

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) / S6 (PT) (R,S) Examination May 2024 (2019 Scheme)

**Course Code: ECT 308****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. The theoretical maximum efficiency of a half wave diode rectifier is
 - a) 40.6%
 - b) 50%
 - c) 81.2%
 - d) 78%
2. Which circuit is called emitter follower?
 - a) Common Emitter
 - b) Common Collector
 - c) Common Base
 - d) Both a and b
3. Crossover distortion is the characteristics ofoutput stage
 - a) Class A
 - b) Class B
 - c) Class AB
 - d) None of the above
4. For a BJT, α and β are related as
 - a) $\alpha = \frac{\beta}{1-\beta}$
 - b) $\beta = \frac{1}{1+\alpha}$
 - c) $\beta = \frac{\alpha}{1-\alpha}$
 - d) $\beta = \frac{\alpha}{1+\alpha}$
5. The unit of voltage gain.....
 - a) dB
 - b) Volt
 - c) Ampere
 - d) No unit
6. What is the purpose of a coupling capacitor in an amplifier circuit?
 - a) To filter out high-frequency noise
 - b) To block DC and allow AC signals to pass
 - c) To provide power supply to the amplifier
 - d) To increase the gain of the amplifier
7. A bridge rectifier circuit using ideal diode has an input voltage of $20\sin\omega t$. The average and rms value of output voltage are
 - a) $\frac{40}{\pi}$ V and $\frac{20}{\sqrt{2}}$ V
 - b) $\frac{20}{\pi}$ V and $\frac{20}{\sqrt{2}}$ V
 - c) $\frac{40}{\pi}$ V and 10 V
 - d) $\frac{20}{\pi}$ V and 10 V
8. In an oscillator the total phase shift around the loop must be
 - a) 180°
 - b) 270°
 - c) 0°
 - d) 90°
9. The unit of $\frac{q}{kT}$ is

- a) V b) V^{-1} c) J d) J/K
10. If a three stage amplifier has individual stage gains of 12dB, 16dB and 8dB; then the total gain in dB is
a) 15dB b) 12dB c) 36dB d) 8dB
11. 10111_2 is equal to decimal number
a) 47 b) 37 c) 17 d) 23
12. $7BF_{16} = (\dots\dots\dots)_2$
a) 0111 1011 1110 b) 0111 1011 1111 c) 0111 1011 0111 d) 0111 1011 0011
13. In Boolean algebra $\bar{A} \cdot A$ is equal to
a) 1 b) A c) A^2 d) 0
14. Which gates corresponds to the action of parallel switches ?
a) AND b) OR c) NAND d) NOR
15. A sequential circuits with twelve states will have:
a) 10 flipflop b) 12 flipflop c) 3 flipflop d) 4 flipflop
16. As compared to TTL, CMOS logic has
a) Higher speed of operation b) Higher power dissipation c) Smaller physical size d) All of the above
17. A mod 4 counter will count
a) From 0 to 4 b) From 0 to 3 c) From any number n to n+4 d) None of the above
18. A counter has N flip flops. The total number of states are
a) N b) 2^N c) 2N d) 4^N
19. Which logic device is called a data distributor?
a) MUX b) DEMUX c) Encoder d) Decoder
20. Which has lowest propagation delay?
a) ECL b) TTL c) CMOS d) PMOS
21. The input to an op-amp integrating amplifier is a constant voltage. The output will be
a) A constant voltage b) A sawtooth wave c) A ramp d) ac voltage
22. The output impedance of an ideal op-amp is
a) zero b) low c) high d) infinite
23. Which of the following circuit is op-amp used in open loop configuration?
a) comparator b) Summing amplifier c) Integrating amplifier d) Logarithmic amplifier
24. The slew rate for an ideal op-amp is
a) Very slow b) slow c) Finite d) Infinitely fast

- 25 Which is not present in the internal circuit of operational amplifier?
 a) Differential Amplifier b) Level Shifter c) Output Driver d) Clamper
- 26 The functional diagram of a 555 Timer IC consists of _____ comparators.
 a) No Comparators b) 1 c) 2 d) 3
- 27 The number of comparator in a 4-bit Flash ADC is
 a) 4 b) 5 c) 15 d) 16
- 28 Find CMRR, if $A_d = 20$ dB and $A_c = 2$ dB ?
 a) 18dB b) 10dB c) 40dB d) 38dB
- 29 An instrumentation amplifier uses
 a) 1 op-amp b) 2 op-amps c) 3 op-amps d) 4 op-amps
- 30 Find the gain of a Non inverting amplifier, if $V_i = 1$ V, $R_f = 100$ K, $R_i = 10$ K
 a) 10 b) 1000 c) 11 d) 21
- 31 Computational complexity refers to the number of _____
 a) Additions b) Arithmetic operations c) Multiplications d) None of these
- 32 The resolution of N-bit system DAC converter is
 a) $\frac{1}{2^N}$ b) $\frac{1}{(2^N - 1)}$ c) $(2^N - 1)$ d) 2^N
- 33 The process of reducing the sampling rate by a factor D is called
 a) Decimation b) Sampling rate conversion c) Interpolation d) None of these
- 34 The DFT of two sample sequence $x[n] = \{A, B\}$ is $X[k] =$
 a) $A + iB$ b) $A - iB$ c) $A + B, A - B$ d) 0
- 35 The impulse response of a LTI system is $h(n) = \{1, 1, 1\}$. What is the response of the signal to the input $x(n) = \{1, 2, 3\}$?
 a) $\{1, 3, 6, 3, 1\}$ b) $\{1, 2, 3, 2, 1\}$ c) $\{1, 3, 6, 5, 3\}$ d) $\{1, 1, 1, 0, 0\}$
- 36 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) $\{14, 16, 14, 16\}$
- 37 Find $x(n) * \delta(n - n_0)$
 a) $x(n + n_0)$ b) $x(n - n_0)$ c) $x(-n - n_0)$ d) $x(-n + n_0)$
- 38 Given $x[n] = \{1, 2, 0, 3, -2, 4, 7, 5\}$, calculate $X[4]$?
 a) 20 b) -8 c) -20 d) 4
- 39 The width of the main lobe in rectangular window spectrum is
 a) $\frac{4\pi}{N}$ b) $\frac{16\pi}{N}$ c) $\frac{8\pi}{N}$ d) $\frac{2\pi}{N}$
- 40 If a discrete time signal $x(n)$ of length L is convolved with a discrete time signal $y(n)$ of length N then the length of output signal is
 a) $L + N$ b) $L + N - 1$ c) $L * N$ d) $(L * N) - 1$

- 41 The number of bits per sample in PCM system is increased from 4 to 6, then the improvement in signal to quantization ratio will be
 a) 3dB b) 12dB c) 2dB d) No change
- 42 For QAM, both _____ of a carrier signal may vary
 a) Frequency and Amplitude b) Phase and Amplitude c) Frequency and Phase d) None of the above
- 43 Which of the following probability density functions is applicable to discrete Random Variables?
 a) Gaussian Distribution b) Poisson Distribution c) Rayleigh Distribution d) Exponential Distribution
- 44 A 1000kHz carrier is simultaneously amplitude modulated by 300Hz and 2kHz audio signal. Which of the following frequencies will not be present in the output?
 a) 998kHz b) 999.7kHz c) 1000.3kHz d) 700kHz
- 45 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
- 46 A broadcast amplitude modulation radio transmitter radiates 140 kW when the modulation percentage is 75. Find the carrier power?
 a) 120.45kW b) 142.26kW c) 109.26kW d) 172.82kW
- 47 The maximum deviation allowed in a frequency modulation system is 120 kHz. If the modulating signal frequency is 20 kHz, find the bandwidth requirement as per Carson's rule?
 a) 120kHz b) 240kHz c) 280kHz d) 320kHz
- 48 In a communication system, the signal power is 13dB and noise power is -1 dB. The SNR will be.
 a) 14 dB b) -13dB c) 12 dB d) None of these
- 49 Boosting of higher frequency at the transmitter is done by using
 a) De-emphasis b) AGC circuit c) Pre-emphasis d) Armstrong method
- 50 In FM modulation, when the modulation index increases, the transmitted power?
 a) Half b) Decreased c) Doubled d) Unchanged