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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S,FE) (FT/WP/PT) Examination December 2025 (2019 Scheme)

Course Code: ECT308

Course name: COMPREHENSIVE COURSE WORK

Max. Marks: 50 Duration: 1Hour

Instructions: ***(1) Each question carries one mark. No negative marks for wrong answers***
(2) Total number of questions: 50
(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.
(4) If more than one option is chosen, it will not be considered for valuation.

1. In a transistor if $\beta = 120$ and collector current is 12mA, then I_E is .....

   a) 12.1mA b) 10.10 mA c) 100mA d) None of these

2. Add (23)8 and (67)8

   a) $(231)_8$ b) $(147)_8$ c) $(112)_8$ d) $(158)_8$

3. What is the ideal output impedance of an operational amplifier (Op-Amp)?

   a) 0 b) infinity c) 1 d) 100

4. The bandwidth for transmission in pulse code modulation is _____

   a) Higher than DPCM b) Lower than DPCM c) Equal to DPCM d) None of these

5. What is the main reason for operating a transistor amplifier in the active region?

   a) To obtain maximum power output b) To obtain maximum voltage gain c) To obtain minimum distortion d) To prevent damage to the transistor

6. The hexadecimal equivalent of $(762.013)_8$ is:

   a) $(1F2.058)_{16}$ b) $(2E2.058)_{16}$ c) $(724.72)_{16}$ d) $(4B6.44)_{16}$

7. The pull-in time depends on

   a) Overall loop gain b) Loop filter characteristics c) All of the mentioned d) None of the above

8. The maximum power efficiency of an AM modulator is

   a) 25% b) 50% c) 33% d) 100%

9. What happens when VCO output is 90^0 out of phase with respect to input signal?

   a) Perfect lock b) Attenuation c) Shift in phase of comparator d) Error signal is removed

10. How does negative feedback affect the bandwidth of an amplifier?

a) It decreases the bandwidth b) It increases the bandwidth c) It has no effect on the bandwidth d) It causes resonance in the circuit

11. Reflected binary code is also known as_____

a) BCD code b) Binary code c) ASCII code d) Gray Code

12. How do we determine the time period of a monostable 555 multivibrator.

a) T = 0.33RC b) T = 1.1RC c) T = 3RC d) T = RC

13. Crossover distortion is the characteristics of .....output stage

a) Class A b) Class B c) Class AB d) None of the above

14. The resistor in the peak detector are used to

a) To maintain proper operation b) Protect op-amp from damage c) To get shaped non-sinusoidal waveform d) None of the mentioned

15. What is the typical efficiency of a transformer-coupled Class A power amplifier?

a) 50% b) 78.5% c) 25% d) 30%

16. Simplify the expression using K-maps: $F(A,B,C) = \Sigma (1,3,5,6,7)$

a) AC'+B' b) AB+C c) AB'+B'C' d) A'BC+B'C+AC

17. Which Op-Amp configuration provides phase inversion?

a) Inverting Amplifier b) Non-Inverting Amplifier c) Voltage follower d) Comparator

18. When a bipolar junction transistor is operating in the saturation mode, which one of the following statements is TRUE about the state of its collector-base (CB) and the base-emitter (BE) junctions?

a) The CB junction is forward biased, and the BE junction is reverse biased b) The CB junction is reverse biased, and the BE junction is forward biased c) Both CB and BE junctions are forward biased d) Both CB and BE junctions are reverse biased

19. The functional diagram of a 555 Timer IC consists of _____ comparators.

a) No Comparators b) 1 c) 2 d) 3

20. What is the primary application of a clamper circuit in television systems?

a) Video amplification b) Audio filtering c) DC restoration d) Image processing

21. Identity the Boolean Law: A+A=A

a) Idempotent law b) Annulment law c) Absorption law d) Distributive law

22. An inverting amplifier with gain 1 have different input voltage: 1.2 V,3.2 V and 4.2 V. Find the output voltage?

a) 4.2 V b) 8.6 V c) -4.4 V d) -8.6 V

23. What is the purpose of the preset and clear inputs in a flip-flop?

a) To force output to a known state b) To enable clock input c) To store multiple bits d) To add extra memory

24. Excess-3 code is known as

a) Weighted code b) Cyclic redundancy code c) Self-complementing code d) Algebraic code

25. Which of the following is true in case of Overlap add method?

a) M zeros are appended at last of each data block b) M zeros are appended at first of each data block c) M-1 zeros are appended at last of each data block d) M-1 zeros are appended at first of each data block

26. For a bit-rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are

a) 16 KHz and 20 KHz b) 20 KHz and 32 KHz c) 20 KHz and 40 KHz d) 32 KHz and 40 KHz

27. In a Hartley oscillator, what determines the frequency of oscillation?

a) Resistance of the feedback network b) Capacitance and inductance in the tank circuit c) Type of transistor used in the circuit d) Power supply voltage

28. An instrumentation amplifier uses

a) 1 op-amp b) 2 op-amps c) 3 op-amps d) 4 op-amps

29. The purpose of the current mirror circuit is to

a) Copy a reference current b) Provide voltage amplification c) Convert AC to DC d) Generate sinusoidal signals

30. DFT performs filtering operation in .....

a) Time domain b) Frequency domain c) Both Time & Frequency domain d) None of these

31. What is the highest frequency that is contained in the sampled signal?

a) 2Fs b) Fs/2 c) Fs d) None of the mentioned

32. Which gates corresponds to the action of parallel switches ?

a) AND b) OR c) NAND d) NOR

33. The slew rate for an ideal op-amp is

a) Very slow b) slow c) Finite d) Infinitely fast

34. At a given probability of error, binary coherent FSK is inferior to binary coherent PSK by

a) 6 dB b) 3 dB c) 2 dB d) 0 dB

35. Find the circular convolution between two sequences x(n) = {2,1,2,1} and y(n) = {1,2,3,4}

a) {2,5,10,16,10,11, 2} b) {2,5,10,16,10} c) {14,14,16,16} d) {14,16,14,16}

36. Which model is commonly used for small signal analysis of a BJT amplifier?

a) Hybrid-pi model b) T-model c) Miller model d) Norton model

37. In Verilog, the operator shown in (a&&b) is a Verilog _____ operator

a) Shift b) Bitwise c) Logical d) Equality

38. The input capacitor in an amplifier is the ..... capacitor

a) Coupling b) Bypass c) Leakage d) None of the above

39. In QAM, both _____ of a carrier frequency vary

a) Frequency and Amplitude b) Phase and Amplitude c) Frequency and Phase d) None of the above

40. The number of complex addition in direct DFT are

a) N(N-1) b) N^2 c) $N\log_2 N$ d) $(N/2)\log_2 N$

41. What is the process of reducing the sampling rate by a factor D?

a) Sampling rate conversion b) Interpolation c) Decimation d) None of the above

42. In an FM system, if the maximum value of deviation is 75kHz, and the maximum modulating frequency is 10kHz, determine the bandwidth of the system using Carson's rule.

a) 85kHz b) 170kHz c) 42.5kHz d) 160kHz

43. With 4 Boolean variables, how many Boolean expressions can be formed?

a) 16 b) 1024(1K) c) 256 d) 64K(64 x 1024)

44. If a three-stage amplifier has individual stage gains of 12db, 7db and 11db; then the total gain in db is

a) 30db b) 924db c) 24db d) 31db

45. If we need to compute an 8-point FFT using Radix-2, how many stages are required?

a) 8 b) 4 c) 3 d) 2

46. The detector that minimizes the error probability is called as.....

a) Maximum likelihood detector b) Minimum likelihood detector c) Maximum & Minimum likelihood detector d) None of the mentioned

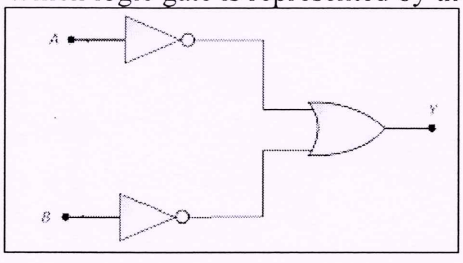
47. The largest two-digit hexadecimal number is_____

a) $(FE)_{16}$ b) $(FD)_{16}$ c) $(FF)_{16}$ d) $(FB)_{16}$

48. Which class of power amplifier operates for the entire input signal cycle?

a) Class A b) Class B c) Class AB d) Class C

49. Which logic gate is represented by the following combination of logic gates?



a) OR b) NAND c) NOR d) AND

50. The carrier amplitude after AM varies between 4V and 1V. Calculate the depth of modulation

a) 100% b) 60% c) 40% d) 25%

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