

VERSION CODE A1	Maximum Marks : 100				
	Total Duration : 150 Minutes				
	Maximum Time For Answering : 120 Minutes				
	Subject : ELECTRICAL SCIENCES (E & E/E & C/TC/IT/BME/ME)				
MENTION YOUR PG CET NUMBER					

Serial
Number :

117633

Subject
Code

P-ELS

DOs:

1. This question booklet is issued to you by the invigilator after 02.20 pm.
2. Check whether the PG CET Number has been entered and shaded in the respective circles on the OMR answer sheet.
3. The version code and serial number of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts:

1. The timing and marks printed on the OMR answer sheet should not be damaged / mutilated / spoiled.
2. The 3rd Bell rings at 2.30 p.m., till then;
 - Do not remove the seal present on the right hand side of this question booklet.
 - Do not look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 75 questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3rd Bell is rung at 02.30 pm, remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely darken / shade the relevant circle with a blue or black ink ballpoint pen against the question number on the OMR answer sheet.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD	ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHOD											
												
												

5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. Last bell will ring at 4.30 pm, stop marking on the OMR answer sheet.
8. Hand over the OMR answer sheet to the room invigilator as it is.
9. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (candidate's copy) to you to carry home for self-evaluation.
10. Only Non-programmable calculators are allowed for "M.E./M.Tech./M.Arch" examination.

Marks Distribution	
Part-A :	(Section 1) 30 Questions: 30 x 1 = 30, (Section 2) 15 Questions: 15 x 2 = 30
Part-B :	(Section 1) 20 Questions: 20 x 1 = 20, (Section 2) 10 Questions: 10 x 2 = 20

117633

ELECTRICAL SCIENCES
(Common to E&E /E&C/TC/BME & ME/IT)

PART – A
(SECTION – I)

Each question carries one mark.

(30 × 1 = 30)

1. Rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ -2 & 0 & 5 \end{bmatrix}$ is _____

- (A) 0
- (B) 1
- (C) 2
- (D) 3

2. If $u = x^2 + y^2$ then $\frac{\partial^2 u}{\partial x \partial y} =$ _____

- (A) -1
- (B) 0
- (C) 1
- (D) 2

3. The linear form of the differential equation

$$x \frac{dy}{dx} + y = x^3 y^6 \text{ is } \underline{\hspace{2cm}}$$

- (A) $\frac{dz}{dx} + \frac{5}{x} z = -5x^2$
- (B) $\frac{dz}{dx} - \frac{5}{x} z = -5x^2$
- (C) $\frac{dz}{dx} - \frac{5}{x} z = -5x^2$
- (D) $\frac{dz}{dx} - \frac{15}{x} z = -5x^2$

4. If $p(r)$ is the probability of r given by

$$p(r) = \frac{(0.083)^r e^{-0.083}}{r!}, \text{ the distribution is called}$$

- (A) Binomial
- (B) Normal
- (C) Poisson
- (D) Exponential

5. The equation

$$\int_{x_0}^{x_n} y dx = \frac{h}{3} [y_0 + y_n + 4(y_1 + y_3 + \dots) + 2(y_2 + y_4 + \dots)]$$

is called _____ in numerical integration

- (A) Trapezoidal rule
- (B) Simpson's rule
- (C) Weddle's rule
- (D) Romberg integration

6. If $\frac{dy}{dx} = x + y$ with $y(0) = 1$ then by Euler's method $y(0.1)$ at $h = 0.1$ is _____

- | | |
|----------|----------|
| (A) 4.11 | (B) 3.11 |
| (C) 2.11 | (D) 1.11 |

Space For Rough Work

7. When two meshes have dependent or independent current source in common, we can call _____
- (A) Dependent Mesh
 - (B) Independent Mesh
 - (C) Super Node
 - (D) Super Mesh
8. Norton's equivalent resistance is the _____ as Thevenin's equivalent resistance
- (A) Not same
 - (B) Same
 - (C) Both A and B
 - (D) None of the above
9. Superposition theorem is not applicable for
- (A) Voltage calculations
 - (B) Bilateral elements
 - (C) Power calculations
 - (D) Passive elements
10. While considering reciprocity theorem, we consider ratio of response to excitation as ratio of _____
- (A) voltage to voltage
 - (B) current to current
 - (C) voltage to current
 - (D) none of the above
11. Which elements act as an independent variables in Y-parameters?
- (A) Current
 - (B) Voltage
 - (C) Both A and B
 - (D) None of the above
12. Which of the following error is caused by poor calibration of the instrument?
- (A) Random error
 - (B) Gross error
 - (C) Systematic error
 - (D) Precision error

Space For Rough Work

13. When using even parity, where is the parity bit placed?
- (A) After the odd parity bit
 - (B) After the LSB
 - (C) In the parity word
 - (D) None of the above
14. DC power output of center tapped full wave rectifier is equal to _____
- (I_m is the peak current and R_L is the load resistance)
- (A) $(2I_m^2/\pi^2) R_L$
 - (B) $(I_m^2/2\pi^2) R_L$
 - (C) $(I_m^2/\pi^2) R_L$
 - (D) $(4I_m^2/\pi^2) R_L$
15. Which type of power amplifier is biased for operation at less than 180° of the cycle?
- (A) Class A
 - (B) Class B or AB
 - (C) Class C
 - (D) Class D
16. One of De Morgan's theorems states that $\overline{X+Y} = \overline{X} \cdot \overline{Y}$. Simply stated, this means that logically there is no difference between:
- (A) a NOR and an AND gate with inverted inputs
 - (B) a NAND and an OR gate with inverted inputs
 - (C) an AND and a NOR gate with inverted inputs
 - (D) a NOR and a NAND gate with inverted inputs
17. A J-K flip-flop with $J = 1$ and $K = 1$ has a 20 kHz clock input. The Q output is _____
- (A) Constantly LOW
 - (B) Constantly HIGH
 - (C) A 20 kHz square wave
 - (D) A 10 kHz square wave
18. The phase difference between the input and output voltages of a transistor connected in common collector arrangement is _____
- (A) 180°
 - (B) 0°
 - (C) 90°
 - (D) 270°

Space For Rough Work

19. In case of DC servomotor, the back emf is equivalent to an electric friction which tends to:
- (A) Slowly decrease the stability of the system
 - (B) Improve stability of the system
 - (C) Very rapidly decrease the stability of the system
 - (D) Have no effect of stability
20. The overall transfer function from block diagram reduction for cascaded blocks is:
- (A) Sum of individual gain
 - (B) Product of individual gain
 - (C) Difference of individual gain
 - (D) Division of individual gain
21. Routh Hurwitz criterion cannot be applied when the characteristic equation of the system containing coefficient's which is/are
- (A) Exponential function of s
 - (B) Sinusoidal function of s
 - (C) Complex
 - (D) Exponential and sinusoidal function of s and complex
22. Which one of the following is not the property of root loci?
- (A) The root locus is symmetrical about imaginary axis
 - (B) They start from the open loop poles and terminate at the open loop zeroes
 - (C) The breakaway points are determined from $dK/ds = 0$
 - (D) Segments of the real axis are the part of the root locus if and only if the total number of real poles and zeroes to their right is odd
23. A closed loop control system is stable if the Nyquist plot of the corresponding open loop transfer function
- (A) Encircles the s -plane point $(-1, 0)$ in the clockwise direction as many times as the number of right half s -plane poles
 - (B) Encircles the s -plane point $(-1, 0)$ in the counter clockwise direction as many times as the number of right half s -plane poles
 - (C) Encircles the s -plane point $(-1, 0)$ in the counter clockwise direction as many times as the number of left half s -plane poles
 - (D) Encircles the s -plane point $(-1, 0)$ in the counter clockwise direction as many times as the number of right half s -plane poles zeros

Space For Rough Work

24. State space analysis is applicable even if the initial conditions are _____
- (A) Non-zero
 - (B) Zero
 - (C) Equal
 - (D) Not equal
25. What is the file extension that is loaded in a microcontroller for executing any instruction?
- (A) .hex
 - (B) .txt
 - (C) .c
 - (D) .doc
26. An alternate function of port pin P3.4 in the 8051 is _____
- (A) Timer 1
 - (B) Timer 0
 - (C) Interrupt 1
 - (D) Interrupt 0
27. Which of the following instructions will load the value 35H into high byte of timer 0?
- (A) MOV TH0, #35H
 - (B) MOV TH0, 35H
 - (C) MOV TO, #35H
 - (D) MOV TO, 35H
28. The ADC0804 has _____ resolution
- (A) 4-bit
 - (B) 8-bit
 - (C) 16-bit
 - (D) 32-bit
29. What should be done if we want to double the baud rate?
- (A) change a bit of the TMOD register
 - (B) change a bit of the PCON register
 - (C) change a bit of the SCON register
 - (D) change a bit of the SBUF register
30. USART abbreviated as _____
- (A) universalsynchronous-asynchronous Receiver-transfer
 - (B) universal asynchronous-synchronous Receiver-transmitter
 - (C) united asynchronous-synchronous Receiver-transmitter
 - (D) universalsynchronous-asynchronous Receiver-transmitter

Space For Rough Work

(SECTION – II)

Each question carries two marks.

(15 × 2 = 30)

31. The limit of $\frac{2x^3 - 4x + 7}{3x^3 + 5x^2 - 4}$ at $x = \infty$ is _____

(A) $\frac{7}{-4}$
(B) $\frac{-4}{5}$
(C) $\frac{2}{3}$
(D) 0

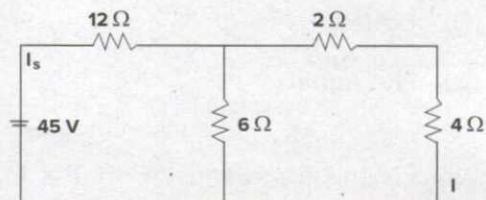
32. If $8x - 10y + 66 = 0$ and $40x - 18y = 214$ then correlation value is $r =$ _____

(A) 0.4
(B) 0.6
(C) 0.8
(D) 0.9

33. If $y(0) = 1$, $y(0.5) = 0.8$ and $y(1) = 0.5$, then by numerical integration using trapezoidal rule the value is _____

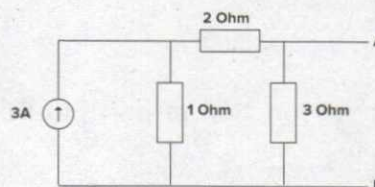
(A) 0.115
(B) 0.225
(C) 0.015
(D) 0.775

34. In the circuit given below, the current [I] in the 4-ohm resistor is _____



(A) 3.5 A (B) 2.5 A
(C) 1.5 A (D) 0.5 A

35. The Norton equivalent of the circuit shown in the figure is



(A) 0.75 A, 5/6 Ohm
(B) 0.75 A, 1.5 Ohm
(C) 1 A, 1.5 Ohm
(D) 1 A, 5/6 Ohm

36. Find the force between two charges when they are brought in contact and separated by 4 cm apart, charges are 2nC and -1nC, in μN .

(A) 1.44 (B) 2.44
(C) 2.404 (D) 1.404

Space For Rough Work

37. Choose the incorrect statement(s) from the following:

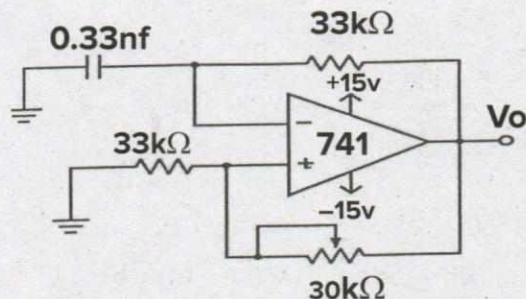
- (1) MROM does not allow the storage of user specified data to the manufacturer of the memory
- (2) PROM can be reprogrammed again and again at any number of times
- (3) EPROM allows to erase the stored content by direct exposure of chip to UV radiations every time before reprogramming
- (4) E^2 PROM allows erasing in an electrical manner despite the exposure of chip to UV rays

- (A) 1 & 2
(B) 3 & 4
(C) Only 3
(D) 2 & 4

38. The subtraction of a binary number Y from another binary number X, done by adding the 2's complement of Y to X, results in a binary number without overflow. This implies that the result is

- (A) negative and is in normal form
(B) negative and is in 2's complement form
(C) positive and is in normal form
(D) positive and is in 2's complement form

39. Determine the output frequency for the circuit given below:



- (A) 28.77 Hz
(B) 31.97 Hz
(C) 35.52 Hz
(D) 39.47 Hz

40. For the block diagram shown in Fig.1, the transfer function of the system is given by

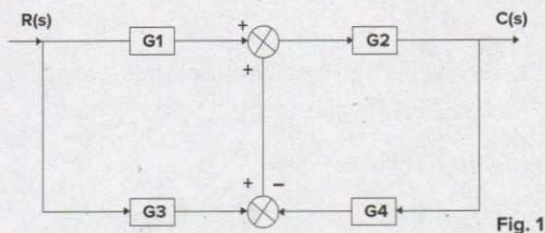
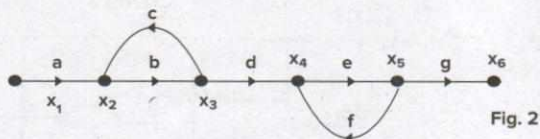


Fig. 1

- (A) $G1 + G2 + G3 / [1 + G2G4]$
(B) $G1G2 + G2G3 / [1 + G2G4]$
(C) $G1G2 + G2 / [1 + G2G4]$
(D) $G1G2 / [1 + G3G4]$

Space For Rough Work

41. Use Mason's gain formula to find the transfer function of the given signal flow graph shown in Fig. 2:



- (A) $abd / [1 - (ac)]$
 (B) $abdeg / [1 - (bc + ef) + bcef]$
 (C) $abd / [1 - (bc + ef) + bcef]$
 (D) $adcdef / [1 - (bc + ef) + bcef]$
42. The number and direction of encirclements around the point $(-1 + j0)$ in the complex plane by the Nyquist plot of $G(s) = (1 - s) / (4 + 2s)$ is
- (A) zero
 (B) one, anti-clockwise
 (C) one, clockwise
 (D) two, clockwise
43. What is the Hex Decimal value loaded into the TH1 Register _____
- Mov TH1, # -200
- (A) C4H (B) FDH
 (C) F4H (D) 38H

44. What is the Time Delay generated by following subroutine?

Given Crystal Frequency = 11.059 MHZ

Delay : Mov R₃, #200d

Here : DJNZ R₃, Here

RET

- (A) 436.25 μ S
 (B) 300 μ S
 (C) 500 μ S
 (D) 800.26 μ S
45. What is the content of Accumulator _____ after this operation?
- Mov A, #45H
 XRL A, #45H
- (A) CCH
 (B) 45H
 (C) 22H
 (D) 00H

Space For Rough Work

(E&E: ELECTRICAL AND ELECTRONICS ENGINEERING)

PART – B

(Section-I)

Each question carries one mark.

(20 × 1 = 20)

46. The synchronous impedance method will not give accurate voltage regulation because
- (A) The value of synchronous impedance found is always less than actual value
 - (B) The value of synchronous impedance found is always more than the actual value
 - (C) The value of the synchronous impedance is independent of saturation
 - (D) The reactance due to armature reaction is considered separately
47. The torque produced by a series combination of two DC series motor is
- (A) Half the torque when they are connected in parallel
 - (B) Twice the torque when they are connected in parallel
 - (C) Four times the torque when they are connected in parallel
 - (D) Equal to the torque when they are connected in parallel
48. Which of the following test can be performed on DC series motor?
- (A) Swinburne test
 - (B) Hopkinson test
 - (C) Brake test
 - (D) Field test
49. How many cycles of alternating current will be generated in one revolution of 8 pole synchronous alternator?
- (A) 10 cycles
 - (B) 8 cycles
 - (C) 4 cycles
 - (D) 16 cycles
50. Which of the following is the main advantage of an autotransformer over a two winding transformer?
- (A) Hysteresis losses are reduced
 - (B) Saving in winding material
 - (C) Copper losses are negligible
 - (D) Eddy losses are totally eliminated

Space For Rough Work

51. Compared with the secondary of a loaded step-up transformer, the primary has
- (A) Lower voltage and higher current
 - (B) Higher voltage and lower current
 - (C) Lower voltage and lower current
 - (D) Higher voltage and higher current
52. Which of the following connections is most suitable and economical for small, high – voltage transformers?
- (A) Delta–delta connection
 - (B) Star–star connection
 - (C) Star–delta connection
 - (D) Delta–star connection
53. Ferranti effect can be compensated by which of the following?
- (A) Shunt Reactor
 - (B) Series Capacitor
 - (C) Shunt Capacitor
 - (D) Both A & B
54. In practice what is the value of diversity factor?
- (A) Less than Unity
 - (B) Greater than Unity
 - (C) Equal to or greater than Unity
 - (D) Less than zero
55. When load factor and diversity factor increase _____
- (A) Cost of electricity decreases
 - (B) Cost of electricity also increases
 - (C) Cost of electricity remains same
 - (D) Cost of electricity increases exponentially
56. An SCR has half cycle surge current rating of 3000 A for 50 Hz supply. One cycle surge current will be
- (A) 1500 A
 - (B) 6000 A
 - (C) 2121.32 A
 - (D) 4242.64 A
57. Which triggering is the most reliable?
- (A) Forward voltage triggering
 - (B) Gate triggering
 - (C) dV/dt triggering
 - (D) Thermal triggering
58. Snubber circuit is used with SCR
- (A) in series
 - (B) in parallel
 - (C) either series or parallel
 - (D) anti-parallel

Space For Rough Work

59. A modern power semiconductor device that combines the characteristics of BJT and MOSFET is

- (A) IGBT (B) FCT
- (C) MCT (D) GTO

60. What is infinite bus in power system?

- (A) A large system with infinite voltage
- (B) A large system in which the voltage and frequency vary
- (C) A large system whose voltage and frequency remain constant throughout.
- (D) Both (A) and (B)

61. Normally Z bus matrix is a

- (A) Null Matrix
- (B) Sparse Matrix
- (C) Full Matrix
- (D) Unit Matrix

62. Single line diagram does not represent:

- (A) Star connection of transformer winding
- (B) Delta connection of transformer winding
- (C) Neutral wire of transmission lines
- (D) Ratings of machines

63. DC series motors are used where the high _____ torque is required.

- (A) Maximum
- (B) Minimum
- (C) Starting
- (D) Stalling

64. Which starting method is the best method in induction motor?

- (A) Direct online starting
- (B) Autotransformer starting
- (C) Reactance starting
- (D) Star-Delta starting

65. The speed control by variation of field flux results in _____

- (A) Constant torque drive
- (B) Zero speed
- (C) Variable torque drive
- (D) Variable power drive

Space For Rough Work

(Section – II)

Each question carries two marks.

(10 × 2 = 20)

66. A 3-phase, Y connected, round rotor synchronous generator rated at 10 kVA, 230V has a Synchronous reactance of 1.2Ω per phase and an armature resistance of 0.5Ω per phase. The percentage voltage regulation at full-load with 0.8 lagging power factor is
- (A) 21.89%
(B) 18.91%
(C) 25.7%
(D) 20.45%
67. An alternator is generating power at 210 V per phase while running at 1500 rpm. If the speed of an alternator drops to 1000 rpm the generated voltage per phase will be
- (A) 115V
(B) 140V
(C) 120V
(D) 150V
68. A 600 kVA transformer has iron losses of 400 kW and copper losses of 500 kW. Its kVA rating for maximum efficiency is given by
- (A) 537 kVA
(B) 548 kVA
(C) 555 kVA
(D) 585 kVA
69. A 5 kVA transformer has a turns ratio of $N_1/N_2 = 10$. The impedance of primary windings is $3 + j5$ ohms while that of secondary winding is $0.5 + j0.8$ ohms. The impedance of transformer when referred to primary will be
- (A) $3.5 + j5.8$ ohms
(B) $8 + j13$ ohms
(C) $53 + j85$ ohms
(D) $3.05 + j5.08$ ohms
70. A voltage of 1000 kV is applied to an overhead line with its receiving end open. If the surge impedance of the line is 500 ohm, then the total surge power in the line is
- (A) 2000 MW
(B) 1000 MW
(C) 10000 MW
(D) 200 MW
71. An overhead line conductor has a cross sectional area of 2.5 cm^2 , span length is 250 m, weight of conductor 1.5 kg/m, allowable maximum tension 6666.67 kg, wind pressure is 40 kg/m^2 . Calculate the deflected sag.
- (A) 2.76 m
(B) 2.26 m
(C) 0.226 m
(D) 1.85 m

Space For Rough Work

72. If a latching current for the circuit shown in Fig. 1 is 2 mA. Obtain the value of minimum width of the property turn ON the SCR?

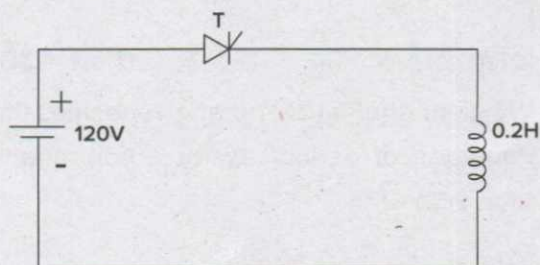


Fig. 1

$$I_L = 2\text{mA}$$

- (A) $3\mu\text{s}$ (B) $3.1\mu\text{s}$
 (C) $3.2\mu\text{s}$ (D) $3.3\mu\text{s}$
73. Find the value of R in case of an RC firing circuit which is to be turned on with a source voltage of 150 V and the following parameters: $I_{gt} = 2\text{A}$, $V_d = 1.5\text{V}$, $V_{gt} = 125\text{V}$.
- (A) 11.75Ω (B) 54.25Ω
 (C) 96Ω (D) 5Ω

74. A motor – load system has following details: Quadrants I and II, $T = 400 - 0.4N$, N – m; where N is the speed in rpm. Motor is coupled to an active load torque $T_1 = \pm 200$, N – m. The motor speeds for motoring and braking operations in the forward direction are

- (A) 400 rpm, 500 rpm
 (B) 1000 rpm, 800 rpm
 (C) 500 rpm, 1500 rpm
 (D) 500 rpm, 1000 rpm

75. A 3 – phase, 6 pole, 50 Hz, Y – connected, squirrel – cage induction motor has following parameters: time constant = 0.4884 sec and slip = 0.1197. The time taken by the motor during starting is

- (A) 1.107 sec
 (B) 1.505 sec
 (C) 0.995 sec
 (D) 1.297 sec

Space For Rough Work

**(E & C AND TC: ELECTRONICS AND COMMUNICATION ENGINEERING AND
TELECOMMUNICATION ENGINEERING)**

PART – B

(Section – I)

Each question carries one mark.

(20 × 1 = 20)

- | | |
|---|---|
| <p>46. In VLSI design, which process deals with the determination of resistance and capacitance of interconnections?</p> <p>(A) Floorplanning
(B) Placement & Routing
(C) Testing
(D) Extraction</p> <p>47. The BJTs in the BICOMS circuit is in _____ configuration.</p> <p>(A) Push-pull
(B) Totem pole
(C) Active high
(D) Active low</p> <p>48. The CMOS inverter consists of:</p> <p>(A) Enhancement mode n - MOS transistor and depletion mode p - MOS transistor
(B) Enhancement mode p - MOS transistor and depletion mode n - MOS transistor
(C) Enhancement mode p - MOS transistor and enhancement mode p - MOS transistor
(D) Enhancement mode p - MOS transistor and enhancement mode n - MOS transistor</p> | <p>49. Which mathematical notation specifies the condition of periodicity for a continuous time signal?</p> <p>(A) $x(t) = x(t + T_0)$
(B) $x(n) = x(n + N)$
(C) $x(t) = e^{-\alpha t}$
(D) None of the above</p> <p>50. A LTI system is said to be initially relaxed system only if _____</p> <p>(A) Zero input produces non-zero output
(B) Zero input produces zero output
(C) Zero input produces an output equal to unity
(D) None of the above</p> <p>51. A causal and stable IIR filter has</p> <p>(A) Linear phase
(B) No Linear phase
(C) Linear amplitude
(D) No amplitude</p> |
|---|---|

Space For Rough Work

52. The z - transform of a sequence $x(n)$ which is given as $X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n}$ is known as _____
- (A) Unilateral Z - transform
(B) Bilateral Z - transform
(C) Trilateral Z - transform
(D) None of the mentioned
53. In MSK, the difference between the higher and lower frequency is _____
- (A) Same as the bit rate
(B) Half of the bit rate
(C) Twice the bit rate
(D) Four times the bit rate
54. US digital cellular system based on CDMA was standardized as _____
- (A) IS - 54
(B) IS - 136
(C) IS - 95
(D) IS - 76
55. What is the disadvantage of FM over AM?
- (A) high modulating power is needed
(B) requires high output power
(C) large bandwidth required
(D) high noise is produced
56. An antenna has a field pattern $E(\theta) = \cos(\theta) \cdot \cos 2(\theta)$. The first null beam width of the antenna is:
- (A) 45°
(B) 90°
(C) 180°
(D) 120°
57. The basic equation of radiation that is applied to any antenna irrespective of the type of the antenna is:
- (A) $iL = Qv$
(B) $iQ = Lv$
(C) $i/L = Q/v$
(D) None of the mentioned
58. A source has a cosine radiation-intensity pattern given by $U = U_m \cos(\theta)$. The directivity of this source is:
- (A) 2
(B) 4
(C) 6
(D) 8

Space For Rough Work

59. Choose the correct statement(s)

- (i) The gate circuit impedance of MOSFET is higher than that of a BJT
- (ii) The gate circuit impedance of MOSFET is lower than that of a BJT
- (iii) The MOSFET has higher switching losses than that of a BJT
- (iv) The MOSFET has lower switching losses than that of BJT

- (A) Both i & ii
- (B) Both ii & iv
- (C) Both i & iv
- (D) Only ii

60. _____ commutation technique is commonly employed in series inverters.

- (A) line
- (B) load
- (C) forced
- (D) external-pulse

61. What is the expression for the current amplification factor?

- (A) $\Delta I_C \Delta V_C$
- (B) $\Delta V_C \Delta I_C$
- (C) $(\Delta I_C \Delta I_B) V_{CE}$
- (D) $(\Delta I_C \Delta I_B) V_{BE}$

62. The instruction that is used to transfer the data from source operand to destination operand is _____

- (A) data copy \ transfer instruction
- (B) branch instruction
- (C) arithmetic \ logical instruction
- (D) string instruction

63. The instruction, MOV AX, 0005H belongs to the address mode is _____

- (A) register
- (B) direct
- (C) immediate
- (D) register relative

64. If the data is present in a register and it is referred using the particular register, then it is _____

- (A) direct addressing mode
- (B) register addressing mode
- (C) indexed addressing mode
- (D) immediate addressing mode

65. The addressing mode that is used in unconditional branch instructions is _____

- (A) intersegment direct addressing mode
- (B) intersegment indirect addressing mode
- (C) intersegment direct and indirect addressing mode
- (D) None of the above

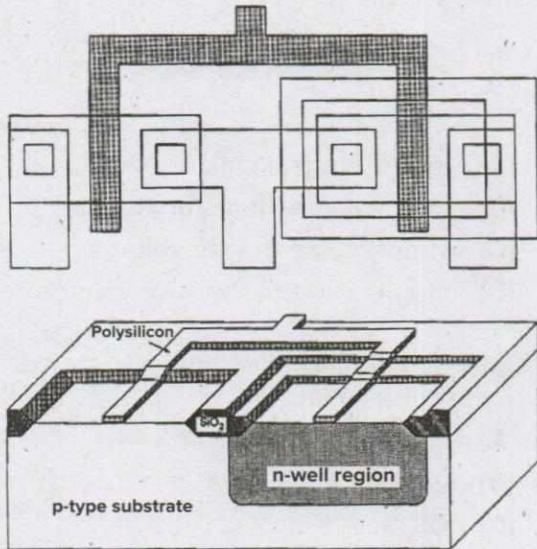
Space For Rough Work

(Section – II)

Each question carries two marks.

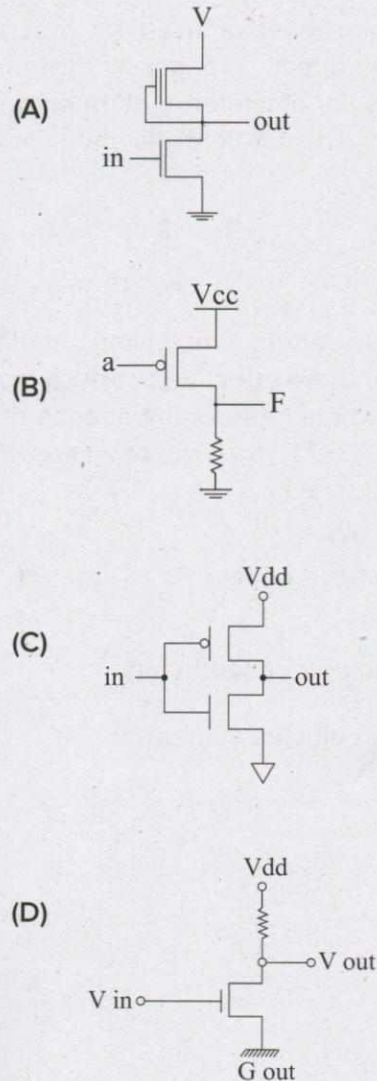
(10 × 2 = 20)

66. Which process is involved in growing the shaded region?



- (A) Chemical Vapor Deposition (CVD)
- (B) Sputtering and patterned by etching
- (C) Chemical Vapor Deposition (CVD)
and patterned by HF acid etching
- (D) Chemical Vapor Deposition (CVD)
and patterned by dry (plasma)
etching

67. Which of these inverters is more efficient?



68. Determine energy of power as applicable for the following signal $x[n] = (1/3)^n u[n]$
- (A) 10/4
 - (B) 9/4
 - (C) 5/8
 - (D) 9/8

Space For Rough Work

69. Which of the following is the odd component of the signal $x(t) = e(jt)$?

- (A) $\cos t$ (B) $J \cdot \sin t$
(C) $J \cdot \cos t$ (D) $\sin t$

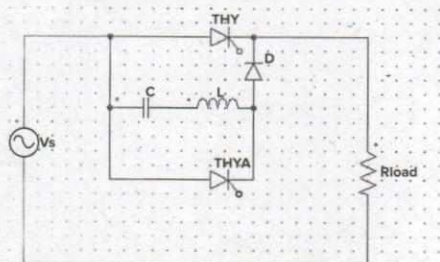
70. A parabolic reflector used for reception with the direct broadcast system is 18 inches in diameter and operates at 12.4 GHz. The far-field distance for this antenna is:

- (A) 18 m (B) 13 m
(C) 16.4 m (D) 17.3 m

71. If the field strength at receiving antenna is $1 \mu\text{V/m}$, and the effective aperture area is 0.4 m^2 and the intrinsic impedance of the medium is 377Ω , then the power received by the antenna is:

- (A) 1.06 pW
(B) 1.06 fW
(C) 2 μW
(D) None of the mentioned

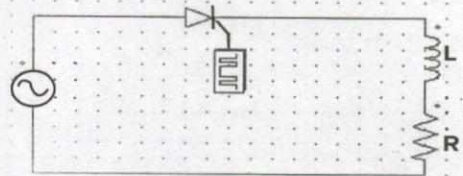
72. For the circuit shown below,



The maximum value of current through thyristors T1 & TA can be given by

- (A) V_s/R , $V_s \sqrt{C/L}$ (B) $V_s \sqrt{C/L}$, V_s/R
(C) $V_s/R + LC$, V_s (D) V_s/LC , V_s/R

73. For a half-wave single phase thyristor rectifier circuit with any type of load the _____ waves must ideally give the supply voltage waveform.



- (A) load voltage, load current
(B) load voltage, thyristor voltage
(C) supply current, load voltage
(D) supply current, thyristor voltage

74. The function, 'data bus tri stated' is performed when _____

- (A) CS (active low) = 1
(B) CS (active low) = 0
(C) CS (active low) = 0, RD (active low) = 1, WR (active low) = 1
(D) CS (active low) = 1 OR CS (active low) = 0, RD (active low) = 1, WR (active low) = 1

75. To estimate the size of an executable program before it is assembled and linked, the programming methodology concerned is by writing _____

- (A) programs with more than one segment for data and code
(B) programs with FAR Subroutines each of size up to 64KB
(C) programs with more than one segment for stack
(D) all of the mentioned

Space For Rough Work

(BME & ME: BIOMEDICAL ENGINEERING & MEDICAL ELECTRONICS)

PART – B

(SECTION – I)

Each question carries one mark.

(20 × 1 = 20)

46. The first heart sound represents which portion of the cardiac cycle?
- (A) Ventricular systole
 - (B) Atrial systole
 - (C) Closing of Atrioventricular valves
 - (D) Closing of the semilunar valves
47. Which branch of the nervous system brings information from the joints to the spinal cord?
- (A) Afferent somatic sensory
 - (B) Efferent somatic motor
 - (C) Efferent autonomic motor
 - (D) Afferent visceral sensory
48. Which of the following statements best describes homeostasis?
- (A) Keeping the body in a fixed and unaltered state.
 - (B) Dynamic equilibrium.
 - (C) Maintaining a near-constant internal environment.
 - (D) Altering the external environment to accommodate the body's needs.
49. Electrodes to measure EEG are placed on _____
- (A) Forehead
 - (B) Scalp
 - (C) Cheek
 - (D) Ears
50. The unit of sensitivity of an electrocardiograph is _____
- (A) m/mV
 - (B) mm/V
 - (C) mm/mV
 - (D) m/V
51. Which rhythm is the principal component of the EEG that indicates the alertness of the brain?
- (A) Theta rhythm
 - (B) Gamma rhythm
 - (C) Beta rhythm
 - (D) Alpha rhythm

Space For Rough Work

52. X-ray lies in which region of the electromagnetic spectrum?
- (A) 10 Å to 7000 Å
(B) 4000 Å to 10 Å
(C) 10 Å to 0.01 Å
(D) 1 Å to 10 Å
53. In order to visualize the flow of blood in the renal arteries, what process is done with CT?
- (A) CT Angioplasty
(B) CT Angiography
(C) Simple CT
(D) CT Cardiography
54. The commonly used MRIs have a magnetic strength of _____
- (A) 1.5 – 3 Tesla
(B) 3 – 6 Tesla
(C) 6 – 12 Tesla
(D) 12 – 24 Tesla
55. What property of sound waves acts like the principle of ultrasound?
- (A) Reflection and Refraction
(B) Reflection only
(C) Refraction only
(D) Propagation
56. The current generation CT scanner use _____ for scanning
- (A) pencil beam and stationary detectors
(B) pencil beam and rotating detectors
(C) fan beam and detectors
(D) electron beam and detectors
57. If $X(k)$ is the N - point DFT of a sequence $x(n)$, then what is the DFT of $x^*(n)$?
- (A) $X(N - k)$
(B) $X^*(k)$
(C) $X^*(N - k)$
(D) None of the mentioned
58. The magnitude response of the following filter decreases monotonically as frequency increases
- (A) Butterworth Filter
(B) Chebyshev type - 1
(C) Chebyshev type - 2
(D) None of the above
59. What is the ROC of the z-transform of the signal $x(n) = a^n u(n) + b^n u(-n-1)$?
- (A) $|a| < |z| < |b|$
(B) $|a| > |z| > |b|$
(C) $|a| > |z| < |b|$
(D) $|a| < |z| > |b|$

Space For Rough Work

60. The Z transformation $x(n) = \delta(n + k)$ for $K > 0$ is _____

- (A) $z / z - 1$
- (B) z^k
- (C) 1
- (D) z^{-k}

61. Rapid Eye Movement (REM) sleep is characterised by:

- (A) High amplitude low frequency EEG waveforms.
- (B) Reduced skeletal muscle tone.
- (C) Slow rolling eye movements.
- (D) An onset at the beginning of sleep.

62. For analog and digital IIR filters to be casual number of zeros must be

- (A) $\geq$ number of poles
- (B) $\leq$ number of poles
- (C) = number of poles
- (D) zeros

63. Gaussian noise is referred to as

- (A) Red
- (B) Black
- (C) Normal noise
- (D) White

64. The sampled frequency less than the nyquist rate is called

- (A) Under sampling
- (B) Over sampling
- (C) Critical sampling
- (D) Nyquist sampling

65. Gradient magnitude images are more useful in

- (A) Point
- (B) Line
- (C) Area
- (D) Edge

Space For Rough Work

(Section – II)

Each question carries two marks.

(10 × 2 = 20)

66. Total lung capacity is the sum of _____, _____, and _____
- (A) TV, ERV, IRV and RV
(B) TLC, VC, IC and IVC
(C) Both A and B
(D) None of the above
67. Major types of joints that are present in our body are _____ joints.
- (A) Fibrous & Cartilaginous
(B) Cartilaginous & Synovial
(C) Fibrous & Synovial
(D) Fibrous, Cartilaginous and Synovial
68. Defibrillators overcome the uncoordinated movement of ventricle walls of heart by discharging approximately _____ V with a duration of short pulses _____ seconds.
- (A) 4000 & 20 milli
(B) 4000 & 20 micro
(C) 400 & 20 micro
(D) None of the above
69. Major types of implantable pacemakers are _____, _____ and _____ pacemakers
- (A) Fixed rate
(B) Demand R-wave triggered
(C) Atrial triggered and dual chamber
(D) All of the above
70. The wave velocity of ultrasound in soft tissues is 1540m/s and the impedance offered by it is $1.63 \times 10^6 \text{ kg/m}^2\text{s}$. The density of the soft tissue is _____.
- (A) 0.1058441 kg/m^3
(B) 10.58441 kg/m^3
(C) 1058.441 kg/m^3
(D) 1.584 kg/m^3
71. Nyquist rate of the signal $x(t) = 3\cos(50\pi t) + 10\sin(300\pi t) - \cos(100\pi t)$ is
- (A) 50Hz
(B) 300Hz
(C) 200Hz
(D) 100Hz

Space For Rough Work

72. Method available for detection and measurements of radiations from radio nuclides are _____.

- (A) Thermistor
- (B) Geiger muller counter
- (C) LED
- (D) Photo detector

73. Important features of IIR filters are _____

- (A) Physically Reliable IIR filters do not have linear phase
- (B) IIR Filter specifications include the desired characteristics for magnitude response only
- (C) Both A and B
- (D) None of the above

74. Two-dimensional transform coding algorithm for image compression has the steps: _____

- (A) Determine the bit allocation
- (B) Code the quantizer output
- (C) FAN coding
- (D) Only A and B

75. To select the order 'N' for a Butterworth filter the expression is given by _____ and 'N' should be _____.

$$(A) \quad N = \frac{1}{2} \frac{\log \left[\frac{\frac{1}{A_s^2} - 1}{\frac{1}{A_p^2} - 1} \right]}{\log \left[\frac{\Omega_s}{\Omega_R} \right]} \text{ and odd.}$$

$$(B) \quad N = \frac{1}{2} \frac{\log \left[\frac{\frac{1}{A_s^2} - 1}{\frac{1}{A_p^2} - 1} \right]}{\log \left[\frac{\Omega_s}{\Omega_R} \right]} \text{ and periodic}$$

$$(C) \quad N = \frac{1}{2} \frac{\log \left[\frac{\frac{1}{A_s^2} - 1}{\frac{1}{A_p^2} - 1} \right]}{\log \left[\frac{\Omega_s}{\Omega_R} \right]} \text{ and integer}$$

(D) None of the above

Space For Rough Work

(IT: INSTRUMENTATION TECHNOLOGY)

PART – B

(SECTION – I)

Each question carries one mark.

(20 × 1 = 20)

46. The use of _____ instruments is merely confined within laboratories as standardizing instruments.
- (A) absolute
 - (B) indicating
 - (C) recording
 - (D) integrating
47. In desired inputs GD is defined as _____.
- (A) Transfer function
 - (B) Desired function
 - (C) Constant
 - (D) Output
48. The indirect measurements involving one translation are called _____ measurements.
- (A) Secondary
 - (B) Primary
 - (C) Tertiary
 - (D) Mono
49. The smallest change in measurement that will result in a measurable change in the transducer output is called _____.
- (A) offset
 - (B) linearity
 - (C) resolution
 - (D) threshold
50. How systematic errors are eliminated?
- (A) Frequent measurement
 - (B) Replacement of instrument
 - (C) Finding mean of reading
 - (D) Finding variance of reading
51. Which of the following errors is caused by poor calibration of the instrument?
- (A) Random error
 - (B) Gross error
 - (C) Systematic error
 - (D) Precision error

Space For Rough Work

52. Output of a bimetallic element will be _____
- (A) Strain
 - (B) Pressure
 - (C) Displacement
 - (D) Voltage
53. Which of the following is used as indication instrument in a liquid expansion system?
- (A) Bellows
 - (B) Bourdon tube
 - (C) Ammeter
 - (D) Thermometer
54. Strain gauge, LVDT and thermocouple are examples of
- (A) Active transducers
 - (B) Passive transducers
 - (C) Analog transducers
 - (D) Primary transducers
55. The time required for the controlled variable to reach a specified value after the application of a step input is called:
- (A) rise time
 - (B) settling time
 - (C) response time
 - (D) peak time
56. The operating characteristic which inherently assists the establishment of equilibrium is called:
- (A) corrective action
 - (B) self regulation
 - (C) automatic regulation
 - (D) proportional control action
57. The controller action in which there is continuous linear relation between the position of the final control element and the value of the controlled variable:
- (A) floating controller action
 - (B) proportional - position controller action
 - (C) proportional - speed floating controller action
 - (D) self - regulation controller action.
58. A process control system consists of _____
- (A) 10 elements
 - (B) 6 elements
 - (C) 2 elements
 - (D) 4 elements
59. Beer's law states that the intensity of light decreases with respect to _____
- (A) Concentration
 - (B) Distance
 - (C) Composition
 - (D) Volume

Space For Rough Work

60. In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?
- (A) Column chromatography
 - (B) Planar chromatography
 - (C) Liquid chromatography
 - (D) Gas chromatography
61. Which of the following is a four-level laser?
- (A) ND: YAG
 - (B) Ruby
 - (C) Argon laser
 - (D) CO₂ laser
62. Which condition determines the causality of the LTI system in terms of its impulse response?
- (A) Only if the value of an impulse response is zero for all negative values of time
 - (B) Only if the value of an impulse response is unity for all negative values of time
 - (C) Only if the value of an impulse response is infinity for all negative values of time
 - (D) Only if the value of an impulse response is negative for all negative values of time
63. Which among the following operations is / are not involved / associated with the computation process of linear convolution?
- (A) Folding Operation
 - (B) Shifting Operation
 - (C) Multiplication Operation
 - (D) Integration Operation
64. A discrete time signal may be
- (A) Samples of a continuous signal
 - (B) A time series which is a domain of integers
 - (C) Timer series of sequence of quantities
 - (D) All of the above
65. FIR filters _____
- 1. are non-recursive
 - 2. do not adopt any feedback
 - 3. are recursive
 - 4. use feedback
- (A) 1 & 2
 - (B) 3 & 4
 - (C) 1 & 4
 - (D) 2 & 3

Space For Rough Work

(SECTION – II)

Each question carries two marks.

(10 × 2 = 20)

66. In a measurement system,
- (A) A single measurement components may have both random errors and systematic errors
 - (B) A measurement system consists of several components with each component having separate errors
 - (C) Both the statements (A) and (B) are true
 - (D) Neither statement (A) nor statement (B) is true
67. An instrument in which the value of ethnical quantity to be measured can be determined from the deflection of the instrument when it has been precalibrated by comparison with an absolute instrument
- (A) Absolute instrument
 - (B) Secondary instrument
 - (C) Recording instrument
 - (D) Integrating instrument
68. Starting position of an object is represented as $x = 5.1 \pm 0.2\text{m}$ and finishing position as $y = 6.9 \pm 0.3\text{m}$. What will be the displacement and error in displacement?
- (A) Displacement = 1m, Error = 0.5m
 - (B) Displacement = 2m, Error = 0.36m
 - (C) Displacement = 1.8m, Error = 0.36m
 - (D) Displacement = 1.5m, Error = 0.4m
69. Which of the following statements are correct?
- I. Repeatability means the closeness of output readings when the same input is applied repetitively over a short period of time, with the same measurement conditions and same instruments.
 - II. Reproducibility means the closeness of output readings for the same input when there are changes in the method of measurement and conditions of measurement.
- (A) Both I and II are correct
 - (B) Only I is correct
 - (C) Only II is correct
 - (D) Both are incorrect
70. Units for Humidity sensor _____
- (A) Dew / frost point or Relative Humidity
 - (B) Relative Humidity or Parts Per Million
 - (C) Dew / frost point or Parts Per Million
 - (D) Dew / frost point or Parts Per Million or Relative Humidity

Space For Rough Work

71. Which of the following is represented by a ratio of density of substance to density of water at 40°C?

- (A) Specific gravity
- (B) Mass density
- (C) Weight density
- (D) Specific density

72. Which of the following can be the output of PLC?

- 1. Relay coils
- 2. Solenoids
- 3. Indicators
- 4. Motors
- 5. Lamps
- 6. Alarms

- (A) Only (1), (2), (3), and (4)
- (B) Only (3), (4), (5), and (6)
- (C) Only (1), (2), (3), and (5)
- (D) All (1), (2), (3), (4), (5), and (6)

73. In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____

- (A) Solid, liquid
- (B) Liquid, liquid
- (C) Liquid, gas
- (D) Solid, gas

74. Calculate the wavelength of radiation emitted by an LED made up of a semiconducting material with band gap energy 2.8eV.

- (A) 2.8 Å (B) 4.3308 Å
- (C) 5548.4 Å (D) 4430.8 Å

75. _____ conditions does an initially relaxed system become unstable?

- (A) only if bounded input generates unbounded output
- (B) only if bounded input generates bounded output
- (C) only if unbounded input generates unbounded output
- (D) only if unbounded input generates bounded output

Space For Rough Work

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK