



Held on 30-04-2023

807461

Question Booklet Sl. No.

Question Booklet Code

A

Question Booklet

01555 – 2023

Hall Ticket No.

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Name of the Candidate

Date of Examination

OMR Answer Sheet No.

Signature of the Candidate with Date

Signature of the Invigilator with Date

Duration of Test : **2 Hours**Max. Marks : **100**

Instructions :

1. This Question Booklet consists of **100** multiple choice objective type questions to be answered in **120** minutes. **PART – A** (Engineering Mathematics and Electrical Engineering) consists of 80 questions and **PART – B** (General) consists of 20 multiple choice questions.
2. Every question in this booklet has 4 choices marked (A), (B), (C) and (D) for its answer.
3. Each question carries **one mark**. There are no negative marks for wrong answers.
4. This Booklet consists of **24** pages. In case of any discrepancy or defect in the booklet, the same may be informed to the Invigilator and new Booklet of same code may be taken.
5. **Ensure to bubble the appropriate Question Booklet Code (A/B/C/D) on the OMR Answer Sheet.**
6. Answer all the questions on the OMR Answer Sheet using **Blue/Black ink ball point pen only**.
7. Before answering the questions on the OMR Answer Sheet, please read the instructions printed on the OMR Sheet carefully.
8. The OMR Answer Sheet should be handed over to the Invigilator before leaving the Examination Hall. The Question Booklet is to be retained by the candidate.
9. **Calculators, Mobile Phones, Smart Watches and any other Electronic gadgets are NOT allowed into the Examination Hall.**
10. The seal of the Booklet should be opened only after signal/bell is given.

PART – A

1. A random variable X has the following probability distribution :

X	-2	-1	0	1	2	a
P(X)	0.1	b	0.2	2b	0.3	b

If the mean of X is 0.8, then a =

- (A) 5 (B) 1.5 (C) 4 (D) 3

2. Given that $F\left\{e^{-\frac{x^2}{2}}\right\} = e^{-\frac{s^2}{2}}$, then $F\left\{\frac{d^2}{dx^2}\left(e^{-\frac{x^2}{2}}\right)\right\} =$

- (A) $e^{-\frac{s^2}{2}}$ (B) $-se^{-\frac{s^2}{2}}$ (C) $-s^2e^{-\frac{s^2}{2}}$ (D) $s^2e^{-\frac{s^2}{2}}$

3. If a particular integral of the equation $x^3y''' + 2x^2y'' + 2y = 10x$ is of the form $a + bx$, then $a^2 + b^2 =$

- (A) 100 (B) 26 (C) 10 (D) 25

4. Let a function $f(x, y)$ be defined by $f(x, y) = \frac{2xy^3}{x + y^2}$, $(x, y) \neq (0, 0)$ and $f(0, 0) = 0$. Then $f_{yx}(0, 0) =$

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

5. The radius of convergence of the Taylor's series about $z = 0$ for the function $f(z) = \frac{z^4 + 2z^2}{1 - \cos z}$ is

- (A) π (B) 2π (C) 2 (D) 1

6. If $(x - 1)^3$ is an integrating factor of the differential equation $y' + P(x)y = 12(x - 1)^2$, $x > 1$, then $P(22) =$

- (A) $\frac{7}{5}$ (B) 7 (C) $\frac{1}{7}$ (D) $\frac{3}{7}$

7. If the system of equations $x - 2y + 3z = -1$, $2x - 3y + 4z = -1$ and $kx + y + (k^2 - k - 3)z = 2k + 2$ has infinitely many solutions, then $k =$
- (A) -1 (B) 1 (C) 0 (D) -2



8. The value of the integral $\int_{|z|=1} \frac{1+i}{(z-1+i)(z+iz-1)} dz$ is
- (A) -2π (B) $2\pi(i+1)$
- (C) $2\pi i$ (D) $2\pi(i-1)$



9. The improper integral $\int_0^9 \frac{1}{(x-1)^3} dx$ converges to
- (A) 6 (B) 3 (C) 9 (D) 0

10. The Newton-Raphson iterative formula for finding $\sqrt[4]{N}$, $N > 0$ is

(A) $x_{n+1} = \frac{x_n^4 + N}{x_n^3}$ (B) $x_{n+1} = \frac{3x_n^4 + N}{4x_n^3}$

(C) $x_{n+1} = \frac{3x_n^4 - N}{x_n^3}$ (D) $x_{n+1} = \frac{-3x_n^4 + N}{4x_n^3}$



11. The following system $y(n) = \sum_{k=-\infty}^n x(k)$ is
- (A) non-casual and time variant (B) casual and time invariant
- (C) non-linear and casual (D) linear and non-casual



12. Choose an incorrect statement from the following.
- (A) Discrete time signal is defined over an infinite domain of sequence
- (B) Discrete time signals can be converted to continuous time signals by Sample and hold process
- (C) Continuous time signals can be converted to discrete time signals by Euler's method
- (D) Discrete time signal is defined over a finite domain of sequence

13. Pick-up the correct statements with respect to windings used in d.c. machines.

- a. In lap winding dummy coils can be needed.
- b. In lap winding equalizer rings are needed.
- c. In wave winding dummy coils can be needed.
- d. In wave winding equalizer rings are needed.

(A) a and b only

(B) b and c only

(C) c and d only

(D) d and a only

14. When armature reaction is neglected, regarding characteristics of d.c. shunt motor (Speed vs. I_a and Torque vs. I_a) at constant V_t (terminal voltage) and I_f (field current)

- a. N vs. I_a is linear
- b. N vs. I_a is non-linear
- c. T vs. I_a is linear
- d. T vs. I_a is non-linear

(A) a and d are true

(B) b and c are true

(C) a and c are true

(D) b and d are true

15. A 125 V d.c. shunt motor has an armature resistance of 0.5Ω and a field resistance of 125Ω . When driving a constant torque load at 600 r.p.m., the motor draws a current of 11 A. The new speed of the motor if an additional resistance of 125Ω is inserted in the field circuit is _____ r.p.m.

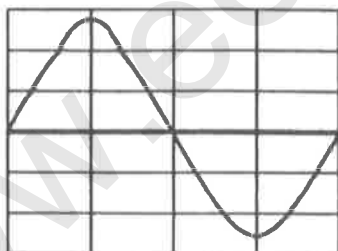
(A) 1150

(B) 1200

(C) 600

(D) 900

16. A sinusoidal voltage is displayed on a CRO. The 'time/cm' switch is on $500 \mu\text{s}/\text{cm}$ (x-axis) and the 'volts/cm' switch is on $5 \text{ V}/\text{cm}$ (y-axis). Find the r.m.s. value if no. of divisions on x-axis (half-cycle) is 2 and no. of divisions (peak-peak) on y-axis is 5.



(A) 17.68 V

(B) 8.84 V

(C) 12.50 V

(D) 7.96 V

17. A $4\frac{1}{2}$ digit voltmeter would display 18.634 V as _____ on a 10 V range.
 (A) 18.63 V (B) 018.63 V (C) 18.634 V (D) 18.630 V
18. A Dual slope type DVM has an integrating capacitor of $0.2\ \mu\text{F}$ and a resistance of $100\ \text{k}\Omega$. If the maximum time for which reference voltage of 5 V can be integrated is 40 ms, calculate maximum output voltage.
 (A) 0.1 V (B) 10 V (C) 1 V (D) 100 V
19. Pick up the wrong statement from the following.
 (A) Oscillator circuit employ positive feedback
 (B) The feedback network of Hartley Oscillator contains two inductors and one capacitor
 (C) The feedback network of Colpitts Oscillator contains two inductors and two capacitors
 (D) The minimum gain of the amplifier must be 3 in case of Wein-bridge Oscillator
20. A transistor having $\alpha = 0.96$ is placed in Common Base configuration with a load resistance of R_L . If the emitter to base junction resistance is $80\ \Omega$ and voltage gain is 60, the value of R_L is
 (A) 5 k Ω (B) 4.8 k Ω (C) 4 k Ω (D) 4.6 k Ω
21. A string of 6 suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If pin to earth capacitances are all equal to C and mutual capacitance of the top insulator is 9C, then mutual capacitances of last two units are
 (A) 20C, 25C (B) 15C, 19C (C) 19C, 24C (D) 24C, 30C
22. In a 3- ϕ transposed line having unsymmetrical spacings of d_1 , d_2 & d_3 with 'r' as radius of each conductor, then the capacitance 'C' between conductor and neutral in F/m is

$$(A) \ C = \frac{2\pi\epsilon_0}{\log_e \left(\frac{d_1 d_2 d_3}{r^3} \right)^{\frac{1}{3}}}$$

$$(C) \ C = \frac{2\pi\epsilon_0}{\log_e \left(\frac{d_1 d_2 d_3}{r^2} \right)^{\frac{1}{2}}}$$

$$(B) \ C = \frac{\log_e \left(\frac{\sqrt[3]{d_1 d_2 d_3}}{r} \right)}{2\pi\epsilon_0}$$

$$(D) \ C = \frac{\log_e \left(\frac{\sqrt{d_1 d_2 d_3}}{r} \right)}{2\pi\epsilon_0}$$



23. A 3- ϕ star connected system with a load of 1000 W operates at 0.5 p.f. lagging. What is the leading 3- ϕ kVAr rating of capacitor bank in parallel, if system p.f. is to be improved to 0.866 ?

(A) 0.366 kVAr



(B) 1.122 kVAr

(C) 0.385 kVAr

(D) 1.155 kVAr

24. Choose a wrong statement from the following regarding the operator a^2 , $(-0.5 - j\sqrt{3}/2)$ when multiplied with current/voltage vector.

(A) When multiplied to a current vector, it rotates the vector through $2\pi/3$ radians in clockwise direction.



(B) When multiplied to a voltage vector, it rotates the vector through $2\pi/3$ radians in anti-clockwise direction

(C) When multiplied to a voltage vector, it rotates the vector through $4\pi/3$ radians in anti-clockwise direction.

(D) When multiplied to a current vector, it rotates the vector through $4\pi/3$ radians in anti-clockwise direction.

25. The annual load duration curve of a 30 MW installed capacity power station can be considered as a straight line from 20 MW to 5 MW. The units generated per year is



(A) 109.5×10^6

(B) 175.2×10^6

(C) 219.0×10^6

(D) 131.4×10^6

26. Identify the correct statement from the following.

(A) PD controller increases the damping ratio and peak overshoot of the system.

(B) PD controller decreases the damping ratio and peak overshoot of the system.

(C) PI controller increases the order of the system by one.

(D) PI controller becomes more stable than the original one.



27. The state transition matrix of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ is

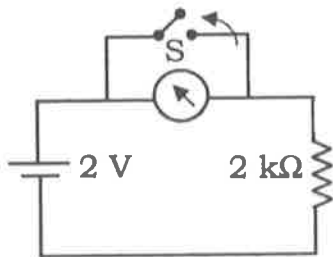
(A) $\begin{bmatrix} e^{3t} & 0 & 0 \\ 0 & e^{2t} & 0 \\ 0 & 0 & e^t \end{bmatrix}$

(B) $\begin{bmatrix} e^{-3t} & 0 & 0 \\ 0 & e^{-2t} & 0 \\ 0 & 0 & e^{-t} \end{bmatrix}$

(C) $\begin{bmatrix} e^t & 0 & 0 \\ 0 & e^{2t} & 0 \\ 0 & 0 & e^{3t} \end{bmatrix}$

(D) $\begin{bmatrix} e^{-t} & 0 & 0 \\ 0 & e^{-2t} & 0 \\ 0 & 0 & e^{-3t} \end{bmatrix}$

28. A PMMC meter as shown in the figure has a range of 0 – 2.5 mA. When switch 'S' is opened, the pointer swings to 1 mA and settles at 0.8 mA. Then the meter is



- (A) Under damped with a coil resistance of 0.5 kΩ
- (B) Under damped with a coil resistance of 0.25 kΩ
- (C) Critically damped with a coil resistance of 0.25 kΩ
- (D) Over damped with a coil resistance of 0.5 kΩ

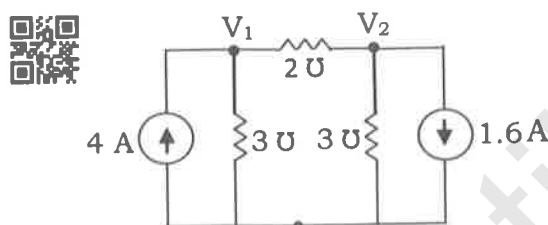
29. A dc current super imposed with ac current measured in a circuit with moving coil meter reads 20 A. If the same current is measured with moving iron meter it reads 25 A. Then the current can be expressed as

- (A) $i = 20 + 25\sin(\omega t)$
- (B) $i = 20\sqrt{2} + 15\sin(\omega t)$
- (C) $i = 20\sqrt{2} + 15\sqrt{2}\sin(\omega t)$
- (D) $i = 20 + 15\sqrt{2}\sin(\omega t)$

30. A 3- ϕ wattmeter is used to measure 3- ϕ balanced power. Given the ratio $|W_1/W_2|$ is 1.5 and pressure coil of second wattmeter had to be reversed to measure the reading. The angle ϕ between phase voltage and phase current is

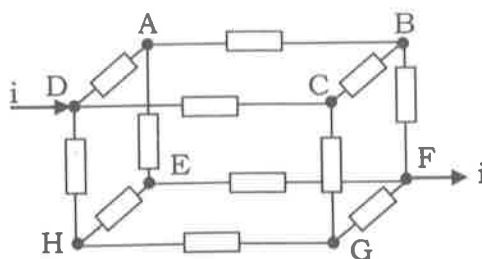
(A) $\phi = \tan^{-1}\left(\frac{5}{\sqrt{3}}\right)$ (B) $\phi = \cos^{-1}\left(\frac{5}{2\sqrt{7}}\right)$
 (C) $\phi = \cos^{-1}\left(\frac{1}{2\sqrt{19}}\right)$ (D) $\phi = \tan^{-1}\left(\frac{\sqrt{3}}{5}\right)$

31. The node-based matrix equation of the circuit shown below is



(A) $\begin{bmatrix} 5 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 4 \\ -1.6 \end{bmatrix}$ (B) $\begin{bmatrix} 5 & -2 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 4 \\ 1.6 \end{bmatrix}$
 (C) $\begin{bmatrix} 5 & -2 \\ 2 & 5 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 4 \\ -1.6 \end{bmatrix}$ (D) $\begin{bmatrix} 5 & -2 \\ 2 & 5 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 4 \\ 1.6 \end{bmatrix}$

32. Between any two horizontal/vertical vertices of a cube shown below a conductance of $1 \text{ } \Omega$ is connected. Using three parallel sets in series, each set consisting of 3, 6 and 3 resistances, determine the equivalent conductance across the terminals D and F.



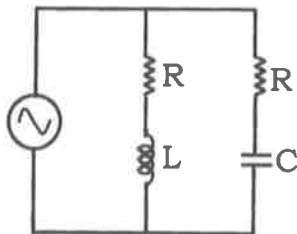
(A) $1/12 \text{ } \Omega$ (B) $12 \text{ } \Omega$
 (C) $6/5 \text{ } \Omega$ (D) $5/6 \text{ } \Omega$

33. In two-port networks where inverse hybrid parameters are used
- (A) V_2 and I_1 are independent variables and V_1 and I_2 are dependent variables
 - (B) V_1 and I_1 are independent variables and V_2 and I_2 are dependent variables
 - (C) V_1 and I_2 are independent variables and V_2 and I_1 are dependent variables
 - (D) V_2 and I_2 are independent variables and V_1 and I_1 are dependent variables

34. Two impedances $(5 - jX_c) \Omega$ and $(5 + j0) \Omega$ which are in parallel are connected in series with $(6.25 + j1.25) \Omega$. If input current is in phase with supply voltage, then susceptance of unknown capacitor is

(A) $10 \text{ } \Omega$ (B) $0.1 \text{ } \Omega$ (C) $24.14 \text{ } \Omega$ (D) $4.14 \text{ } \Omega$

35. In a 1- ϕ ac circuit RL is in parallel with RC. The circuit resonates at all frequencies when



- (A) $R = L/C$
- (B) $R = C/L$
- (C) $R = \sqrt{L/C}$
- (D) $R = \sqrt{C/L}$

36. For the following Assembly language program, what is the output ?

```
LDA    2501 H
CMA
INR A
STA    2502 H
HLT
```

[2501] = E 9

- (A) 9 E
- (B) E 9
- (C) 17
- (D) 97



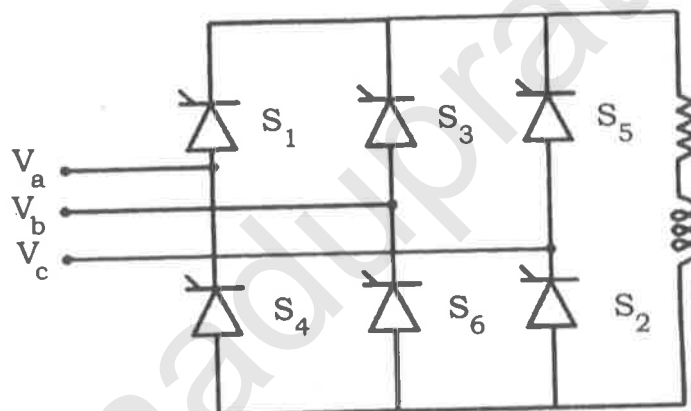
37. Identify the correct matching for the following data.

Interrupt	Call location
L. RST 7.5	P. 002C
M. RST 6.5	Q. 003C
N. TRAP	R. 0024
O. RST 5.5	S. 0034



- (A) L - P; M - Q; N - R; O - S
 (B) L - R; M - P; N - S; O - Q
 (C) L - S; M - R; N - Q; O - P
 (D) L - Q; M - S; N - R; O - P

38. Choose a wrong statement from the following on 3- ϕ full converter, where top switches are numbered 1, 3 and 5 and bottom switches are numbered 4, 6 and 2 from left to right.



- (A) When S_1 conducts S_4 should not conduct
 (B) When S_6 conducts S_3 should not conduct
 (C) When S_2 conducts S_5 should not conduct
 (D) When S_3 conducts S_4 should not conduct



39. Each of five equal pulse widths in every half cycle of 1- ϕ inverter is $(\pi/15)$ radians. If input dc voltage is 100 V, then r.m.s. value of output voltage is

- (A) 57.7 V (B) 70.7 V
 (C) 86.6 V (D) 50.0 V





40. A 3- ϕ semi-converter is operated with a firing angle of 30° . What is its input displacement factor ?

(A) $\frac{\sqrt{2+\sqrt{3}}}{2}$ (B) $\frac{2-\sqrt{3}}{4}$ (C) $\frac{\sqrt{2-\sqrt{3}}}{2}$ (D) $\frac{2+\sqrt{3}}{4}$



41. In the operation of 3- ϕ Induction Motor, \vec{F}_r represents air gap m.m.f.; \vec{F}_2 represents rotor m.m.f. and θ_2 represents the angle by which rotor current lag the rotor e.m.f.

Pick-up the correct statement from the following :

- (A) \vec{F}_r leads \vec{F}_2 by $(90 + \theta_2)^\circ$ (B) \vec{F}_r lags \vec{F}_2 by $(90 + \theta_2)^\circ$
(C) \vec{F}_r leads \vec{F}_2 by $(90 - \theta_2)^\circ$ (D) \vec{F}_r lags \vec{F}_2 by $(90 - \theta_2)^\circ$



42. Which of the following single-phase Induction Motor has highest starting torque ?

- (A) Shaded pole motor (B) Permanent capacitor motor
(C) Resistance split phase motor (D) Capacitor start motor



43. In case of a 3- ϕ cylindrical rotor synchronous machine when armature current (I_a) lags excitation e.m.f. (E_f) by 90° , the nature of armature reaction is

- (A) Demagnetising in case of synchronous motor and magnetising in case of alternator
(B) Cross magnetising in case of synchronous motor and demagnetising in case of alternator
(C) Magnetising in case of synchronous motor and demagnetising in case of alternator
(D) Demagnetising in case of synchronous motor and cross magnetising in case of alternator

44. Choose correctness of Assertion and Reason statements.

Assertion (A) : Short circuit characteristic of an alternator is a straight line.

Reason (R) : Alternator during short circuit test operates under saturated conditions.

- (A) A is False, but R is True (B) A is True, but R is False
(C) Both A and R are True (D) Both A and R are False





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- $$(A) \quad D = \left(1 + \frac{YZ}{4} \right)$$

$$(B) \quad A = \left(1 + \frac{YZ}{4} \right)$$

$$(C) \quad B = Z \left(1 + \frac{YZ}{2} \right)$$

$$(D) \quad C = Y \left(1 + \frac{YZ}{4} \right)$$

-

- (A) 3 and 1 (B) 3 and 2 (C) 4 and 1 (D) 4 and 2

- $$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -4 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t) \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- (A) 0.25 (B) 0 (C) 0.5 (D) 0.75

48. The value of gain at the breakaway point of the root locus of a feedback system whose open loop transfer function is given by $GH = \frac{K}{s(s+1)}$ is

- (A) 0.5 (B) 0.25 (C) 0.75 (D) Infinity

- (A) It consists of the entire $j\omega$ axis and a semicircle of finite radius.
(B) It consists of the entire $j\omega$ axis and a semicircle of infinite radius.
(C) It encloses the entire right half of s -plane and is traversed in the counter-clockwise direction.
(D) On the $j\omega$ -axis, ω varies from 0 to ∞ .

50. Match the following to draw a Bode plot (phase angle versus $\log \omega$).

Location of Zeros and poles**Phase angle (degrees)**

- a. Pole at the origin
- b. Two poles at the origin
- c. Zero at the origin
- d. Two zeros at the origin

- P. 180
- Q. 90
- R. -90
- S. -180
- T. 0

- (A) a - R; b - S; c - Q; d - P
- (C) a - Q; b - P; c - R; d - S

- (B) a - R; b - S; c - T; d - P
- (D) a - Q; b - P; c - R; d - T

51. The voltage and current of a 1- ϕ ac circuit are given by : $v = 200 \sin \left(\omega t + \frac{\pi}{6} \right)$ and $i = 50 \sin \left(\omega t + \frac{\pi}{3} \right)$. The reactive power is

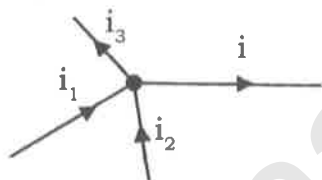
(A) 2.5 kVAr

(B) $2.5\sqrt{3}$ kVAr

(C) 5.0 kVAr

(D) $5.0\sqrt{3}$ kVAr

52. Find peak to peak value of the resultant current 'i' at the following junction, if $i_1 = 5 \sin \omega t$, $i_2 = 10 \sin \left(\omega t + \frac{\pi}{3} \right)$ and $i_3 = 5 \sin \left(\omega t - \frac{\pi}{3} \right)$.



(A) 15.00 A

(B) 30.00 A

(C) 10.61 A

(D) 9.35 A

53. If three unbalanced supply voltages of a 3- ϕ circuit are given by

$$V_A = 200 \sin (100 \pi t) \text{ V}, V_B = 210 \sin (100 \pi t - 108^\circ) \text{ V and}$$

$$V_C = 220 \sin (100 \pi t - 234^\circ) \text{ V, then the time difference between phases A \& B and B \& C are}$$

(A) 6.5 ms, 6 ms respectively

(B) 7 ms, 6 ms respectively

(C) 6 ms, 6.5 ms respectively

(D) 6 ms, 7 ms respectively



54. Identify the correct statement from the following.

- (A) If the divergence of a field vector is zero everywhere in the field, it is a solenoidal field.
 (B) Curl of gradient of scalar function does not vanish identically.
 (C) Divergence of a vector is a vector.
 (D) Gradient of a scalar is a scalar.



55. A dielectric slab of flat surface with relative permittivity of 6 is disposed with its surface normal to a uniform field with a flux density of 3 coulombs per m^2 . The uniform polarisation in the slab is _____ coulombs per m^2 .

- (A) 3 (B) 2.5 (C) 18 (D) 2

56. Identify the correct statements from the following.

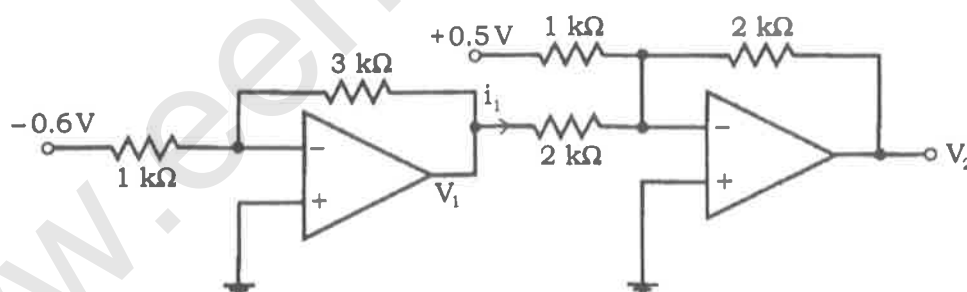


- i. Clamper circuit is also called as d.c. restorer.
 ii. The positive clamping circuit shifts the original signal in a vertical downward direction.
 iii. The clamping circuit changes the r.m.s. value of the waveform.
 iv. The clamping circuit changes the average value of the waveform.

- (A) i and ii (B) ii and iii
 (C) iii and iv (D) iv and i



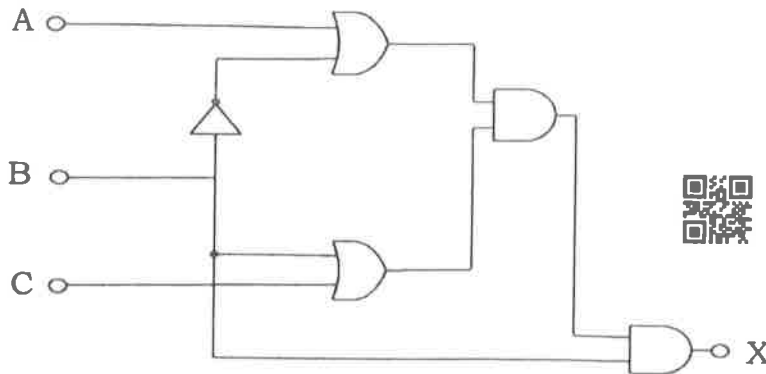
57. The value of V_2 for the circuit given below is



- (A) -2.8 V (B) 2.8 V
 (C) -1.8 V (D) 0.8 V



58. The minimised Boolean expression for the output "X" of the following diagram can be implemented by using a



- (A) 2-input OR gate
(B) 2-input AND gate
(C) 2-input NAND gate
(D) 2-input NOR gate
59. A 10 bit D/A converter has a step size of 20 mV. The full scale output voltage is
(A) 20.46 V
(B) 10.23 V
(C) 5.12 V
(D) 10.24 V
60. From the following statements P and Q, choose the correct combination.
P : Schmitt trigger accepts a slow changing input and produces a rapid oscillation free transition at the output.
Q : 555 IC timer can be used as a free running oscillator.
(A) P and Q are not correct
(B) P is correct and Q is not correct
(C) P is not correct and Q is correct
(D) P and Q are correct
61. The self and mutual inductances (in Henries) of a two coupled coils are $L_1 = \left(5 + \frac{1}{4x}\right)$; $L_2 = \left(3 + \frac{1}{4x}\right)$ and $M_{12} = M_{21} = \frac{1}{4x}$ over a certain displacement of "x" metres. For constant currents of $I_1 = 20$ A and $I_2 = -10$ A, the mechanical work done in decreasing "x" from 1 to 0.5 m is _____ watt-sec.
(A) -6.25
(B) -12.5
(C) 6.25
(D) 12.5

Diagram

62. Which of the following statements are correct ?

P. The concentric coils are used for core type transformers whereas interleaved coils for shell type transformers.

Q. The concentric coils are used for shell type transformers whereas interleaved coils for core type transformers.

R. Shell type transformers are preferred for low power levels whereas core type transformers are used for high power levels.

S. Shell type transformers are preferred for high power levels whereas core type transformers are used for low power levels.

(A) P and R (B) Q and R (C) P and S (D) Q and S

63. Which of the following statements is not true with respect to a 1- ϕ transformer ?

(A) If the load current is kept constant, the maximum efficiency occurs at U.P.F.

(B) The transformer efficiency is maximum at the same load current regardless of variation in the load p.f.

(C) If the load current is kept constant, the maximum efficiency occurs at 0.8 p.f. lagging.

(D) The core loss and copper loss of a transformer are unaffected by a variation of p.f.

64. The full load voltage drops in a single phase transformer are 3% and 4% due to resistance and leakage reactance respectively. The full load p.f. at which voltage drop is maximum and the load p.f. at which voltage drop is zero are

(A) 0.6 lag and 0.8 lag respectively (B) 0.6 lag and 0.8 lead respectively

(C) 0.8 lead and 0.6 lag respectively (D) 0.8 lag and 0.6 lead respectively

65. A 3- ϕ Squirrel Cage Induction Motor has a slip corresponding to maximum torque is 20%. Its starting current is five times the full load current, then the full load slip is

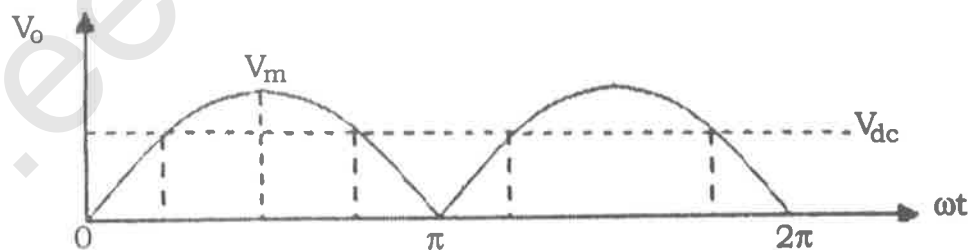
(A) 3%

(B) 4%

(C) 5%

(D) 2%

66. The input power factor and displacement factor of ac to dc converter are measured as 0.8 and 1.0 respectively. Then input total harmonic distortion is
 (A) 50% (B) 20%
 (C) 75% (D) 56.25%
67. If f is switching frequency and ' α ' is duty ratio, then ripple voltage across capacitor in a Buck-boost converter is
 (A) $(1 - \alpha)/f^2$ (B) $(1 - \alpha)/f$
 (C) α/f^2 (D) α/f
68. If I_C , V_{GS} and V_{CE} represent collector current, gate to emitter voltage and collector to emitter voltage respectively of IGBT, then the transfer characteristic is a plot of
 (A) V_{CE} (y-axis) versus I_C (x-axis) (B) V_{GE} (y-axis) versus I_C (x-axis)
 (C) I_C (y-axis) versus V_{CE} (x-axis) (D) I_C (y-axis) versus V_{GE} (x-axis)
69. In chopper fed dc drives choose correct combination of quadrants.
 (A) Type D operates in quadrants I and II
 (B) Type C operates in quadrants II and III
 (C) Type D operates in quadrants I and IV
 (D) Type C operates in quadrants I and IV
70. Identify one of the angles at which the average dc voltage equal to instantaneous output voltage of a 1- ϕ full wave rectifier.



- (A) $\alpha = \pi + \sin^{-1}(2/\pi)$ (B) $\alpha = (\pi/2) + \sin^{-1}(2/\pi)$
 (C) $\alpha = (\pi/2) - \sin^{-1}(2/\pi)$ (D) $\alpha = (3\pi/2) + \sin^{-1}(2/\pi)$



71. Which of the following are correct with reference to conductors in electrostatic fields ?

- The static electric field intensity inside a conductor is zero.
- The static electric field intensity inside a conductor is not zero.
- The static electric field intensity at the surface of a conductor is everywhere directed normal to the surface.
- The conductor surface is an equipotential surface.
- The conductor surface is not an equipotential surface.

(A) i, iii and v (B) ii, iii and iv (C) i, iii and iv (D) i and iv

72. The magnetic field intensity within a magnetic material (linear isotropic material) of magnetic susceptibility 14 and magnetic flux density of $300 \mu\text{T}$ is

(A) $(50/\pi) \text{ A/m}$ (B) $(72/\pi) \text{ A/m}$ (C) $(7.2/\pi) \text{ A/m}$ (D) $(5/\pi) \text{ A/m}$

73. The inductance of a wire of length " l " metres and radius of " a " metres is given by

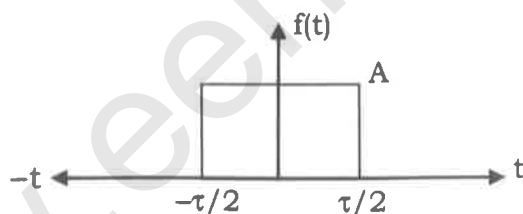
(A) $\frac{\mu_0 l}{2\pi}$ (B) $\frac{\mu_0 l}{8\pi a}$ (C) $\frac{\mu_0 l}{4\pi a}$ (D) $\frac{\mu_0 l}{8\pi}$

74. Identify which of the following expressions are Maxwell's equations for time varying fields.

- $\nabla \cdot \mathbf{J} + \frac{\partial \rho_v}{\partial t} = 0$
- $\nabla \cdot \mathbf{D} = \rho_v$
- $\nabla \cdot \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$
- $\oint \mathbf{B} \cdot d\mathbf{s} \neq 0$

(A) i and ii (B) ii and iii (C) iii and iv (D) iv and i

75. The Fourier transform of the following function is



- $A\tau \text{sinc}\left(\frac{\omega\tau}{2\pi}\right)$
- $A\left(\frac{\tau}{2}\right) \text{sinc}\left(\frac{\omega\tau}{\pi}\right)$
- $\frac{A}{\omega} \text{sinc}\left(\frac{\omega\tau}{2}\right)$
- $\frac{2A}{\omega} \text{sinc}(\omega\tau)$



76. Assuming a balanced load with a power factor of 0.8, the approximate volume of conductor material required for a 3- ϕ , 4 wire system is _____ of that is required for 2 wire dc system with one conductor earthed.

(A) 73%

(B) 91%

(C) 63%

(D) 78%



77. A hydro-electric generating station is supplied from a reservoir of force equal to 50×10^{10} N at a head of 200 metres. Find the total electrical energy available if the overall efficiency is 72%.

(A) 2×10^5 MWh

(B) 2×10^5 kWh

(C) 20000 kWh

(D) 20000 MWh



78. In thermal power station, the correct sequence of the following in increasing sequence of efficiency is

(A) Boiler, Generator, Turbine

(B) Turbine, Generator, Boiler

(C) Boiler, Turbine, Generator

(D) Turbine, Boiler, Generator

79. Choose correct statement from the following regarding loop tests for fault location in underground cables using resistances of Wheatstone bridge.

(A) In Varley loop test one fixed resistance is used

(B) In Varley loop test two variable resistances are used

(C) In Murray loop test two fixed resistances are used

(D) In Murray loop test two variable resistances are used



80. Choose correctness of Assertion and Reason statements.

Assertion (A) : Zero input stability is called the asymptotic stability.

Reason (R) : In the absence of any input, the output tends to finite irrespective of the initial conditions.

(A) A is true, but R is not true

(B) Both A and R are true





(C) Both A and R are not true

(D) A is false, but R is true



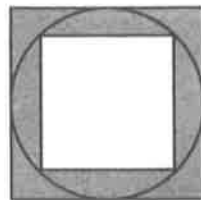


PART - B

81. Telangana Yuddha Bheri Meeting was held in 2007 at
(A) Siddipet (B) Warangal (C) Suryapet (D) Nalgonda
82. The Political Joint Action Committee (T-JAC) was formed in the year
(A) 2008 (B) 2010 (C) 2009 (D) 2011 
83. Bison-horn dance in Telangana is performed by which of the following tribes?
(A) Gonds (B) Raj Gonds (C) Koyas (D) Chenchus
84. Where is 'Heritage Jail Museum' located in Telangana?
(A) Hyderabad (B) Sangareddy (C) Vikarabad (D) Chennoor
85. Which one of the following is grammatically NOT correct?
(A) Lead is the most heaviest all metals.
(B) Lead is heavier than all other metals. 
(C) No other metal is as heavy as lead.
(D) Lead is the heaviest of all metals.
86. Choose the word with correct spelling to make the following sentence acceptable -
'My brother has just celebrated his _____ birthday.'
(A) twelpth (B) twelfth  (C) twelve (D) twelth
87. Identify the part of speech of the underlined word in following sentence.
'I watched a beautiful movie yesterday.'
(A) adverb (B) preposition (C) adjective (D) noun
88. Identify the odd word out of the following based on pronunciation.
(A) soot (B) put (C) wool (D) food
89. The small portable device used to store data for computers is
(A) Universal Storage Bus  (B) Universal Serial Bus
(C) Universal Serial Bit (D) Universal Storage Bit



90. Full form of GPT in Chat GPT is
- (A) Generative Pre-trained Transformer
 - (B) Generative Pre Training
 - (C) Generative Pre-trained Transition
 - (D) Generative Pre-trained Transformation
91. Hyperlink is used in MS-PowerPoint to
- (A) Transit from existing slide to another slide
 - (B) Transit from existing slide to another slide and back to existing slide
 - (C) Create a web page
 - (D) Send mail to new addresses
92. Identify a wrong statement from the following.
- (A) C++ is a compiler language
 - (B) BASIC is an interpreter language
 - (C) JavaScript is an interpreter language
 - (D) Python is a compiler language
93. Identify the next number from the series : 5, 10, 26, 50, 122, 170,
- (A) 281
 - (B) 280
 - (C) 291
 - (D) 290
94. Find the area of shaded part of the following, if radius of circle is 'r'.



- (A) $2r^2$
- (B) $4r^2 - \pi r^2$
- (C) $\sqrt{2}r^2$
- (D) $\pi r^2 - \sqrt{2}r^2$



95. The present age of A is three times the present age of B. If after ten years, age of B is 60% of the age of A, then what are the ages of A and B after ten years ?
(A) 20 Yrs. and 12 Yrs. respectively
(B) 30 Yrs. and 18 Yrs. respectively
(C) 25 Yrs. and 15 Yrs. respectively
(D) 40 Yrs. and 24 Yrs. respectively
96. A dice having six face sides numbered from 1 to 6 is thrown randomly. What is the chance that number on top face is an odd prime number ?
(A) 66.66% (B) 33.33%
(C) 50.00% (D) 100.0%
97. Quad is a group of countries consisting of
(A) Australia, Japan, India, U.S.A.
(B) France, Japan, India, U.S.A.
(C) Australia, South Korea, India, U.S.A.
(D) Australia, Japan, Indonesia, Canada
98. Who is the current President of Financial Action Task Force (FATF) having headquarters in France ?
(A) Dr. Tedros Ghebreyesus (B) Emmanuel Macron
(C) Dr. Marcus Pleyer (D) T. Raja Kumar
99. India became full member country of Shanghai Cooperation Organization (SCO) in the year
(A) 2021 (B) 2023 (C) 2017 (D) 2019
100. The currency of Indonesia is
(A) Rupee (B) Rufiyaa (C) Taka (D) Rupiah

S.NO	A	B	C	D
1	D	C	B	D
2	D	B	C	B
3	D	A	C	D
4	B	*	B	D
5	B	D	A	C
6	C	D	*	B
7	A	D	D	B
8	*	B	D	C
9	C	B	D	A
10	B	C	B	*
11	B	C	B	B
12	B	D	A	C
13	B	D	D	B
14	B	A	D	C
15	B	A	B	A
16	B	A	D	C
17	C	D	C,D	A
18	B	C	C	B
19	C	B	B	B
20	A	D	B	A
21	C	C	B	C
22	A	C	C	D
23	D	A	B	D
24	B	D	C	C
25	A	D	A	A

S.NO	A	B	C	D
26	C	A	A	D
27	C	C	B	C,D
28	A	C	B	C
29	D	B	A	B
30	D	C	B	B
31	A	B	C	A
32	C	C	D	A
33	C	B	D	B
34	B	C	C	C
35	C	A	A	A
36	C	D	C	D
37	D	C,D	C	A
38	D	C	A	B
39	A	B	D	A
40	A	B	D	D
41	A	B	C	A
42	D	A	A	C
43	C	D	B	C
44	B	D	B	B
45	D	B	B	C
46	A	D	C	A
47	A	A	A	D
48	B	B	D	C
49	C	A	B	B
50	A	D	A	D

S.NO	A	B	C	D
51	A	B	C	B
52	B	B	D	A
53	B	B	D	D
54	A	B	A	D
55	B	B	A	B
56	D	C	B	A
57	A	D	B	B
58	B	D	B	B
59	A	C	B	A
60	D	A	B	B
61	D	C	A	C
62	C,D	A	A	D
63	C	D	B	D
64	B	B	C	A
65	B	A	A	A
66	C	A	A	B
67	B	B	C	B
68	D	B	C	B
69	C	A	B	B
70	A	B	C	B
71	C	A	D	C
72	A	A	A	A
73	B	B	B	D
74	B	C	A	B
75	A	A	D	A

S.NO	A	B	C	D
76	B	C	A	C
77	A	A	D	C
78	D	B	C	A
79	D	A	B	D
80	B	A	D	D
81	B	A	B	A
82	C	D	A	B
83	C	C	A	C
84	B	D	D	B
85	A	D	A	B
86	B	A	D	C
87	C	C	C	C
88	B	C	D	B
89	B	B	D	A
90	A	C	A	D
91	A	C	C	C
92	D	B	C	D
93	D	A	B	B
94	A	B	C	A
95	C	C	C	A
96	C	B	B	D
97	A	B	A	D
98	D	A	B	A
99	C	A	C	C
100	D	D	C	C