

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S6 (R,S) Examinations April 2026 (2019 Scheme)



Course Code: MRT308

Course name: COMPREHENSIVE COURSE WORK

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.

1. The working principle of a DC generator is based on:
a) Faraday's Law of Electromagnetic Induction b) Fleming's Left Hand Rule c) Lenz's Law d) Ohm's Law
2. In a DC generator, the purpose of the commutator is to:
a) Collect current from the armature b) Convert AC induced in armature conductors to DC c) Reduce friction d) Increase the magnetic flux
3. Transformer core laminations are used to reduce:
a) Hysteresis loss b) Eddy current loss c) Copper loss d) Magnetic leakage
4. The open-circuit test on a transformer is performed to find:
a) Copper loss b) Core loss and magnetizing current c) Efficiency at full load d) Regulation
5. The speed at which the magnetic field of a 3-phase induction motor rotates is called:
a) Rotor speed b) Slip speed c) Synchronous speed d) Relative speed
6. At standstill (start), the value of slip is:
a) 0 b) 1 c) 0.5 d) Infinity
7. The EMF equation of an alternator includes which factors?
a) Distribution factor (K_d) and Pitch factor (K_p) b) Only number of turns c) Slip d) Back EMF constant
8. Voltage regulation of an alternator is negative for:

9. An Electrical Drive consists of:
- a) Lagging power factor loads b) Unity power factor loads c) Leading power factor loads d) Resistive loads
10. The primary advantage of using an Electrical Drive is:
- a) Motor and Control system b) Motor only c) Generator and Turbine d) Battery and Inverter
11. Which power amplifier class has the highest theoretical efficiency?
- a) Class A b) Class B c) Class AB d) Class C
12. In a Class B push-pull amplifier, the main drawback is:
- a) Low efficiency b) Cross-over distortion c) Thermal runaway d) Excessive heat
13. RC Phase Shift oscillators are generally used for:
- a) High-frequency radio waves b) Ultra-high frequencies c) Microwave frequencies d) Audio frequencies
14. In a Hartley oscillator, the feedback network consists of:
- a) Two capacitors and one inductor b) A crystal c) Only resistors d) Two inductors and one capacitor
15. Input Offset Voltage is defined as the voltage that must be applied to the input terminals to:
- a) Maximize the output b) Make the output voltage zero c) Increase the gain d) Protect the IC
16. An Op-amp Integrator circuit uses a _____ in the feedback path.
- a) Resistor b) Inductor c) Capacitor d) Diode
17. In a 555 Timer, the Astable mode is used to generate:
- a) A single pulse b) A continuous square wave (Pulse train) c) A sawtooth wave d) A constant DC voltage
18. The Monostable multivibrator is also called a:
- a) Free-running multivibrator b) One-shot multivibrator c) Flip-flop d) Schmitt Trigger
19. A 3-to-8 line Decoder is also known as a:
- a) Binary-to-Octal converter b) Octal-to-Binary converter c) BCD-to-Decimal converter d) Hex-to-Binary converter
20. A "Don't Care" condition in a K-map can be used as:
- a) Always a 0 b) Always a 1 c) Either 0 or 1 to simplify the expression d) A literal 'X' that cannot be grouped

- 21 Solid-state magnetic sensors (like GMR) offer _____ sensitivity compared to standard Hall sensors.
a) Lower b) Higher c) Zero d) Equal
- 22 To minimize noise in a VR sensor, the signal conditioning circuit often uses a:
a) Low-pass filter b) High-pass filter c) Schmitt trigger d) Transformer
- 23 The force produced by a linear solenoid is approximately proportional to:
a) The square of the current (I^2) b) The square root of the current c) The voltage only d) The resistance
- 24 A "Latching Solenoid" is energy efficient because:
a) It uses a permanent magnet to hold position without power b) It has zero resistance c) It works on AC only d) It uses a battery
- 25 In "Half-Stepping" mode, the step angle is
a) Doubled b) Reduced by half c) Remain same d) Quadrupled
- 26 Cylindrical rotary actuators are preferred for:
a) Low speed, low torque b) Compact size and smooth rotation c) Extremely high temperature d) Linear motion only
- 27 Which device uses a rotating transformer principle to provide absolute position feedback?
a) Resolver b) Tacho-generator c) Potentiometer d) Hall sensor
- 28 The main output of a DC Tacho-generator is:
a) A DC voltage proportional to speed b) A pulse train c) A digital bit-stream A digital bit-stream d) A magnetic field
- 29 The "Detent Torque" in a stepper motor is the torque when:
a) The motor is running at high speed b) The motor is energized but not moving c) The motor is not energized (windings are OFF) d) The load is zero
- 30 Micro-stepping in motor control is used to:
a) Increase the physical size of the motor b) Improve resolution and smooth out rotation c) Reduce the voltage d) Stop the motor instantly
- 31 The 8085 microprocessor is a/an _____ bit microprocessor.
a) 4-bit b) 8-bit c) 16-bit d) 32-bit
- 32 The number of address lines in 8085 is 16. What is the maximum memory it can address?
a) 32 KB b) 1MB c) 128KB d) 64KB

- 33 A Microcontroller differs from a Microprocessor primarily because it includes:
- a) Only an ALU b) CPU, RAM, ROM, and I/O on a single chip c) Larger registers d) No instruction set
- 34 Which tool is used to convert assembly language code into machine code?
- a) Compiler b) Linker c) Assembler d) Debugger
- 35 The "Program Status Word" (PSW) register in 8051 contains:
- a) Only the Accumulator b) Math flags and Register Bank Select bits c) The stack pointer d) Timer values
- 36 Which port of the 8051 does not have internal pull-up resistors and requires external ones?
- a) Port 0 b) Port 1 c) Port 2 d) Port 3
- 37 In Embedded C for 8051, which keyword is used to access a single bit of an SFR?
- a) int b) bit c) sbit d) char
- 38 The main advantage of using Embedded C over Assembly is:
- a) Code runs faster b) Easier to maintain and portable across different processors c) Uses less memory d) Does not require a compiler
- 39 Which register is used to enable/disable interrupts in 8051?
- a) TMOD b) SCON c) IE (Interrupt Enable) d) IP (Interrupt priority)
- 40 A D/A converter (DAC) is used to:
- a) Convert physical temperature to voltage b) Convert a digital binary number to an equivalent analog voltage/current c) Store digital data d) Amplify a signal
- 41 A "Non-touching loop" in a Signal Flow Graph refers to loops that do not share any:
- a) Nodes b) Branches c) Transmittance d) Input signals
- 42 Feedback can change the system's:
- a) Stability and bandwidth b) Physical weight c) Number of supply phases d) Operating voltage only
- 43 A system is "Critically Damped" when the damping ratio is:
- a) Greater than 1 b) Less than 1 c) Equal to 0 d) Equal to 1
- 44 Which of the following determines the "Type" of a control system?
- a) Number of poles at the origin of the open-loop transfer function b) The total number of zeros c) The highest power of 's' in the denominator d) The DC gain

- 45 The Nyquist stability criterion relates the stability of a closed-loop system to:
- | | | | |
|---|-----------------------------------|----------------------|---|
| a) The enclosure of the point $(-1 + j0)$ by the Nyquist plot | b) The value of the damping ratio | c) The settling time | d) The number of zeros in the left-half plane |
|---|-----------------------------------|----------------------|---|
- 46 A system is "Marginally Stable" if the poles of the closed-loop transfer function lie:
- | | | | |
|---|------------------------------|-----------------------------|-----------------------|
| a) On the imaginary axis of the s-plane | b) In the right-half s-plane | c) In the left-half s-plane | d) At the origin only |
|---|------------------------------|-----------------------------|-----------------------|
- 47 A system is stable if both the Gain Margin (GM) and Phase Margin (PM) are:
- | | | | |
|-------------|-------------|---------|-------------|
| a) Positive | b) negative | c) Zero | d) Infinite |
|-------------|-------------|---------|-------------|
- 48 In a Bode plot, the slope of the magnitude curve for a simple pole ($1/s$) is:
- | | | | |
|------------------|----------------|------------------|------------------|
| a) +20 dB/decade | b) 0 dB/decade | c) -40 dB/decade | d) -20 dB/decade |
|------------------|----------------|------------------|------------------|
- 49 "Break-away" points in a root locus occur where:
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|-------------------------|--|--|----------------------------------|
| a) The gain 'K' is zero | b) Two or more roots meet and then leave the real axis | c) The locus enters the right-half plane | d) The system becomes overdamped |
|-------------------------|--|--|----------------------------------|
- 50 Root locus branches terminate at:
- | | | | |
|--------------------|--|---------------|-----------------------|
| a) Open-loop poles | b) Open-loop zeros (including those at infinity) | c) The origin | d) The imaginary axis |
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