Faculty of Engineering
End Semester Examination May 2025
EC3CO18 Analog Communication

Programme	:	B.Tech.	Branch/Specialisation	:	EC
Duration	:	3 hours	Maximum Marks	:	60

Note: *All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.*

	Section 1 (Answer all question(s))		Marks	CO	BL

Q1. Which of the following is not a block of transmitter section? — **1 1 1**
- ○ Modulator
- ○ Filter
- ○ Amplifier
- ◉ Demodulator

Q2. Which of the following modulation scheme requires maximum transmission bandwidth? — **1 1 1**
- ◉ DSB-SC
- ○ SSB-SC
- ○ SSB-FC
- ○ VSB-SC

Q3. In direct method of FM generation, which parameter is varied to deviate frequency? — **1 1 1**
- ○ Inductance
- ◉ Capacitance
- ○ Resistance
- ○ Conductance

Q4. Two sinusoidal signals are simultaneously modulating a carrier, the modulation indices being 0.3 and 0.4. What is the overall modulation index? — **1 2 2**
- ○ 0.12
- ○ 0.1
- ○ 0.7
- ◉ 0.5

Q5. In a broadcast superheterodyne receiver having no RF amplifier. If the IF is 455 kHz, calculate the image frequency at 1500 kHz. — **1 2 2**
- ○ 910 kHz
- ◉ 2410 kHz
- ○ 3000 kHz
- ○ 1955 kHz

Q6. Sensitivity is defined as- — **1 1 1**
- ◉ Ability of receiver to amplify weak signals
- ○ Ability to reject unwanted signals
- ○ Ability to convert incoming signal into Image frequency
- ○ Ability to reject noise

Q7. What is figure of merit of SSB-SC system with coherent detection? — **1 1 1**
- ○ 0
- ◉ 1
- ○ Infinity
- ○ Some finite value

Q8. The non-continuous noise of irregular pulses or spikes with high amplitudes known as- — **1 1 1**
- ○ Wander
- ◉ Jitter
- ○ Hits
- ○ Singing

Q9. The spectrum of the sampled signal may be obtained without overlapping only if- — **1 2 2**
- ◉ fs ≥ 2fm
- ○ fs < 2fm
- ○ fs > fm
- ○ fs < fm

Q10. Calculate the Nyquist rate for sampling when a continuous time signal is given by $x(t) = 5cos100\pi t + 10cos200\pi t - 15cos300\pi t$

     1   **2** **2**

- ○ 150 Hz
- ◉ 300 Hz
- ○ 600 Hz
- ○ 200 Hz

Section 2 (Answer all question(s))

Q11. What are the fundamental needs of modulation? Explain each with example.   **3**   **2** **2**

Rubric	Marks
One mark for each need with example.	3

Q12. (a) Draw the circuit diagram of diode detector. How it recovers the information signal from DSB-FC modulated signal? Derive the expression of charging and discharging time constants for proper recovery of information signal.   **7**   **3** **3**

Rubric	Marks
Circuit diagram	1
How it recovers the information signal from DSB-FC modulated signal?	3
Derive the expression of charging and discharging time constants for proper recovery of information signal.	3

(OR)

(b) Explain the coherent generation and detection of double sideband suppressed carrier (DSB-SC) signal with the help of neat and clean block diagrams, waveforms, expressions and spectrum.

Rubric	Marks
Block diagrams	2
waveforms	2
Expressions	1
Spectrums	2

Section 3 (Answer all question(s))

Q13. How frequency modulation can be generated by using a phase modulator? Explain using proper block diagram.   **3**   **2** **2**

Rubric	Marks
Block diagram	1
Proper explanation	2

Q14. (a) Draw neat and clean block diagram for the Armstrong's method of FM generation. How it   7   4   3
converts a NBFM signal to WBFM signal? Explain it with the help of a mathematical example.
Calculate $N_1 * N_2$.

Rubric	Marks
Draw neat and clean block diagram for the Armstrong's method of FM generation.	2
How it converts a NBFM signal to WBFM signal.	2
Explain it with the help of a mathematical example.	3

(OR)

(b) A FM wave is represented by the following equation:
$x_{FM}(t) = 10sin(5 * 10^8 t + 4 * sin1250t)$ volts
Determine the following:
- Carrier frequency and modulating frequency.
- Modulation index and maximum deviation.
- The power dissipated by this FM wave in a 5Ω resistor.

Rubric	Marks
Carrier frequency and modulating frequency	2
Modulation index and maximum deviation	2
The power dissipated by this FM wave in a 5Ω resistor	3

Section 4 (Answer all question(s))
    Marks CO BL

Q15. Explain the concept of image frequency. How it can be rejected?   3   2   2

Rubric	Marks
Explain the concept of image frequency.	2
How it can be rejected?	1

Q16. (a) What are the features of a good receiver? Explain superheterodyne receiver with the help of neat   7   2   2
and clean block diagram.

Rubric	Marks
One mark for each feature.	3
Explain superheterodyne receiver with the help of neat and clean block diagram.	4

(OR)

(b) Why pre-emphasis and de-emphasis is required in FM system? Draw their circuit diagrams and
explain using frequency domain characteristics.

Rubric	Marks
Why pre-emphasis and de-emphasis is required in FM system?	2
Draw their circuit diagrams.	2
Explain using frequency domain characteristics.	3

Section 5 (Answer all question(s))
    Marks CO BL

Q17. Define energy signal and power signal with the help of example of each.   3   2   2

Rubric	Marks
Explanation of energy signal with example.	1.5
Explanation of power signal with example.	1.5

Q18. (a) What is noise and how noise is classified? Explain each type in details.   7   3   3

Rubric	Marks
What is noise?	1
How noise is classified?	2
Explain each type in details.	4

(OR)

(b) Evaluate the performance of coherent DSB-SC receiver by deriving the expression of figure of merit.

Rubric	Marks
Calculating input SNR.	3
Calculating output SNR.	3
Calculating FOM.	1

Section 6 (Answer any 2 question(s))

Marks CO BL

Q19. Explain generation and detection of PWM system with the help of neat and clean block diagrams and waveforms.   5   4   2

Rubric	Marks
Block diagrams.	2
Waveforms and explanation.	3

Q20. Explain generation and detection of PPM system with the help of neat and clean block diagrams and waveforms.   5   4   2

Rubric	Marks
Block diagrams.	2
Waveforms and explanation.	3

Q21. State and proof sampling theorem.   5   4   2

Rubric	Marks
Correct statement.	2
Correct proof.	3

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