programmable peripheral Interface and its operating modes.	CO3	UN	16
4.	Explain the 8251 USART with neat block diagram. Also explain its mode word, command word and status word.	CO3	UN	16
5.	With a neat block diagram explain the keyboard and display controller IC 8279.	CO3	UN	16
6.	Describe the block diagram of 8259 Programmable Interrupt Controller and its priority modes**.**	CO3	UN	16

UNIT IV

MICROCONTROLLER

Comparison of Microprocessor and Microcontroller- Architecture of 8051 – Memory Organization -Special Function Registers (SFRs) - I/O Pins Ports and Circuits –Instruction set - Addressing modes –Assembly language programming.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What are the special function registers used for port operation in 8051?	CO4	RE	2
2.	What is the need for Bit wise instructions in 8051?	CO4	RE	2
3.	How do you select the register bank in 8051 microcontroller?	CO4	RE	2
4.	List the SFR's involved in Interrupt programming of 8051.	CO4	RE	2
5.	Which of the 8051 port need pull-up registers to function as I/O port?	CO4	RE	2
6.	What are the advantages of register indirect addressing mode in 8051 microcontroller?	CO4	RE	2
7.	What is the function of DPTR register?	CO4	RE	2
8.	With XTAL = 11.0592 MHz, what value should be loaded into TH1 to have 9600 baud rate?	CO4	UN	2
9.	Draw the diagram for Program Status Word in 8051.	CO4	RE	2
10.	What is the difference between AJMP and LJMP instruction?	CO4	UN	2
	PART B			
1.	Explain the architecture of 8051 microcontroller with neat diagram.	CO4	UN	16
2.	a) Explain the memory structure of an 8051 Micro-controller. b) Draw the pin diagram of 8051 microcontroller and explain the functions of each pin.	CO4	UN	16
3.	Explain the Various addressing modes of 8051 in detail.	CO4	UN	16
4.	Explain about arithmetic and control instruction set in 8051.	CO4	UN	16
5.	a) Explain the rotate and swap instructions with an example for each. b) Describe the logic instructions in 8051with an example for each.	CO4	AP	16
6.	a) Write an assembly language program for 8051 to find the largest of three numbers. b) Write an assembly language program for 8051 to find the sum of 10 numbers stored in the array.	CO4	AP	16

UNIT V

INTERFACING MICROCONTROLLER

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is PWM?	CO5	RE	2
2.	Give a schematic to interface relay with microcontroller.	CO5	RE	2
3.	Write shortly on the various operating modes for serial port of 8051 microcontroller.	CO5	RE	2
4.	What is the size of the on-chip program memory and on-chip data memory of 8051 microcontroller?	CO5	RE	2
5.	Name the sensor used in Microprocessor based temperature controller.	CO5	RE	2
6.	How does the status of EA pin affect the access to internal and external program memory?	CO5	RE	2
7.	Differentiate between timers and counter. Draw the diagram of TCON in 8051.	CO5	UN	2
8.	Explain the register IE format of 8051.	CO5	UN	2
9.	What is the function of SM2 bit in the SCON register of 8051?	CO5	RE	2
10.	Write an ALP to receive input from port P1.5 and if it is high then an output 35H is sent to Port 0.	CO5	AP	2
	PART B			
1.	Write an assembly language program to generate square wave form using on-chip timer.	CO5	AP	16
2.	Explain the working of microprocessor-based stepper motor control with suitable circuit diagram.	CO5	UN	16
3.	Explain the interfacing of 4×4 matrix keyboard to the 8051 microcontroller with neat diagram.	CO5	UN	16
4.	Describe the different modes of operation of timers/counters in 8051 with its associated register.	CO5	UN	16
5.	Explain with a help of a neat block diagram how DAC is interfaced with 8051 Microcontroller.	CO5	UN	16
6.	a) Describe the various interrupts and their associated priorities in 8051 microcontroller. b) How does one interface a 16 X 2 LCD Display using 8051 Micro-controller?	CO5	UN	16

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