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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S, FE) Examination December 2024 (2019 Scheme)

Course Code: MRT 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. In a DC generator, the critical resistance can be increased by -------

a) Increasing its field resistance b) decreasing its field resistance c) Increasing its speed d) Decreasing its speed

2. If a DC motor is connected across the AC supply, it will

a) Run at normal speed b) Not run c) Run at lower speed d) Burn due to heat produced in the field winding by eddy currents

3. Direction of rotation of motor is determined by ---------

a) Faraday's law b) Lenz's law c) Coulomb's law d) Fleming's left hand rule

4. The current drawn by the armature of a DC motor is directly proportional to ---------

a) Torque b) Speed c) The voltage across the terminals d) Cannot be determined

5. What is the working principle of a transformer?

a) Transformer works on the principle of self-induction b) Transformer works on the principle of mutual induction c) Transformer works on the principle of ampere law d) Transformer works on the principle of coulomb law

6. An ideal transformer will have maximum efficiency at a load such that ---------

a) Copper loss > iron loss b) Cannot be determined c) Copper loss = iron loss d) Copper loss <iron loss

7. The stator core of a 3-phase induction motor is laminated in order to reduce the ---------

a) Eddy current loss b) Hysteresis loss c) Both eddy current and hysteresis losses d) Weight of the stator

8. Single phase induction motor usually operates on ---------

a) 0.6 power factor lagging b) 0.8 power factor lagging c) 0.8 power factor leading d) Unity power factor

9. The ripple voltage of a full wave rectifier with a 100 μF filter capacitor connected to a load drawing 50mA is ----------

a) 2.4 kV b) 4.8 kV c) 1.2 kV d) 6.6 KV

10. Two alternators are to be put in parallel. Which of the following factors should be identical for both?

a) Frequency b) Phase sequence c) Voltage d) All of the above

11 In an npn transistor operating in saturated mode, the output voltage V_{CE} is --------

a) Greater than $2V_{BE}$ b) Between $2V_{BE}$ and V_{BE} c) Less than V_{BE} d) Equal to V_{BE}

12 JFET is a ---------

a) Voltage controlled device b) Current controlled device c) Two terminal device d) None of these

13 Input stage of a power amplifier is also called ---------

a) First op-amp b) Beginning stage c) Front end d) Normal stage

14 Which of the following is not an example of non-sinusoidal oscillators?

a) Sawtooth generator b) Blocking oscillator c) Multivibrator d) Crystal oscillator

15 Relaxation oscillators are also known as ---------

a) Multivibrators b) Phase shift oscillators c) Blocking oscillators d) Sawtooth generator

16 Which of the following statement is not true for an ideal operational amplifier?

a) The input current is zero b) The output resistance is infinite c) The input resistance is infinite d) Gain is infinite

17 A monostable multivibrator has R=120 KΩ and the time delay T=1000ms. Calculate the value of C.

a) 0.9 μF b) 1.32 μF c) 7.57 μF d) 2.49 μF

18 Invalid BCD can be made to valid BCD by adding with ---------

a) 0101 b) 0110 c) 0111 d) 1001

19 A positive edge triggered D flipflop will store 1 when

a) D is high, clock changes from low to high b) D is high, clock changes from high to low c) D is high, clock is low d) D is high, clock is high

20 For a design of 16:1 multiplexer, how many select lines will be required?

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

21 Which of the following is a type of solid-state sensor?

a) Thermocouple b) Accelerometer c) Hall effect sensor d) Light-dependent resistor (LDR)

22 Which of the following best describes the Coanda effect?

a) The ability of a fluid to flow through a narrow opening. b) The tendency of a fluid to spread out evenly in all directions. c) The adherence of a fluid stream to a nearby curved surface d) The resistance of a fluid to flow due to its viscosity.

23 Which of the following is a type of fluidic sensor used for measuring pressure?

a) Thermocouple b) Accelerometer c) Hall effect sensor d) Piezoresistive sensor

24 What type of actuator is commonly used to provide rotational motion in robotic systems and industrial machinery?

a) Linear actuator b) Pneumatic cylinder c) Servo motor d) Gear motor

25 Which feedback device is used to measure linear displacement by converting it into an electrical signal?

a) LVDT b) Accelerometer c) Fiber optic sensor d) Hall effect sensor

26 Which of the following statements is true about stepper motors?

a) Stepper motors operate on the principle of electromagnetic induction. b) Stepper motors are only used for linear motion. c) Stepper motors require feedback for precise positioning. d) Stepper motors rotate in discrete steps or increments.

27 Consider the following statements regarding resolvers.
1)resolver is an internal state sensor
2)resolver converts available AC signal into digital form
3)it can be used as an incremental encoder
Which of the above statements are true?

a) 1 and 3 b) 2 and 3 c) 1 and 2 d) 1,2 and 3

28 For increasing the productivity, CNC system can be interfaced with

a) CAD/CAM b) DNC c) FMS d) All of these

29 Can an encoder be a transducer?

a) Yes b) No c) May or may not be d) Both are not even related slightly

30 What should be the acceleration of a rigid body of mass 5Kg, if a force sensor measures a normal collision impact force of 15N? (Ignore acceleration due to gravity)

a) 5 m/s^2 b) 13 m/s^2 c) 6 m/s^2 d) 3 m/s^2

31 Accumulator has data FFH. Determine the state of CY, Z and S flag when :
1) 01H is added
2) The content of accumulator is incremented

a) CY=0, S=0, Z=1 CY=1, S=1, Z=0 b) CY=1, S=0, Z=1 CY=same as previous state, S=0, Z=1 c) CY=0, S=0, Z=0 CY= same as previous state, S=1, Z=1 d) CY=1, S=0, Z=0 CY=1, S=0, Z=0

32 What is SIM?

a) Select Interrupt Mask b) Sorting Interrupt Mask c) Set Interrupt Mask d) Set Interrupt Mode

33 Which of the following is a two byte instruction in 8085 microprocessor?

a) MOV b) CMA c) ADD d) MVI

34 What is the restart address of TRAP interrupt?

a) 002CH b) 0024H c) 0034H d) 003cH

35 All the functions of the ports of 8255 are achieved by programming the bits of an internal register called ---------

a) Data bus control b) Read logic control c) Control word register d) None of the mentioned

36 The directory that is under work must have the files that are related to ----------

a) Norton's editor b) Assembler c) Linker d) All of the mentioned

37 The 8051 microcontrollers can handle ------- interrupt sources.

a) 3 b) 4 c) 6 d) 5

38 When 8051 wakes up, then 0x00 is loaded to which register?

a) SP b) PSW c) PC d) Accumulator

39 MOV A, @R7 will :

a) Copy R7 to the accumulator b) Copy the accumulator to the R7 c) Copy the contents of memory whose address is in R7 to the accumulator d) Copy the accumulator to the contents of memory whose address is in R7

40 The higher and lower bytes of a 16 bit register DPTR are represented respectively as :

a) HDPTR and LDPTR b) DPTRH and DPTRL c) DPH and DPL d) HDP and LDP

41 If the poles of a system lie on the imaginary axis, the system will be

a) Stable b) Conditionally stable c) Marginally stable d) Unstable

42 Addition of zeros in a transfer function causes

a) Lead compensation b) Lag compensation c) Lead-lag compensation d) None of these

43 For which systems are the signal flow graphs applicable?

a) Causal b) Invertible c) Linear time invariant d) Dynamic

44 A unit step is applied at t=0 to a first order system without time delay. The response has the value of 1.264 units at t=10 mins., and 2 units at steady state. The transfer function of the system is ---------

a) 3/(1+600s) b) 2/(1+500s) c) 5/(1+220s) d) 2/(1+600s)

45 Comment about the damping of the system represented by G(s)=9/($s^2 + 6s + 9$)

a) Undamped b) Underdamped c) Critically damped d) Overdamped

46 For the open loop transfer function G(S)=1/s(s+2), the gain margin in dB is equal to :

a) 0 b) 1 c) 2 d) ∞

47 Consider the loop transfer function K(s+6)/(s+3)(s+5). In the root locus diagram the centroid will be located at :

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

48 What is the number of the root locus segments which do not terminate on zeros?

a) The number of poles b) The number of zeros c) The difference between the number of poles and zeros d) The sum of number of poles and zeros

49 In a bode a magnitude plot, which one of the following slopes would be exhibited at higher frequencies by a 3rd order all pole system?

a) -60 dB/decade b) 60 dB/decade c) -30 dB/decade d) 30 dB/decade

50 The step error coefficient of a system G(s)=1/(s+2)(s+3)with unity feedback is -------

a) 0 b) ∞ c) 1 d) 1/6