No. of Pages. 20

Code No.	Y – 3055

Register Number :

Name :

Time : 2 Hours

Max.Marks : 100

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2026

CSS

ELECTRONICS (OPTO ELECTRONICS/ARTIFICAL INTELLIGENCE)

GENERAL INSTRUCTIONS

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be marked **only** in the "**OMR Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

INSTRUCTIONS FOR FILLING THE OMR SHEET

- The OMR sheet should not be folded or crushed.
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not leave any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.
- WRONG METHODS

CORRECT METHOD

DO NOT WRITE HERE

Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. The Curl of a conservative Electric Field $\left(\nabla \times \vec{E}\right)$ is always:

   A. infinity
   B. 1
   C. 0
   D. Negative

2. A wave travels in a medium with $\in_r = 4$ The velocity of the wave is:

   A. $3 \times 10^8 m/s$
   B. $1.5 \times 10^8 m/s$
   C. $6 \times 10^8 m/s$
   D. $0.75 \times 10^{8t} m/s$

3. Which Maxwell equation represents the non-existence of isolated magnetic monopoles?

A. $\nabla \cdot \mathbf{E} = \rho / \in$

B. $\nabla \times \mathbf{E} = -\partial \mathbf{B} / \partial t$

C. $\nabla \cdot \mathbf{B} = 0$

D. $\nabla \times \mathbf{H} = \mathbf{J}$

4. A parallel plate capacitor is completely filled with a dielectric material of dielectric constant 4. If the original capacitance was C, what will be the new capacitance?

A. C/4

B. C

C. 2C

D. 4C

5. The work done in moving a 2C charge through a potential difference of 10V is:

A. 5 J

B. 20 J

C. 12 J

D. 8 J

6. At Brewster's angle, the reflected wave is:

A. Unpolarized

B. Partially polarized

C. Completely plane-polarized

D. Circularly polarized

7. The electric field of an EM wave in vacuum is given. If the electric field is E = 300 V / m what is the corresponding magnetic field?

A. 1×10^{-6} T

B. 1×10^{-5} T

C. 3×10^{-6} T

D. 3×10^{-5} T

8. A transistor operates as a closed switch in the:

A. Active region

B. Saturation region

C. Cut-off region

D. Reverse active region

9. The relationship between α and β in a BJT is

A. $\beta = \alpha / (1 - \alpha)$

B. $\alpha = \beta / (1 - \beta)$

C. $\alpha\beta = 1$

D. $\beta = \alpha / (1 + \alpha)$

10. An emitter follower (CC amplifier) is characterized by:
    A. High voltage gain
    B. High input impedance and unity voltage gain
    C. Low input impedance
    D. 180º phase shift

11. An RL circuit has an inductance of 2 H and resistance of $4\,\Omega$. What is the time constant of the circuit?
    A. 0.25 s
    B. 0.5 s
    C. 1 s
    D. 2 s

12. The power gain of an amplifier is 100. In decibels (dB), this is:
    A. 10 dB
    B. 20 dB
    C. 40 dB
    D. 100 dB

13. The energy stored in a 10 mH inductor carrying 2 A current is:
    A. 20 mJ
    B. 40 mJ
    C. 10 mJ
    D. 5 mJ

14. A phase shift oscillator uses three RC sections. If R=10 k and C=0.01 uF, the frequency is roughly:
    A. 650 Hz
    B. 1.2 kHz
    C. 2.5 kHz
    D. 100 Hz

15. In an AM wave, $V_{max} = 10\,V \quad V_{min} = 2\,V$ The modulation index is:
    A. 0.8
    B. 0.67
    C. 0.5
    D. 0.2

16. In an electrical circuit, Kirchhoff's loop rule is applied to analyze potential differences. This rule is fundamentally based on which physical principle?
    A. Charge conservation
    B. Energy conservation
    C. Momentum conservation
    D. Ohm's law

17. For a bridge rectifier, the ripple frequency with 50 Hz input is:
    A. 50 Hz
    B. 100 Hz
    C. 25 Hz
    D. 200 Hz

18. In a Step-Index fiber, the refractive index profile is:
    A. Parabolic
    B. Constant in the core and steps down at the cladding
    C. Continuously varying
    D. Zero in the cladding

19. The He-Ne laser is an example of a:
    A. Solid-state laser
    B. Gas laser
    C. Dye laser
    D. Semiconductor laser

20. The "V-number" of a fiber determines:
    A. The number of modes supported
    B. The fiber's tensile strength
    C. The battery life of the source
    D. The price of the cable

21. When an electron absorbs a photon and moves to a higher energy state, it is.
    A. Stimulated emission
    B. Spontaneous emission
    C. Stimulated absorption
    D. Ionization

22. Attenuation in optical fibers is expressed in units of:
    A. Watts
    B. dB/km
    C. Ω/km
    D. Candela

23. Which fiber is most suitable for ultra-long-distance communication?
    A. Multimode step index
    B. Multimode graded index
    C. Single mode fiber
    D. Plastic fiber

24. The propagation of light in optical fibers is based on:

A. Refraction
B. Total Internal Reflection
C. Dispersion
D. Scattering

25. Which operator is used to access the value at the address stored in a pointer?

A. '&'
B. '->'
C. '*'
D. '.'

26. Which is valid C expression?

A. int my_num = 100,000;
B. int my_num = 100000;
C. int my num = 1000;
D. int $my_num = 10000

27. scanf() is a predefined function in ———————— header file.

A. stdlib. h
B. ctype. h
C. stdio. h
D. stdarg. h

28. What is meant by 'a' in the following C operation?

fp = fopen("Random.txt", "a");

A. Attach
B. Append
C. Apprehend
D. Add

29. What is function overloading?

A. Process of multiple functions
B. Multiple functions with the same name
C. Looping functions
D. All of the above

30. Which numerical method is generally used to solve ordinary differential equations by providing a step-by-step approximation?

A. Lagrange interpolation
B. Trapezoidal rule
C. Euler's method
D. Simpson's rule

31. Which digital circuit is often referred to as a "Data Selector"?

A. Decoder
B. Multiplexer
C. Demultiplexer
D. Counter

32. The main disadvantage of a ripple counter compared to a synchronous counter is:

A. High power consumption
B. Circuit complexity
C. Propagation delay accumulation
D. Limited count range

33. A 4-bit Johnson counter has how many distinct states?

A. 4
B. 8
C. 16
D. 32

34. In a Ring counter, if the initial state is 1000, what is the next state?

A. 1100
B. 0100
C. 0001
D. 1001

35. A Full-Adder can be implemented using:

A. One Half-Adder and one OR gate
B. Two Half-Adders and one OR gate
C. Two Half-Adders and one AND gate
D. One Half-Adder and two OR gates

36. In Boolean algebra, the law $A + (B \,.\, C) = (A + B) \,.\, (A + C)$ is known as the:

A. Associative Law
B. Commutative Law
C. Distributive Law
D. Idempotent Law

37. The SOP (Sum of Products) form of a Boolean expression is logically equivalent to which gate configuration?

A. OR-AND
B. NAND-NAND
C. NOR-NOR
D. XOR-AND

38. What is the result of $A \,.\, (A + B)$ according to the Absorption Law?

A. B B. AB

C. A D $A + B$

39. The "Speed Mismatch" between a fast processor and slow main memory is traditionally bridged using:

A. Flash Memory B. Cache Memory

C. Virtual Memory D. Magnetic Disk

40. The communication path between the CPU and the various peripherals is known as a:

A. Connector B. Port

C. Bus D. Socket

41. The transient current in an RL circuit decays to what percentage of its initial value after one time constant?

A. 50% B. 63.2%

C. 36.8% D. 0%

42. At series resonance in an RLC circuit, the impedance of the circuit is:

A. Maximum and purely resistive B. Minimum and purely resistive

C. Zero D. Infinite

43. Superposition Theorem is applicable only to circuits that are:

A. Non-linear B. Linear and Bilateral

C. Reactive only D. Passive only

44. In an AC circuit, the ratio of the RMS value to the Average value of a sine wave is called the:

A. Peak factor B. Form factor

C. Power factor D. Quality factor

45. A crystalline solid is characterized by:

A. Random arrangement
B. Short-range order only
C. Long-range periodic order
D. No symmetry

46. The total number of Bravais lattices is:

A. 7
B. 14
C. 21
D. 32

47. Which crystal system has unequal axes but all angles 90°?

A. Cubic
B. Orthorhombic
C. Monoclinic
D. Triclinic

48. Miller indices (hkl) represent:

A. Directions
B. Planes
C. Axes
D. Angles

49. Photoelectric effect results in emission of:

A. Protons
B. Neutrons
C. Electrons
D. Photons

50. Bragg's law is given by:

A. $\lambda = d \sin\theta$
B. $n\lambda = 2d \sin\theta$
C. $n\lambda = d \cos\theta$
D. $\lambda = 2d \cos\theta$

51. X-rays are electromagnetic waves of:

A. Long wavelength
B. Medium wavelength
C. Short wavelength
D. Infinite wavelength

52. Free electron model assumes electrons behave as:

A. Bound particles
B. Free gas
C. Fixed ions
D. Photons

53. Electrical resistivity of metals with increase in temperature:
    A. Decreases
    B. Increases
    C. Becomes zero
    D. Remains constant

54. Fermi energy is defined at:
    A. Infinite temperature
    B. Room temperature
    C. Absolute zero
    D. Boiling point

55. The input resistance of an ideal op-amp is:
    A. Zero
    B. Infinite
    C. Very small
    D. Medium

56. CMRR stands for:
    A. Common Mode Rejection Ratio
    B. Current Mode Resistance Ratio
    C. Common Mode Resistance Range
    D. Current Matching Resistance Ratio

57. In a differential amplifier, the output depends on:
    A. Sum of inputs
    B. Difference of inputs
    C. Product of inputs
    D. Ratio of inputs

58. Virtual ground concept is used in:
    A. Inverting amplifier
    B. Non-inverting amplifier
    C. Comparator
    D. Oscillator

59. The gain of an inverting amplifier is:
    A. Positive
    B. Negative
    C. Zero
    D. Infinite

60. Instrumentation amplifier is mainly used for:
    A. High noise signals
    B. Low-level signal amplification
    C. Power amplification
    D. Oscillation

61. Butterworth filter is known for:
    A. Ripple in passband
    B. Flat frequency response
    C. High distortion
    D. Zero gain

62. Wien bridge oscillator generates:
    A. Square wave
    B. Triangular wave
    C. Sine wave
    D. Pulse wave

63. A 555 timer in monostable mode produces:
    A. Continuous pulses
    B. One stable state
    C. One-shot pulse
    D. Sine wave

64. A microcomputer consists of:
    A. Only CPU
    B. CPU, memory, and I/O devices
    C. Only memory
    D. Only input devices

65. CISC architecture is characterized by:
    A. Simple instructions
    B. Complex instructions
    C. Reduced instruction set
    D. Fixed instruction format

66. Which of the following is an addressing mode?
    A. Immediate
    B. Arithmetic
    C. Logical
    D. Control

67. Machine cycle is:
    A. Group of instructions
    B. Smallest operation of processor
    C. Program execution
    D. Interrupt handling

68. Stack operates on:

A. FIFO
B. LIFO
C. Random
D. Sequential

69. Subroutines are used for:

A. Looping
B. Reusability of code
C. Interrupts
D. I/O operations

70. Memory mapping refers to:

A. Mapping CPU
B. Assigning memory addresses
C. Mapping instructions
D. Mapping registers

71. Keyboard interfacing is commonly done using:

A. 8257
B. 8255
C. 8253
D. 8085

72. 8253 is a:

A. Timer
B. Interrupt controller
C. Memory
D. DAC

73. Leibnitz's Theorem is used for:

A. First derivative of a sum
B. n^{th} derivative of a product of two functions
C. Integration by parts
D. Solving matrices

74. Rolle's Theorem states that if $f(a) = f(b)$ for a continuous and differentiable function, then there exists $c \in (a, b)$ such that:

A. $f(c) = 0$
B. $f'(c) = 0$
C. $f'(c) = 1$
D. $f''(c) = 0$

75. The Divergence Theorem relates:

A. Line integral to Surface integral

B. Surface integral to Volume integral

C. Line integral to Volume integral

D. Scalar to Vector

76. The Laplace transform of e^{at} is:

A. $1/s$

B. $1/(s-a)$

C. a/s

D. $s/(s^2+a^2)$

77. A square matrix A is singular if its determinant is:

A. 1

B. 0

C. Infinite

D. Negative

78. The Eigenvalues of a Hermitian matrix are always:

A. Imaginary

B. Real

C. Zero

D. Complex

79. Cauchy-Riemann equations are necessary conditions for a function to be:

A. Continuous

B. Analytic

C. Real

D. Periodic

80. Fourier series can be used to represent functions that are:

A. Only linear

B. Periodic

C. Constant

D. Exponential only

81. The rank of a matrix is the:

A. Number of rows

B. Number of columns

C. Number of linearly independent rows/columns

D. Sum of diagonal elements

82. Cayley-Hamilton Theorem states that:

A. Every square matrix satisfies its own characteristic equation

B. Determinant is always zero

C. Eigenvalues are always 1

D. Inverse doesn't exist

83. GMSK modulation is commonly used in:

A. Satellite TV

B. GSM Mobile communication

C. AM Radio

D. Radar

84. The distance of a Geostationary satellite from Earth's surface is approximately:

A. 360 km

B. 36,000 km

C. 100,000 km

D. 2,000 km

85. The unit of Magnetic Flux Density is:

A. Weber

B. Tesla

C. Henry

D. Ampere/meter

86. Which material shows overlapping of valence and conduction bands?

A. Wood

B. Gold

C. Silicon

D. Glass

87. The forbidden energy gap of Germanium at 300 K is:

A. 1.1 eV

B. 0.7 eV

C. 0.3 eV

D. 5.0 eV

88. Which gate is known as the "Universal Gate"?

A. AND

B. NAND

C. OR

D. XOR

89. In an n-channel JFET, the gate-source junction is always:

A. Forward biased

B. Reverse biased

C. Unbiased

D. Connected to a capacitor

90. A conversion of 100ºC to Kelvin is:

A. 273.15 K

B. 373.15 K

C. 0 K

D. 100 K

91. An Optocoupler is used to:

A. Increase voltage

B. Provide electrical isolation using light

C. Rectify AC

D. Store charge

92. The "Skin Depth" decreases as:

A. Frequency decreases

B. Frequency increases

C. Conductivity decreases

D. Material becomes an insulator

93. For a 2-port network to be reciprocal:

A. AD–BC=0

B. AD–BC = 1

C. $Z_{11} = Z_{22}$

D. $h_{21} = h_{12}$

94. The resolution of a telescope is limited by:

A. Refraction

B. Diffraction

C. Reflection

D. Polarization

95. ALE (Address Latch Enable) signal in 8085 is used to:

A. Enable the interrupt

B. Demultiplex the address/data bus

C. Stop the processor

D. Trigger the clock

96. The Program Counter (PC) in 8085 holds:
    A. The data to be processed
    B. The address of the next instruction
    C. The results of ALU
    D. Current instruction opcode

97. The "Race Around Condition" in Flip-Flops is solved by using:
    A. SR latches
    B. Master-Slave configuration
    C. More resistors
    D. Higher voltage

98. The effective mass of an electron in a crystal depends on:
    A. The curvature of the energy bands
    B. The weight of the atom
    C. The colour of the crystal
    D. External temperature only

99. The Hall Effect can be used to determine:
    A. Magnetic field only
    B. Carrier concentration and type
    C. Resistivity only
    D. Dielectric constant

100. Splicing in optical fibers refers to:
    A. Cutting the fiber
    B. Permanently joining two fibers
    C. Cleaning the fiber
    D. Measuring the attenuation

ROUGH WORK

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