**University of Mumbai**

**Examinations Summer 2022**

Program: Electronic & Telecommunication Engineering

SEM-IV (C Scheme) (R2019)

Subject: PCE Course Code: ECC405

Time: 2hour 30 minutes Max. Marks: 80

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| **Q1.** | **Choose the correct option for following questions. All the Questions are compulsory and carry equal marks** |
| 1. | Which noise is generated due to random behavior of charge carriers? |
| Option A: | Shot noise |
| Option B: | Partition noise |
| Option C: | Industrial noise |
| Option D: | Flicker noise |
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| 2. | What is the circuit used for producing AM called? |
| Option A: | Modulator |
| Option B: | Transmitter |
| Option C: | Receiver |
| Option D: | Duplexer |
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| 3. | What is special circuit used to generate a Double sideband suppressed carrier signal? |
| Option A: | Sideband suppressor |
| Option B: | Anti-modulator |
| Option C: | Balanced modulator |
| Option D: | Carrier suppressor |
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| 4. | Pre-Emphasis Circuit is used to amplify what kind of frequencies? |
| Option A: | Low |
| Option B: | High |
| Option C: | Moderate |
| Option D: | Oscillator |
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| 5. | According to Sampling Theorem, Sampling frequency is ------- of modulating frequency. |
| Option A: | Less than or equal to twice of Modulating frequency |
| Option B: | Greater than or equal to Modulating frequency |
| Option C: | Greater than or equal to half of Modulating frequency |
| Option D: | Greater than or equal to twice of Modulating frequency. |
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| 6. | Which pulse modulation technique gives comparatively high SNR? |
| Option A: | PAM |
| Option B: | PWM |
| Option C: | PPM |
| Option D: | WDM |
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| 7. | Aliasing refers to |
| Option A: | Sampling of signals greater than at Nyquist rate |
| Option B: | Sampling of signals less than at Nyquist rate |
| Option C: | Sampling of signals at Nyquist rate |
| Option D: | demodulation |
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| 8. | The standard value for Intermediate Frequency (IF) in AM receivers is |
| Option A: | 455 KHz |
| Option B: | 580 KHz |
| Option C: | 10.7 MHz |
| Option D: | 50 MHz |
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| 9. | What causes a quantization noise in PCM system? |
| Option A: | Serial transmission errors |
| Option B: | The approximation of the quantized signal |
| Option C: | The synchronization between encoder and decoder |
| Option D: | Binary coding techniques |
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| 10. | The ratio between the modulating signal voltage and the carrier voltage is called? |
| Option A: | Amplitude modulation |
| Option B: | Modulation frequency |
| Option C: | Modulation index |
| Option D: | Ratio of modulation |
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| 11. | What is the BW of DSB-SC signal? |
| Option A: | fm |
| Option B: | 2fm |
| Option C: | fm/2 |
| Option D: | fc+fm |
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| 12. | What is the sequence of operations in which PCM is done? |
| Option A: | Quantizing, encoding, sampling |
| Option B: | Sampling, quantizing, encoding |
| Option C: | Quantizing, sampling, encoding |
| Option D: | Sampling, encoding, quantization |
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| 13. | Calculate the side band power in an SSBSC signal when there is 50% modulation and the carrier power is 100W. |
| Option A: | 50 W |
| Option B: | 25 W |
| Option C: | 6.25 W |
| Option D: | 12.5 W |
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| 14. | A super heterodyne receiver with an IF of 450 kHz is tuned to a signal at 1250 kHz. The image frequency is |
| Option A: | 1700 kHz |
| Option B: | 2150 kHz |
| Option C: | 1650 kHz |
| Option D: | 2100 kHz |
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| 15. | For a three-stage cascade amplifier, calculate the overall noise figure when each stage has a gain of 12 DB and noise figure of 8dB. |
| Option A: | 12 |
| Option B: | 24 |
| Option C: | 13.55 |
| Option D: | 8 |
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| 16. | Which of the following analog modulation schemes requires the minimum transmitted power and minimum channel bandwidth? |
| Option A: | VSB |
| Option B: | DSB-SC |
| Option C: | SSB |
| Option D: | AM |
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| 17. | In PM, the information is transmitted using |
| Option A: | change in phase of the carrier |
| Option B: | change in position of the carrier |
| Option C: | change in amplitude of the carrier |
| Option D: | change in frequency of the carrier |
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| 18. | The process of impressing a low frequency information signals onto a high-frequency carrier signal is called as \_\_\_\_\_\_\_\_ |
| Option A: | demodulation |
| Option B: | modulation |
| Option C: | oscillation |
| Option D: | amplification |
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| 19. | ARMSTRONG method is used for the generation of |
| Option A: | DSB-SC |
| Option B: | DSB-FC |
| Option C: | Direct FM |
| Option D: | Indirect FM |
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| Q20. | If signal x(t) has maximum frequency of “W” Hz then Nyquist Interval is given by |
| Option A: | W |
| Option B: | 1/W |
| Option C: | 2W |
| Option D: | 1/2W |
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| Q21. | Pre-emphasis in FM system involves |
| Option A: | compression of the modulating signal |
| Option B: | expansion of the modulating signal |
| Option C: | amplification of lower frequency component of modulating signal |
| Option D: | amplification of higher frequency component of modulating signal |
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| Q22. | In a radio receiver, the local oscillator is tuned to a frequency |
| Option A: | lower than the incoming frequency |
| Option B: | higher than the incoming frequency |
| Option C: | equal to incoming frequency |
| Option D: | half of the incoming frequency |
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| Q23. | When two networks are connected in series, its composite noise figure can be given as |
| Option A: | F1+(F2-1)/G1 |
| Option B: | F1-(F2-1)/G1 |
| Option C: | F2+(F1-1)/G1 |
| Option D: | F1G1+(F2-1) |
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| Q24. | The AM spectrum consists of |
| Option A: | Carrier frequency |
| Option B: | Upper side band frequency |
| Option C: | Lower side band frequency |
| Option D: | Carrier Frequency, Upper side band frequency and Lower sideband frequency |
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| Q25. | For an AM DSB-FC envelope with Vmax =20 V and Vmin = 4V, what will be the peak amplitude of carrier |
| Option A: | 20 |
| Option B: | 4 |
| Option C: | 8 |
| Option D: | 12 |
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| 26. | Noise Factor (F) and Noise Figure (NF) are related as |
| Option A: | NF = 10 log10(F) |
| Option B: | F = 10 log10(NF) |
| Option C: | NF = 10 (F) |
| Option D: | F = 10 (NF) |
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| 27. | Noise in a communication system originates in: |
| Option A: | the sender |
| Option B: | the receiver |
| Option C: | the channel |
| Option D: | the sender, the receiver, the channel |
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| 28. | Shot noise is generated in: |
| Option A: | transistors and diodes |
| Option B: | resistors |
| Option C: | copper wire |
| Option D: | Only diodes |
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| 29. | VSB modulation is preferred in TV because |
| Option A: | it reduces the bandwidth requirement to half |
| Option B: | it avoids phase distortion at low frequencies |
| Option C: | it results in better reception |
| Option D: | it saves power |
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| 30. | Most of the power in an AM signal is in the |
| Option A: | Carrier |
| Option B: | Upper Sideband |
| Option C: | Lower Sideband |
| Option D: | Modulating Signal |
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| 31. | A 100MHz carrier is frequency modulated by 10 KHz wave. For a frequency deviation of 50 KHz, calculate the modulation index of the FM signal. |
| Option A: | 100 |
| Option B: | 50 |
| Option C: | 70 |
| Option D: | 90 |
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| 32. | The function of an AM detector circuit is to |
| Option A: | rectify the input signal |
| Option B: | discard the carrier |
| Option C: | provide audio signal |
| Option D: | rectify the input signal by discarding the carrier to provide audio signal |
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| 33. | In Pulse Position Modulation, the drawbacks are |
| Option A: | Synchronization is required between transmitter and receiver |
| Option B: | Large bandwidth is required as compared to PAM |
| Option C: | It doesn’t need any synchronization |
| Option D: | It needs synchronization between transmitter & receiver and requires large bandwidth as compared to PAM |
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| 34. | The sampling technique having the minimum noise interference is |
| Option A: | Instantaneous sampling |
| Option B: | Natural sampling |
| Option C: | Flat top sampling |
| Option D: | Instantaneous, Natural & Flat top sampling |
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| 35. | Which of the following is digital multiplexing technique? |
| Option A: | FDM |
| Option B: | Asynchronous TDM |
| Option C: | Synchronous TDM |
| Option D: | Asynchronous & Synchronous TDM both |
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| 36. | When two or more signals share a common channel, it is called: |
| Option A: | sub-channeling |
| Option B: | signal switching |
| Option C: | SINAD |
| Option D: | multiplexing |
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| 37. | Indicate which one of the following is not an advantage of FM over AM: |
| Option A: | Better noise immunity is provided |
| Option B: | Lower bandwidth is required |
| Option C: | The transmitted power is more useful |
| Option D: | Less modulating power is required |
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| 38. | With high-level AM: |
| Option A: | the RF amplifiers are typically Class A |
| Option B: | the RF amplifiers are typically Class B |
| Option C: | the RF amplifiers are typically Class C |
| Option D: | the RF amplifiers are typically Class AB |
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| 39. | Basically, sensitivity measures: |
| Option A: | the weakest signal that can be usefully received |
| Option B: | the highest-frequency signal that can be usefully received |
| Option C: | the dynamic range of the audio amplifier |
| Option D: | Ratio of input signal to output signal |
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| 40. | In delta modulation, “granular noise” is produced when: |
| Option A: | the signal changes too rapidly |
| Option B: | the signal does not change |
| Option C: | the bit rate is too high |
| Option D: | the sample is too large |

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| **Sr. No.** | **Q.1 or Q2 or Q3 5 marks each** |
| 1 | Define modulation and advantages of modulation. |
| 2 | Explain block diagram of basic communication system. |
| 3 | Explain different types of communication channels. |
| 4 | Define noise, noise factor, noise figure, noise temperature |
| 5 | Explain different types of noise. |
| 6 | Compare different modulation techniques of AM |
| 7 | Compare different modulation techniques of FM |
| 8 | Calculate power saving in DSBSC/SSB AM. |
| 9 | Explain Ring Modulator. |
| 10 | Compare AM, FM and PM. |
| 11 | Compare narrowband and wideband FM. |
| 12 | Compare AM and FM receivers. |
| 13 | Compare Delta and Adaptive delta modulation. |
| 14 | Explain with block diagram TDM. |
| 15 | Explain with block diagram FDM. |
| 16 | Compare TDM and FDM. |
| 17 | Explain different types of AGC. |
| 18 | Explain Sampling theorem. |
| 19 | Explain aliasing error and aperture effect. |
| 20 | Explain Nyquist criteria. |

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| **Sr. No.** | **Q.1 or Q2 or Q3 10 marks each** |
| 1 | Draw and explain frequency allocation table of international communication standards. |
| 2 | Derive Friss transmission formula |
| 3 | Explain with applications ISB and VSB |
| 4 | Explain different methods for generation of DSBFC/DSBSC/SSB |
| 5 | Explain Foster Seeley discriminator. |
| 6 | Explain ARMSTRONG method of FM generation. |
| 7 | Explain noise triangle in FM and pre-emphasis and De-emphasis |
| 8 | Explain SHR (Super heterodyne receiver) with its advantages over TRF. |
| 9 | Explain performance parameters (characteristics) of receivers. |
| 10 | Why IF of AM is 455KHZ? Also explain AGC and its different types. |
| 11 | Determine noise figure using Friss formula if G1=15dB, F1=10db and F2=20db.  Also calculate noise voltage and noise power at temperature 2900K, Bandwidth 5MHz and resistor 50ohm. |
| 12 | One input to AM modulation is 500 KHz carries with an amplitude of 20Vp. The  second input is 10 KHz modulating signal that is of sufficient amplitude to cause a  change in o/p wave of ± 7.5 Vp. Determine:   1. Upper and Lower side frequencies 2. Modulation co-efficient and % modulation 3. Expression of modulated wave 4. Draw o/p spectrum 5. Total transmitted power and power saving in SSB |
| 13 | In an FM system if the maximum value of deviation is 75KHz and the maximum modulating frequency is 10KHz. calculate the deviation ratio and bandwidth of the system. |
| 14 | Explain FM receivers. |
| 15 | Explain PAM /PWM/PPM modulator and demodulator, also give its advantages, disadvantages and applications. |
| 16 | Explain Delta and adaptive delta modulation with its advantages and disadvantages and applications. |
| 17 | Explain PCM and DPCM. |
| 18 | Explain Sampling theorem and Nyquist criteria. |
| 19 | Explain aliasing error and aperture effect. |
| 20 | Explain advantages, disadvantages and applications of TDM and FDM with receiver block diagram. |