

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE COMPREHENSIVE EXAMINATION(S), DECEMBER 2019

Course Code: EC352

Course name: COMPREHENSIVE EXAM

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.
 - (5) Calculators are not permitted

PART A- COMMON COURSES

1. The sum of the series $\sum_{k=0}^{\infty} \left(\frac{1}{3}\right)^k$ is
a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{2}$ d) 1
2. The solution of the differential equation $y'' - 4y' + 4y = 0$ is
a) $y = (A + Bx)e^{2x}$ b) $y = (A + Bx)e^{-2x}$ c) $y = (A + Bx)e^x$ d) $y = (A + Bx)e^{-x}$
3. The resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is
a) 120° b) 30° c) 90° d) 60°
4. Two bodies of masses m_1 and m_2 are dropped from the top of a tower of same height. When these bodies reach the ground, their kinetic energies will be in the ratio
a) 1 : 2 b) 1 : $\sqrt{2}$ c) 1 : 4 d) 1 : 1
5. The top view of a pentagonal prism with axis perpendicular to the vertical plane and parallel to horizontal plane will be a
a) Pentagon b) Rectangle c) Trapezoid d) Straight line
6. In perspective projection the object is assumed to be kept on which of these planes.
a) Picture plane b) Horizon plane c) Ground plane d) Central plane
7. Which is the most abundant element available in the atmosphere?
a) Oxygen b) Nitrogen c) Argon d) Carbon di oxide
8. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide
a) Carbon Dating b) Carbon Trading c) Carbon Footprint d) Carbon Factor
9. One of the pins in a 3 pin plug top is bigger than the rest. This is most closely related to design for 'X', where 'X' is
a) Assembly b) Manufacturing c) Life cycle Cost d) Environment

10. Which of the following can be most appropriately associated with the design space of a ball?
 a) Speed b) Velocity c) Diameter d) Height

PART B- CORE COURSES

11. A voltage source has 10 V across its terminals when no load is connected. With a load current of 2 A, the voltage across the terminals of the source drops to 9.5 V. What is the value of the internal resistance of the voltage source?
 a) 0.25Ω b) 5Ω c) 4.75Ω d) 0.5Ω
12. The value of source resistance of a voltage source of 10 V is 100Ω . What is the value of maximum power that can be transferred to a load resistor which is connected to this source?
 a) 10 W b) 0.25 W c) 1 W d) 0.5 W
13. A current pulse $5\delta(t)$ is forced through a capacitor C. The voltage $V_c(t)$ across the capacitor is given by
 a) $5t$ b) $5u(t) - C$ c) $5t/C$ d) $5u(t)/C$
14. At poles, the Network function $N(s)$ becomes _____
 a) zero b) One c) Oscillatory d) Infinity
15. Which among the following represents the condition for reciprocity of a network in terms of transmission parameters?
 a) $AB - CD = 1$ b) $AD - BC = 1$ c) $A = D$ d) $AC - BD = 1$
16. Two coupled coils connected in series have an equivalent inductance of 24mH or 16mH depending on the interconnection. Then the mutual inductance M between the coils is
 a) 12mH b) 8mH c) 4mH d) 2mH
17. Which among the following gets cancelled under the resonance condition in ac circuits, if inductive and capacitive reactances are in parallel?
 a) Reactance b) Susceptance c) Resistance d) None of these
18. The system described by the relationship, $y[n]=2^n x[n]$ is
 a) Always unstable b) Some times unstable c) stable d) Not able to predict about stability
19. When two systems are connected in parallel, the overall impulse response is
 a) $h_1[n]*h_2[n]$ b) $h_1[n].h_2[n]$ c) $h_1[n]+h_2[n]$ d) $h_1[n]-h_2[n]$
20. The spectrum of periodic impulse train is
 a) Unit step b) Constant value c) Periodic impulse train d) Periodic sine and cosine signals
21. When a signal is sampled, its spectrum
 a) Is also sampled b) Becomes periodic c) oscillates d) Remains the same
22. If the DTFT of $x[n]$ is $X(\omega)$, then the DTFT of $e^{j\omega_0 n} x[n]$ is,
 a) $e^{j\omega_0 \omega} X(\omega)$ b) $e^{-j\omega_0 \omega} X(\omega)$ c) $X(\omega - \omega_0)$ d) $X(\omega + \omega_0)$

23. For an LTI system the Z transform is given as (where $a=0.5$), $H(z) = \frac{1}{1-az^{-1}}$
- a) Is always stable b) Is always stable and causal c) Is always stable but not causal d) Cannot be predicted
24. $\delta(t)*u(t)$, where * denotes the convolution operation is
- a) $u(t)$ b) $\delta(t)$ c) $x(t)$ d) 0
25. The ideal value for the stability factor is
- a) 0 (b) More than 100 c) Infinite d) 1
26. ----- configuration is used as a buffer amplifier
- a) Common base (b) Common Collector c) Common Emitter (d) None of the above
27. A change in frequency by a factor of _____ is equivalent to 1 octave.
- a) 2 (b) 10 c) 5 (d) 20
28. In order to start oscillations, a feedback oscillator requires
- a) negative feedback with gain less than 1. (b) positive feedback with gain greater than 1. c) Gain equal to 1. (d) no feedback.
29. The conversion efficiency of Class B Push pull amplifiers is approximately
- a) 94.5% (b) 68.3% c) 48.5% (d) 78.5%
30. What is the input resistance ($R_{in(source)}$) of a common-gate amplifier?
- a) R_s b) $(1/g_m)||R_s$ c) $1/g_m$ d) None of the above
31. Cascode amplifiers are
- a) RC coupled amplifiers (b) CB-CE configuration c) CE-CB configuration (d) CE-CC configuration
32. A capacitor stores 0.24 coulombs at 10 volts. Its capacitance is
- a) 0.024F (b) 0.24F c) 2.4F (d) 240nF
33. What is the major factor for determining whether a medium is free space, a lossless dielectric, lossy dielectric or good conductor?
- a) Attenuation constant (b) Phase factor c) Reflection Coefficient (d) Loss tangent
34. The power in an electromagnetic wave with electric field and magnetic field intensities 12 and 8 respectively is
- a) 96 (b) 9.6 c) 24 (d) 48
35. Find the reflection coefficient of the wave with SWR of 3.5.
- a) 0.55 (b) 5.5 c) 0.23 d) 1.5

36. Impedance inverter is
a) $\lambda/2$ line (b) $\lambda/4$ line (c) $\lambda/8$ line (d) None of the above
37. For a rectangular slotted line waveguide in TE_{10} mode, slot is cut in the middle as
a) Maximum field variation is in the middle (b) Current pattern is not disturbed (c) Radiation is minimum at the centre (d) All of the above
38. The magnitude of the E_x and E_y components are same in which type of polarisation?
a) Linear (b) Circular (c) Elliptical (d) Perpendicular
39. Hexadecimal and BCD numbers of decimal number 43 are
a) B2, 0100 0110 (b) 2B, 0100 0011 (c) 2B, 0011 0100 (d) B2, 0100 0100
40. How many 3-line-to-8-line decoders are required for a 1-of-32 decoder?
a) 1 (b) 2 (c) 4 (d) 8
41. The output of the 74 series of TTL gates is taken from a BJT in
a) totem pole and common collector configuration (b) either totem pole or open collector configuration (c) common base configuration (d) common collector configuration
42. How many flip-flops are required to produce a divide-by-128 device?
a) 1 (b) 4 (c) 6 (d) 7
43. What is the modulus of 3-bit Johnson's counter
a) 3 (b) 8 (c) 6 (d) None of the above
44. Which mechanism allocates the binary value to the states in order to reduce the cost of the combinational circuits?
a) State Reduction (b) State Minimization (c) State Assignment (d) State Evaluation
45. Noise Factor (F) and Noise Figure (NF) are related as
a) $NF = 10 \log_{10}(F)$ (b) $F = 10 \log_{10}(NF)$ (c) $NF = 10 (F)$ (d) $F = 10 (NF)$
46. Find lower frequency component in AM wave, given that highest frequency component is 900KHz and bandwidth is 12KHz
a) 888KHz (b) 894 KHz (c) 876 KHz (d) 897 KHz
47. What is the standard IF frequency for AM receivers?
a) 100 KHz (b) 1.07 MHz (c) 455 KHz (d) 10.7 MHz
48. A balanced modulator produces
a) SSB (b) DSB-FC (c) AM (d) DSB-SC
49. In a superheterodyne receiver, if F_s and F_i are the RF signal frequency and intermediate

frequency respectively, the image frequency is given by

- a) $F_s + F_i$ (b) $F_s - F_i$ (c) $F_s + 2F_i$ (d) $F_s - 2F_i$

50. Pre-emphasis is done

- a) Before modulation (b) Before transmission (c) Before detection at receiver (d) After detection at receiver
