Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMREHENSIVE EXAMINATION(S), DECEMBER 2019

Course Code: EE352
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) 120^0 b) 30^0 c) 90^0 d) 60^0

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.   For a base current of 12μA, what is the value of collector current in Common Emitter Transistor configuration if β_{dc} (current gain) =100

   a) 10 μA   b) 1 mA   c) 1.2mA   d) 12mA

12.   Field Effect Transistor (FET) is a _____

   a) Current   b) Conductivity   c) Negative   d) Voltage
       Controlled device   Modulation device   Conductance   Controlled
                                                 device   device

13.   Maximum theoretical collector circuit efficiency of class B amplifier is

   a) 15%   b) 25%   c) 78.5%   d) 50.5%

14.
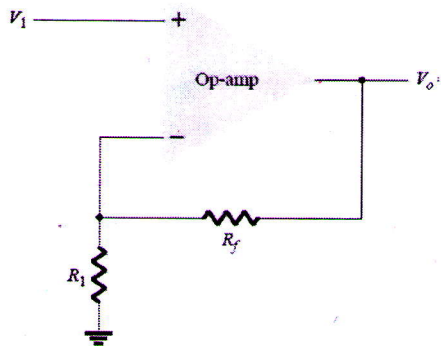
   Calculate the output voltage, if V_1=2V, R_1=100kΩ and R_f=500kΩ

   a) 10V   b) 6V   c) 12 V   d) 15 V

15.   How many op amps are present in a typical instrumentation amplifier circuit?

   a) One   b) Two   c) Three   d) Four

16.   Which of the following oscillator circuit will be suitable for highly stable frequency oscillation

   a) Wien bridge   b) RC Phase shift   c) LC   d) Crystal

17.   A common drain amplifier is similar in configuration to which BJT amplifier

   a) Common Base   b) Common Emitter   c) Common   d) None of the
                                                 Collector   above

18.   Octal equivalent of binary number 01000100111 is

   a) 4236   b) 1047   c) 1084   d) 4136

19.   The complement of the function F= $(A + \bar{B})(\bar{C} + D)(\bar{B} + C)$ is
   a) $\bar{A}B + C\bar{D} + B\bar{C}$ b) $A\bar{B} + \bar{C}D + \bar{B}C$ c) $A\bar{B} + C\bar{D} + BC$ d) AB+BC+CD

20.   In which of the following adder circuits is the carry ripple delay eliminated?

   a) Half adder   b) Full-adder   c) Parallel adder   d) Carry-look-ahead
                                                                       adder

21.   For a flip flop with provisions of preset and clear

a) Preset and clear   b) While presetting,   c) While clearing,   d) Both (b) and (c)
operations   are   clear is disabled.   preset is   are true.
performed   disabled.
simultaneously

22.   The output of a sequential circuit depends on

a) Present inputs   b) Past outputs   c) Both present and   d) Past inputs
past inputs

23.   The number of flip flops required for Mod 6 asynchronous counter is

a) 2   b) 3   c) 6   d) 4

24.   Which type of ADC has the fastest conversion speed

a) Counter-type   b) Flash-type   c) Successive-   d) Dual-slope type
approximation
type

25.   The transfer function of a system is also known as

a) Unit step   b) Unit impulse   c) Sine wave   d) Ramp response
response   response   response

26.   Which of the following parameters are dependent on ζ (damping ratio) alone?

a) peak overshoot   b) settling time   c) rise time   d) damped natural
frequency

27.   The signs of the elements of the first column of a Routh array are as follows -
+ve, +ve ,-ve ,-ve. How many roots does the function have on the right half of the s- plane?

a) 1   b) 2   c) 3   d) 4

28.   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) None of the
above

29.   Suppose in a bode magnitude plot, it is observed that at high frequency, the slope is -
60dB/decade.
How many asymptotes will the root locus of that transfer function have?

a) 1   b) 2   c) 3   d) 4

30.   Due to an addition of pole at origin, the polar plot gets shifted by ___ at $\omega = 0$?

a) -45°   b) -60°   c) -90°   d) -180

31.   For a system with double pole at the origin the phase angle is

a) +90   b) +180   c) -90   d) -180

32.   The Norton equivalent of a circuit is 10 A in parallel with a resistance of 2 Ω. Then the Thevenin
equivalent of the circuit will be

a) 10 A in series   b) 10 V in series with c) 20V in series   d) 5V in series with
with a resistance   a resistance of 2 Ω   with a   a resistance of 2
of 2 Ω   resistance of 2 Ω   Ω

33. If the number of branches in a network is B, the no. of nodes is N and the number of dependent loops is L, then the number of independent node equations will be

a) N+L-1   b) B-1   c) B-N   d) N-1

34. A series combination of R=2 MΩ and capacitor C= 0.2 μF is connected across a 100 V DC source through a switch. The switch is closed at time t= 0 s. The voltage across R at t= 0 s and at t=10 s will be

a) 100 V, 63.2 V   b) 0 V, 63.2 V   c) 100 V, 36.8 V   d) 0 V, 36.8 V

35. Two coils in differential connection have self-inductances of 2mH and 4mH and a mutual inductance of 0.15mH. The equivalent inductance of the combination is

a) 5.7mH   b) 5.85mH   c) 6mH   d) 6.15mH

36. A two port network is defined by the following pair of equations.

$I_1=2V_1+V_2$; $I_2=V_1+V_2$

Its impedance parameters $(Z_{11}, Z_{12}, Z_{21}, Z_{22})$ are given by

a) 2,1,1,1   b) 1,-1,-1,2   c) 1,1,1,2   d) 2,-1,-1,1

37. Cauer and Foster form of realisations are used only for

a) Driving point reactance function
b) Transfer reactance function
c) Driving point impedance function
d) Transfer impedance function

38. A system having connected load of 100kW peak load of 80kW, base load of 20kW, and average load of 40kW, will have a load factor of

a) 40%   b) 50%   c) 60%   d) 80%

39. The tendency of ac to concentrate near the surface of a conductor is known as _____

a) Ferranti effect   b) Inductance Effect   c) Proximity Effect   d) Skin Effect

40. Economic choice of conductor size is obtained from

a) Biot-Savart's Law   b) Kelvin's Law   c) Kirchhoff's Law   d) Faraday's Law

41. On a long high voltage transmission line under heavy load conditions kVAR compensation can be provided by installing

a) Series inductive reactors
b) Series Capacitors
c) Shunt inductive reactors
d) Series resistors

42. Breaking capacity of a circuit breaker is usually expressed in terms of

a) Amperes   b) Volts   c) MW   d) MVA

43. For most reliable distribution supply, the configuration used is

a) Radial Main   b) Ring Main   c) Parabolic Main   d) Balancing Main

44. Select the correct law from the following options which indicates the direction of emf induced as a result of electromagnetic induction

a) Faraday's laws   b) Lenz's Law   c) Kirchhoff's Law   d) Ampere's Law

45. A dc shunt generator delivers 100A at 200V and the resistance of shunt field and armature are 100Ω and 0.01 Ω respectively the generated emf will be ………………

a) 205V   b) 212V   c) 201.02V   d) 208V

46. Which of the following DC Motors have the highest starting torque

a) Shunt Motor   b) Series Motor   c) Cumulative Compound   d) Differential Compound

47. Transformer ratings are usually expressed in terms of

a) Volts   b) Amperes   c) kW   d) kVA

48. Sumpner's test is also known as

a) Back to Back test   b) Load Test   c) Swinburne's test   d) None of the above

49. Open delta connection has VA rating of

a) √3 times delta – delta VA rating   b) 1/√3 times delta – delta VA rating   c) 3 times delta – delta VA rating   d) 1/3 times delta – delta VA rating

50. Which machine is having highest efficiency?

a) DC shunt motor   b) Transformer   c) DC series motor   d) Compound motor

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