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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R,S) Examination April 2025 (2019 Scheme)

Course Code: MRT308

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 losses in electrical machines increases as _____ of the linear dimension of machine

a) Cube b) Square c) Inverse d) Inverse square

2. The in-rush current in a transformer at no load is maximum if the supply voltage is switched at

a) Peak voltage value b) Half peak voltage value c) Zero voltage value d) 0.866 times peak voltage value

3. When load on a transformer is increased, the eddy current

a) Is increased b) Remains unchanged c) Is decreased d) Becomes Zero

4. The inductive reactance of a transformer depends on

a) Electromagnetive force b) Magnetomotive force c) Magnetic flux d) Leakage flux

5. The open circuit test of a transformer gives information about

a) Hysteresis loss b) Eddy current loss c) Copper loss d) Both hysteresis and eddy current losses

6. What is the function of an alternator in a power system?

a) To convert mechanical energy into heat energy b) To convert electrical energy into mechanical energy c) To convert mechanical energy into electrical energy d) To regulate the voltage of the system

7. The frequency of an alternator depends on:

a) Load current b) Power factor c) Rotor speed and number of poles d) Stator voltage

8. An electrical drive is used to:

a) Measure electrical energy b) Convert electrical energy into mechanical energy c) Store electrical energy d) None of the above

9. Which of the following motors is generally used in electric trains?

a) Synchronous motor b) Stepper motor c) DC series motor d) Universal motor

10. Which one of the following motors is preferred for robotics and CNC machines?

a) DC shunt motor b) Synchronous motor c) Stepper motor d) Induction motor

11 Which class of amplifier offers the highest efficiency?

a) Class A b) Class B c) Class AB d) Class C

12 In a Class B amplifier, the transistor conducts for

a) 180° b) 360° c) 90° d) 270°

13 Which of the following is NOT a type of sinusoidal oscillator?

a) Hartley oscillator b) Wien bridge oscillator c) Colpitts oscillator d) Schmitt trigger

14 Which component determines the frequency in an RC phase shift oscillator?

a) Transformer b) Inductor c) Capacitor and resistor d) Transistor gain

15 Which oscillator is typically used for audio frequency generation?

a) Hartley oscillator b) Wien bridge oscillator c) Crystal oscillator d) Colpitts oscillator

16 A low-pass filter allows:

a) Only high frequencies to pass b) All frequencies equally c) Low frequencies to pass and attenuates high frequencies d) Only DC signals

17 The cutoff frequency of an active filter is the frequency at which the output voltage is:

a) Zero b) Maximum c) 3 dB less than the maximum d) Equal to the supply voltage

18 The output of the phase detector is filtered by a:

a) High-pass filter b) Band-pass filter c) Low-pass filter d) Notch filter

19 The condition where both inputs of an SR flip-flop are 1 is called:

a) Set condition b) Reset condition c) No change condition d) Invalid condition

20 Which flip-flop is known for its edge-triggered operation?

a) RS flip-flop b) JK flip-flop c) T flip-flop d) D flip-flop

21 The output of a piezoelectric sensor is:

a) Voltage b) Current c) Resistance d) Capacitance

22 Which sensor is commonly used in proximity detection?

a) Thermocouple b) Capacitive sensor c) Strain gauge d) Potentiometer

23 The sensor used in touchscreens to detect human touch is typically a:

a) Pressure sensor b) Capacitive sensor c) Piezoelectric sensor d) Proximity sensor

24 Which of the following is a non-contact position sensor?

a) Potentiometer b) LVDT c) Thermistor d) Load cell

25 A solenoid is a type of:

a) Sensor b) Thermal actuator c) Electromechanical actuator d) Capacitive actuator

26 Which actuator is typically used for precise positioning in robotics?

a) Hydraulic actuator b) Pneumatic actuator c) Stepper motor d) Thermoelectric actuator

27 What is the main advantage of hydraulic actuators over electric ones?

a) High-speed operation b) High force and torque output c) Lower cost d) No maintenance

28 Which of the following actuators would be most suitable for high-speed switching?

a) Hydraulic actuator b) Pneumatic actuator c) Solenoid d) Stepper motor

29 The output of a NOT gate is:

a) Same as input b) Always LOW c) Complement of the input d) Always HIGH

30 The number of possible input combinations for a 3-input logic gate is:

a) 8 b) 4 c) 6 d) 16

31 The first commercially available microprocessor was:

a) Intel 4004 b) Intel 8086 c) Motorola 68000 d) Zilog Z80

32 The 8085 microprocessor has how many address lines?

a) 8 b) 16 c) 32 d) 64

33 In 8085 microprocessor, the size of the accumulator register is:

a) 4-bit b) 8-bit c) 16-bit d) 32-bit

34 The clock signal in a microprocessor is used to:

a) Store data b) Perform I/O operations c) Synchronize all operations d) Decode instructions

35 In a microcontroller, the main purpose of timers is to:

a) Store data b) Keep track of program counter c) Increase clock speed d) Measure time intervals or generate delays

36 Which memory in a microcontroller is used to store firmware/code permanently?

a) RAM b) ROM c) EEPROM d) Cache

37 Which microcontroller is widely used in **Arduino** boards?

a) ATmega328 b) PIC16F877A c) 8051 d) STM32

38 The output of an assembler is called:

a) Source code b) Machine code c) Object code d) Executable code

39 Which of the following is **not** a type of compiler?

a) Cross compiler b) Native compiler c) Source-to-source compiler d) Reverse compiler

40 Which of the following generates **intermediate code** during translation?

a) One-pass assembler b) Two-pass compiler c) Interpreter d) Linker

41 Which type of feedback generally improves system **stability**?

a) Positive feedback b) Negative feedback c) Open-loop feedback d) No feedback

42 Positive feedback is commonly used in:

a) Amplifiers for gain stabilization b) Oscillators for sustained oscillations c) Servo systems d) Temperature control systems

43 The time required for the response to reach and stay within a certain % of its final value is called:

a) Peak time b) Rise time c) Settling time d) Delay time

44 What is the typical percentage band for settling time calculation?

a) ±2% or ±5% of final value b) ±10% only c) ±1% d) 100%

45 Which of the following input signals will cause infinite steady-state error in a Type 0 system?

a) Step b) Ramp c) Impulse d) Sine

46 What is the steady-state error of a **Type 1** system to a step input?

a) 0 b) Finite c) Infinite d) 1

47 In Routh's array, if the first column has a sign change, the system is:

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

48 A lag compensator primarily improves:

a) Phase margin b) Speed of response c) Steady-state accuracy d) Settling time

49 A lead-lag compensator is used when:

a) Only steady-state error needs to be corrected b) Only transient response needs improvement c) Both transient and steady-state responses need improvement d) System has no phase margin

50 Time delays in control systems are often caused by:

a) Increased gain b) Sensor noise c) Feedback instability d) Signal transmission or processing time

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