

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: AE352

Course Name: COMPREHENSIVE EXAM (AE)

Max. Marks: 50

Duration: 1 Hour

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**

- 1 For the differential equation $\frac{dy}{dt} + 5y=0$ with $y(0) =1$ the general solution is
a) e^{5t} b) e^{-5t} c) $5e^{-5t}$ d) none of these.
- 2 The function $f(x)=x^3-6x^2+9x+25$ has
a) a maxima at $x=1$ and a minima at $x=3$
b) a maxima at $x=3$ and a minima at $x=1$
c) no maxima but a minima at $x=1$
d) a maxima at $x=1$ and no minima
- 3 The maximum and minimum magnitude of resultant force is 1000N and 500 N at a point. What are the values of two forces acting on it
a) 500N,500 N b) 450N,700N c) 250 N,750 N d) 300N,700N
- 4 The force applied on a body of mass 100 kg to produce an acceleration of 5 m/S^2 is
a) 20 N b) 100 N c) 500 N d) None of these
- 5 A tetrahedron has four equal _____ faces
a) square b) rectangular c) triangular d) circle
- 6 A point is 20 mm above HP and 60 mm behind VP ,identify in which quadrant the point lies
a) First Quadrant b) Second Quadrant
c)Third Quadrant d)Fourth Quadrant
- 7 Which is the most common air pollutant
a) NO_2 b)NO c) NO_3 d) N_2O_3
- 8 The Air Pollution and Control Act, popularly known as the 'Air Act' was passed for the first time in US in
a) 1955 b) 1999 c) 2004 d) 2015
- 9 Probability of a product successfully operation for a specific period of time is called
a) reliability b) durability c) conformance d) serviceability
- 10 A limit or restriction on the features or behaviour of a design is termed
a) Design objective b) Design function c) Design Constraint d) None of the above
- 11 How many select lines are required for a 1-to-8 demultiplexer?
a) 2 b) 3 c) 4 d) 5

- 12 How many flip-flops are required to make a MOD-32 binary counter?
a) 3 b) 45 c) 5 d) 6
- 13 Shift register belong to the class of
a) Sequential logic circuit b) Combinational logic circuit
c) Neither of the two d) Both a and b
- 14 Four J-K flip-flops are cascaded with their J-K inputs tied HIGH. If the input frequency (f_{in}) to the first flip-flop is 32 kHz, the output frequency (f_{out}) is _____.
a) 1 kHz b) 2 kHz c) 4 kHz d) 16 kHz
- 15 A group of data 11001 is serially input to a 5-bit SIPO register with an initial data of 00111. After 3 clock pulse the data at the output is
a) 00000 b) 00100 c) 00111 d) 11001
- 16 Recommended fan out of standard TTL logic family is
a) 5 b) 15 c) 50 d) 10
- 17 If $J = K$ (J and K are shorted) in a JK flip-flop, what circuit is made
a) SR flip-flop b) Shorted JK flip-flop c) T flip-flop d) K flip-flop
- 18 A network contains an independent current source and resistor. If the values of all resistor are doubled the value of node voltage will
a) Become half b) Become double c) Remain unchanged d) None of these
- 19 A certain network consists of a large number of ideal linear resistors, one of which is R and two constant ideal sources. The power consumed by R is P1 when only the first source is active, and P2 when only the second source is active. If both sources are active simultaneously, then the power consumed by R is
a) $P1 \pm P2$ b) $\sqrt{P1} \pm \sqrt{P2}$ c) $(\sqrt{P1} \pm \sqrt{P2})^2$ d) $(P1 \pm P2)^2$
- 20 If the resistors of star connected system are R_1, R_2, R_3 then the resistance between 1 and 2 in delta connected system will be?
a) $(R_1 R_2 + R_2 R_3 + R_3 R_1) / R_3$
b) $(R_1 R_2 + R_2 R_3 + R_3 R_1) / R_1$
c) $(R_1 R_2 + R_2 R_3 + R_3 R_1) / R_2$
d) $(R_1 R_2 + R_2 R_3 + R_3 R_1) / (R_1 + R_2)$
- 21 If power factor = 1, then the current to the load is _____ with the voltage across it.
a) out of phase b) in phase c) 90° out of phase d) 45° out of phase
- 22 If source impedance is complex, then maximum power transfer occurs when the load impedance is _____ the source impedance.
a) equal to b) negative of
c) complex conjugate of d) negative of complex conjugate of
- 23 The principle of homogeneity and superposition are applied to:
a) Linear time invariant systems b) Nonlinear time invariant systems
c) Linear time variant systems d) Nonlinear time invariant systems
- 24 A two-port network is symmetrical if
a) $Z_{11} Z_{12} - Z_{12} Z_{21} = 1$ b) $h_{11} h_{22} - h_{12} h_{21} = 1$
c) $AD - BC = 1$ d) $Y_{11} Y_{22} - Y_{12} Y_{21} = 1$
- 25 Air cored transducers are suitable for use at
a) Low frequency b) High Frequency

- c) At equal frequency d) None of these
- 26 Strain gauge is a/an
- a) Active device and converts mechanical displacement into a change of resistance
 - b) Passive device and converts electrical displacement into a change of resistance
 - c) Passive device and converts mechanical displacement into a change of resistance
 - d) Active device and converts electrical displacement into a change of resistance
- 27 Which of the following conversion take place in bourdon tubes?
- a) Pressure to displacement b) Pressure to voltage
 - c) Pressure to strain d) Pressure to force
- 28 Hot wire anemometers are used to measure
- a) Discharge b) velocity of gas
 - c) Pressure intensity of gas d) Pressure intensity of liquid
- 29 A Level sensor can measure in the range 0-400 mm. Worst case deviation from the best-fit straight line is found to be 5 mm. Find out the maximum non-linearity as a percentage of full-scale?
- a) 1.0 b)1.25 c)1.5 d) none
- 30 Thermocouple instruments can be used for a frequency range
- a) Upto 100 Hz b) Upto 500 Hz c) Upto 1MHz d)50 Mhz and above
- 31 In an electro-dynamometer type wattmeter
- a) The pressure coil is fixed b) The current coil is made fixed
 - c) Any of the two coils can be made fixed d) Both the coils should be movable
- 32 Maxwell's inductance -capacitance bridge is used for measurement of inductance of
- a) Low Q coils b) Medium Q coils
 - c) Low and medium Q coils d) High Q coils
- 33 Kelvins bridge is a
- a) DC bridge b) AC bridge c) AC-DC bridge d) none
- 34 Watt hour meters are used for measuring
- a) Voltage b) Current c) Energy d) Power
- 35 The smallest variable change that an instrument will respond is known as
- a) Threshold b) Sensitivity c) Accuracy d) Resolution
- 36 Horizontally mounted moving iron instrument use
- a) Eddy current damping b)Electromagnetic damping
 - c)Fluid friction damping d)Air friction damping
- 37 The position and velocity errors of a type -2 system are
- a) constant, constant b) Zero,zero
 - c) constant, infinity d) zero, constant
- 38 At which frequency does the magnitude of the system become zero dB ?
- a) Resonant frequency b) Cut -off frequency
 - c) Gain cross over frequency d) Phase cross over frequency
- 39 Laplace transform of unit impulse signal is :
- a) A/s b) A c) 1 d) 1/s
- 40 For making an unstable system stable:
- a) Gain of the system should be increased
 - b) Gain of the system should be decreased

- c) The number of zeroes to the loop transfer function should be increased
d) The number of poles to the loop transfer function should be increased
- 41 Root locus is used to calculate:
a) Marginal stability b) Absolute stability
c) Conditional stability d) Relative stability
- 42 Which point on root locus specifies the meeting or collision of two poles ?
a) Centroid b) Break away point
c) Stability point d) Anti- break point
- 43 Which of the following is the best method for determining the stability and transient response?
a) Root locus b) Bode plot c) Nyquist plot d) Polar plot
- 44 Which is the most versatile ADC?
a) Dual slope ADC b) Flash ADC
c) Successive approximation ADC d) Counter ADC
- 45 The output of a particular Op-amp increases 8V in 12 μ s. The slew rate is
a) 90 V/ μ s b) 0.67 V/ μ s c) 1.5 V/ μ s d) none of these
- 46 In a PLL, to obtain lock, the signal frequency must:
a) come within the lock range
b) be less than the capture frequency
c) come within the capture range
d) be greater than the capture frequency
- 47 Initially, the closed-loop gain (A_{CL}) of a Wien-bridge oscillator should be
a) 0 b) $A_{CL} = 1$ c) $A_{CL} > 3$ d) $A_{CL} < 3$
- 48 Which among the following is a nonlinear application of op-amp?
a) V to I converter b) Comparator c) Precision rectifier
d) Instrumentation amplifier
- 49 The input offset current of an opamp equals the
a) difference between two base currents
b) average of two base currents
c) collector current divided by current gain
d) none of these
- 50 What is the cutoff frequency of an op-amp if the unity-gain frequency is 1.5 MHz and the open-loop gain is 100,000?
a) 150 Hz b) 10 Hz c) 15 Hz d) 20 Hz
