Roll No.

(Write Roll Number from left side
exactly as in the Admit Card)

Signature of Invigilators

1. _____

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Question Booklet Series **X**

2118

PAPER–II   **Question Booklet No.**

(Identical with OMR
Answer Sheet Number)

Subject Code : 21

ELECTRONIC SCIENCE

Time : 2 Hours   *Maximum Marks:* 200

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.

2. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:

    (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.

    (ii) Faulty booklet, if detected, should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.

    (iii) Verify whether the Question Booklet No. is identical with OMR Answer Sheet No.; if not, the full set is to be replaced.

    (iv) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet.

3. This paper consists of One hundred (100) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.

4. Each Question has four alternative responses marked: (A) (B) (C) (D)**.** You have to darken the circle as indicated below on the correct response against each question.

    Example: (A) (B) ● (D), where (C) is the correct response.

5. Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.

6. Rough work is to be done at the end of this booklet.

7. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Sheet, except in the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.

8. Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.

9. You have to return the Original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry question booklet and duplicate copy of OMR Sheet after completion of examination.

10. **Use only Black Ball point pen.**

11. **Use of any calculator or mobile phone etc. is strictly prohibited.**

12. **There are no negative marks for incorrect answers.**
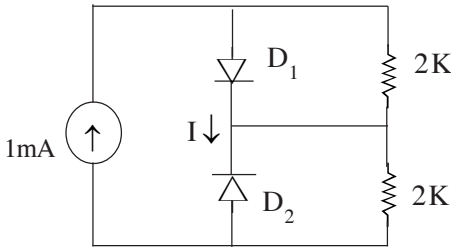
[Please Turn Over]

ELECTRONIC SCIENCE

PAPER II

1. A diode is said to be 'ideal' when it has
   (A) forward resistance = 0, Reverse resistance = ∞ and cut-in voltage = 0·7V
   (B) forward resistance = ∞; Reverse resistance = 0 and cut-in voltage = 0·7V
   (C) forward resistance = 0, Reverse resistance = ∞ and cut-in voltage = 0
   (D) forward resistance = 0, Reverse resistance = 0 and cut-in voltage = 0

2. SiO_2 is a good
   (A) conductor
   (B) semiconductor
   (C) insulator
   (D) superconductor

3. Assume that diodes D_1 and D_2 are ideal. The value of current (I) is
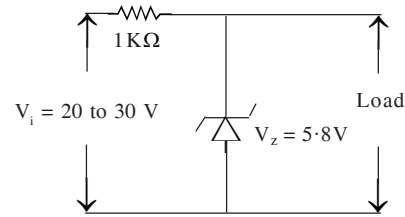

   (A) 0 mA
   (B) 0·5 mA
   (C) 1 mA
   (D) 2 mA

4. The modulation bandwidth of a GaAs LED is compared with that of a GaAS laser diode (LD). The result is
   (A) LED bandwidth is greater than that of LD.
   (B) LD bandwidth is greater than that of LED.
   (C) LED bandwidth is equal to the LD bandwidth.
   (D) LED bandwidth is infinitely large.

5. The Zener diode in the regulator circuit shown in figure has a Zener voltage of 5·8 V and a Zener knee current of 0·5mA. The maximum load current drawn from this circuit ensuring proper functioning over the input voltage range between 20 and 30 Volts, is
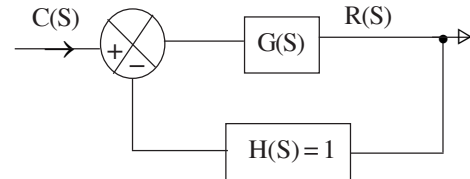

   (A) 23·7 mA
   (B) 14·2 mA
   (C) 13·7 mA
   (D) 24·2 mA

6. Which one of the following microwave diodes is suitable for very low power oscillation application only?
   (A) Tunnel diode
   (B) IMPATT diode
   (C) VARACTOR diode
   (D) GUNN diode

7. In the figure, the transfer function is written as

$$\frac{C(S)}{R(S)} = \frac{S+4}{S^2+7S+13}$$

   The DC gain will be $|G|_{DC} = ?$
   (A) $|G|_{DC} = \dfrac{4}{11}$
   (B) $|G|_{DC} = \dfrac{4}{9}$
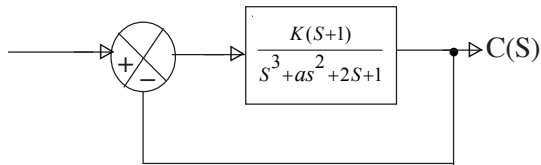   (C) $|G|_{DC} = \dfrac{2}{3}$
   (D) $|G|_{DC} = \dfrac{1}{3}$

8. The Laplace transform of the δ-function δ(X − a) is

    (A) 1

    (B) 0

    (C) e^{-a}

    (D) e^{-sa}

9. The Fourier transform of a δ-function δ(X − *a*) is given by

    (A) $\dfrac{e^{iwa}}{\sqrt{2\pi}}$

    (B) 1

    (C) 0

    (D) e^{-wa}

10. The positive values of "*K*" and "*a*", so that the system shown in the figure oscillates at a frequency of 2 rad/sec, are respectively

    (A) 1, 0·75

    (B) 2, 0·75

    (C) 1, 1

    (D) 2, 2

11. A CE p-n-p transistor amplifier with a open-loop gain of 100 and a bandwidth of 10 kHz is operated with a negative voltage series feedback. The feedback factor is 0·005. The bandwidth of this amplifier with feedback applied will be

    (A) 10 kHz
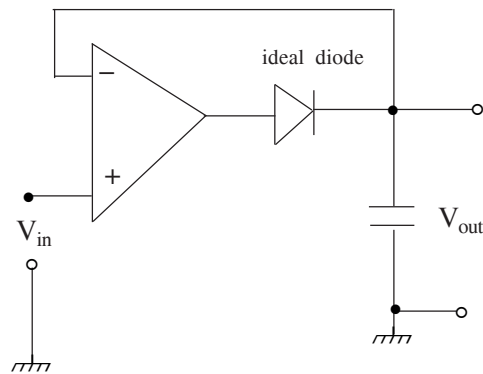
    (B) 5 kHz

    (C) 20 kHz

    (D) 15 kHz

12. In a sinusoidal transistorized Wien-bridge oscillator—

    (A) The oscillator amplitude grows monotonically until it is limited by power supply.

    (B) The oscillation amplitude is stabilized by a current-dependent resistance which provides negative current feedback.

    (C) The Wein-bridge is perfectly balanced and oscillation is obtained under this condition.

    (D) The Barkhausen criterion is not satisfied.

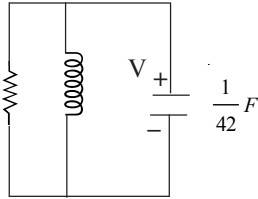**13.** In a tuned collector RF oscillator, the condition of zero loop phase shift is achieved

    (A) by a single CE transistor.

    (B) by the tank circuit alone which is connected with the collector.

    (C) by the R_E — C_E emitter bias of the CE transistor.

    (D) by the transistor amplifier and the feedback through inductive coupling from output to input jointly.

14. The OP-Amp circuit shown in the figure is

    (A) a sample/hold circuit

    (B) a rectifier/amplifier circuit

    (C) a peak detector circuit

    (D) an analog amplifier circuit
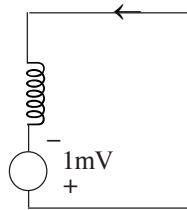
15. For the circuit in the figure, the value of R for critical damping will be

(A) 10·5 ohm

(B) 6 ohm

(C) 2·5 ohm

(D) 3 ohm

16. A 2 mH inductor with some initial current can be represented as given in the figure, where S is the Laplace transform variable. The value of initial current is
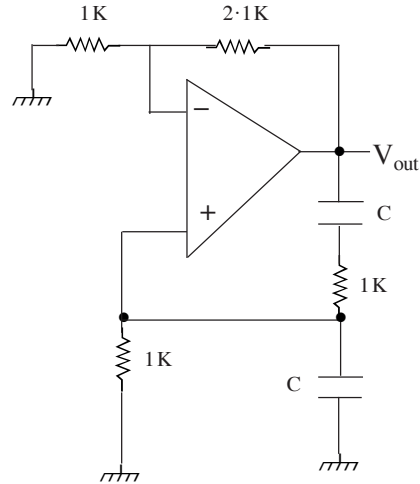
(A) 0·5 Amp

(B) 2·0 Amp

(C) 1·0 Amp

(D) 0·0 Amp

17. A transistorized astable multivibrator has

(A) a single stable state.

(B) no stable state.

(C) two stable states.

(D) infinite number of stable states.

18. One of the following is incorrect related to negative feedback in amplifier

(A) increases the stability in amplifier.

(B) increases the bandwidth of the amplifier.

(C) increases the distortion in amplifier.

(D) decreases the gain in amplifier.

19. The value of 'C' required for sinusoidal osc. of frequency 1kHz in the circuit of figure:

(A) $1/2\pi$ µF

(B) 2π µF

(C) $\dfrac{1}{2\pi\sqrt{6}}$ µF

(D) $2\pi\sqrt{6}$ µF

20. The bandwidth of an n-stage amplifier, with each stage having a bandwidth of B, is given by

(A) B/n

(B) $B/\sqrt{n}$

(C) $B\sqrt{2^{1/N}-1}$

(D) $\dfrac{B}{\sqrt{2^{1/N}-1}}$

21. A FET amplifier in CS configuration uses a load resistance of 250 kΩ. The ac drain resistance of the device is 100 kΩ and the transconductance is 0·5 mA/V. The voltage gain of the amplifier is
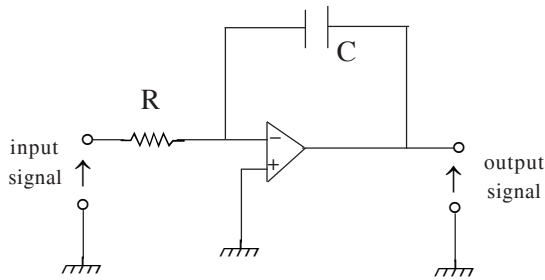
(A) 1

(B) −100

(C) −35·7

(D) 52

22. Characteristics impedance (Z_0) of an ideal transmission line is

(A) $Z_0 = \sqrt{LC}$

(B) $Z_0 = L/C$

(C) $Z_0 = \sqrt{L/C}$

(D) $Z_0 = LC$

23. One of the following is not the characteristics of an ideal op-amp.
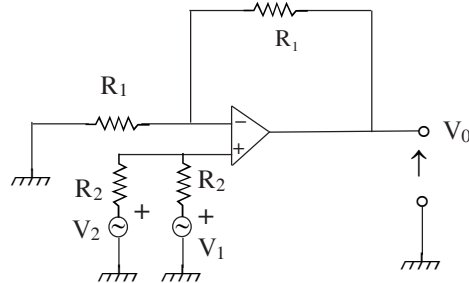
(A) Infinite slew rate

(B) Infinite input-resistance

(C) Infinite offset voltage

(D) Infinite voltage gain

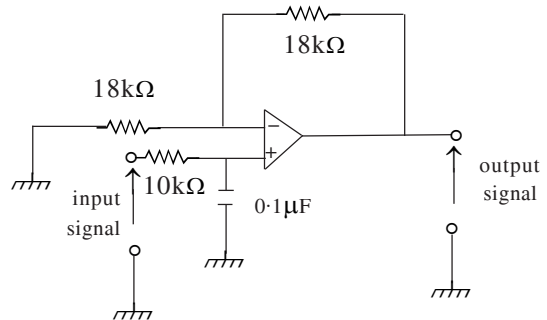**24.** The following Op-Amp circuit has parameter values such that $2\pi RC = 10^{-3}$ sec. The circuit will act as

(A) a differentiator for input signal frequency greater than 1kHz.

(B) an integrator for input signal frequency smaller than 1kHz.

(C) a high-pass filter with a cut-off frequency of 1kHz.

(D) an integrator for input signal frequency greater than 1kHz.

25. The output voltage (V_0) of the following Op-Amp circuit is

(A) $V_1 + V_2$

(B) $V_2 - V_1$

(C) $\dfrac{1}{2}(V_1 + V_2)$

(D) $\dfrac{R_1}{R_2}(V_1 - V_2)$

26. The following Op-Amp circuit is an active filter. The type of filter and its cut-off frequency are

(A) High-pass, 100 rad/sec

(B) Low-pass, 10000 rad/sec

(C) High-pass, 5000 rad/sec

(D) Low-pass, 1000 rad/sec

27. The ripple factor of the output waveform of a full wave rectifier supplied by 220V, 50Hz ac at the input is given by

(A) $\dfrac{\pi}{3} - 1$

(B) $\sqrt{\dfrac{\pi^2}{4} - 1}$

(C) $\sqrt{\dfrac{\pi^2}{8} - 1}$

(D) $0 \cdot 81$

28. Among the three digital IC families TTL, ECL and CMOS

(A) TTL has the lowest power consumption.

(B) CMOS has the lowest noise margin.

(C) TTL has largest fan out.

(D) ECL has the least propagation delay.

29. Consider a 3-variable Karnaugh map using the variables A, B and C. Which one of the following is true if the Boolean function Y = C?

(A) $Y = \sum m$ (0, 1, 2, 3)

(B) $Y = \sum m$ (1, 3, 5, 7)

(C) $Y = \sum m$ (2, 4, 6, 7)

(D) $Y = \sum m$ (3, 4, 5, 6)

30. In which type of shift register data is loaded in one operation but shifted out one bit at a time?

(A) serial-in-parrallel-out shift register

(B) parallel-in-serial-out shift register

(C) serial-in-serial-out shift register

(D) parallel-in-parallel-out shift register

31. In a Half Adder circuit, the sum of A and B can be implemented using the following number of NAND gates
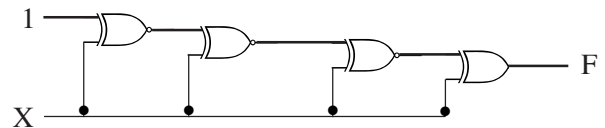
(A) 3

(B) 4

(C) 5

(D) 6

32. A 10 bit D/A converter gives a maximum output of 10·23V. The resolution is

(A) 5 mV

(B) 10 mV

(C) 15 mV

(D) 25 mV

33. Which of the following memory is preferred in case of calculators?

(A) Static ROM
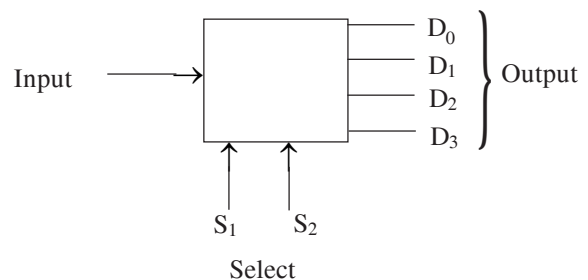
(B) Static RAM

(C) Dynamic ROM

(D) Dynamic RAM

34. The following digital circuit consists of a cascade of 15 XOR gates. If the input to the circuit is 'X' then the output F is equal to
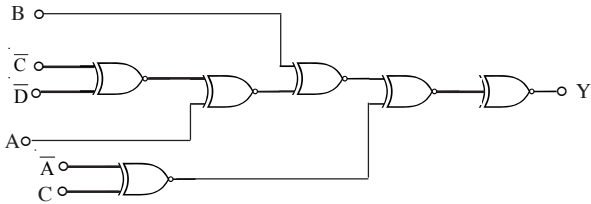

(A) 0

(B) 1

(C) X

(D) $\overline{X}$
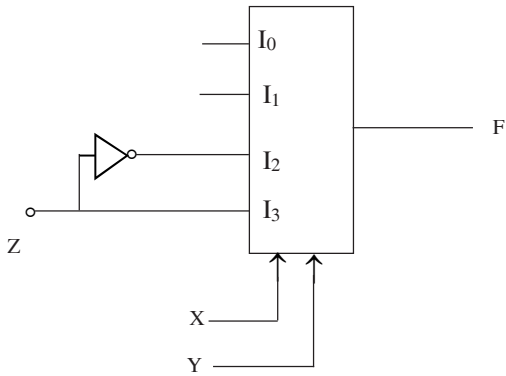
35. The following logic symbol is that of a

(A) (1×4) Multiplexer

(B) (1×4) Demultiplexer

(C) Binary magnitude comparator

(D) Binary full adder

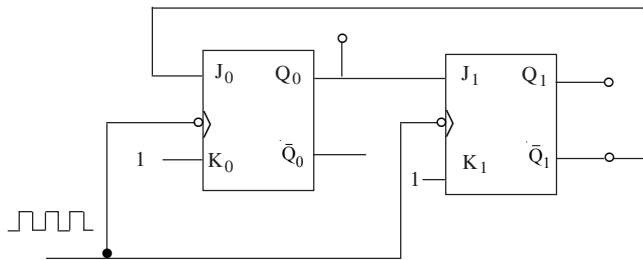**36.** For the following circuit, the output Y equals to

(A) $A(\bar{C} D + \bar{D})$

(B) $\bar{B}(A+CD)+A\bar{C}$

(C) $C(BC+\bar{D})+AB$

(D) $\bar{A}C + B(A + \bar{C}\bar{D})$

37. In the following multiplexer circuit, the Bollean function implemented is

(A) $\sum (0, 1, 2, 3)$

(B) $\sum (0, 1, 3, 5)$

(C) $\sum (0, 2, 4, 6)$

(D) $\sum (0, 2, 4, 7)$

38. A mod-3 counter is shown in figure below: The states of the counter will be

clock pulse

(A) $11 - 10 - 01$

(B) $11 - 01 - 00$

(C) $00 - 10 - 11$

(D) $00 - 01 - 10$

39. In the following NMOS gate circuit, the output F is

(A) $\overline{ABCDE}$

(B) $\overline{A + B}\ C + \overline{D}\ \overline{E}$

(C) $(AB + \overline{C})(\overline{D} + \overline{E})$

(D) $\overline{A(B + C) + DE}$

40. The number of flip-flops required and the maximum decimal number of a MOD-15 counter is

(A) 3, 15

(B) 3, 14

(C) 4, 15

(D) 4, 14

41. The propagation delay each inverter of the following ring oscillator is 5n sec. The fundamental frequency of the oscillator output is

(A) 5 GHz

(B) 10 MHz

(C) 25 MHz

(D) 50 MHz

42. Rotate instruction in microprocessor belongs to

(A) data transfer group
(B) arithmetic group
(C) logic group
(D) branch group

43. Which of the following 8085 instructions do not effect CY flag?

(A) SEE M
(B) SEE R
(C) DCR M
(D) ADC M

44. Consider the following program for 8085:

MOV A, D
RAL
MOV D, A

If initial contents of register D is decimal number 20, the final content of register D is

(A) decimal 20
(B) decimal 40
(C) decimal 10
(D) decimal 50

45. With

int X = 10, y = 3;

in usual C-program, what is the output of modulation division in (% d, x % y)?

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

46. Which of the following is not an interrupt line is 8085?

(A) TRAP
(B) RST 5·5
(C) RST 7·5
(D) RST 9·5

47. The signal in 8086 are in minimum mode when

(A) $MN/\overline{MX}$ pin is tied to $V_{CC.}$
(B) $MN/\overline{MX}$ pin is grounded.
(C) $MN/\overline{MX}$ pin is left open.
(D) $MN/\overline{MX}$ pin is right open.

48. The memory segment registers in 8086 are denoted by

(A) AS, BS, CS, DS
(B) BS, CS, SS, ES
(C) CS, DS, SS, ES
(D) DS, ES, FS, SS

49. Which of the following is not a proper FORTRAN expression?

(A) $B + \dfrac{A}{C} - D$
(B) $B + \dfrac{{}^*A}{C}$
(C) $\dfrac{(A + C)}{(B + D)}$
(D) $A ** (B + 2)$

50. In a series regulated power supply circuit the voltage gain A_v of the "Pass" transistor satisfies the condition

(A) $A_v \to \infty$
(B) $1 \le A_v < \infty$
(C) $A_v = 1$
(D) $A_v \ll 1$

51. What is the output of the following C-program?

```
printf("% ·0f/n", 3·0/4·0);
printf("% ·2f/n", 3·0/4·0);
printf("% ·1f/n", 3·0/4·0);
printf("% ·3f/n", 3·0/4·0).
```

(A) 1, 0·7

(B) 1, 0·75, 0·8, 0·750

(C) 0, 0·75, 1, 0·750

(D) 0, 0·7, 0·7, 0·750

52. With usual begining and end of a C-program, what will be the output of the following C-program?

```
int counter;
for (counter = 10; counter > = 1;
– – counter) {
printf("*");
printf("%d", counter);
}
```

(A) * 10 * 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1

(B) 10 9 8 7 6 5 4 3 2 1

(C) 1 2 3 4 5 6 7 8 9 10

(D) 1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 * 9 * 10 *

53. The critical frequency of the ionospheric layer having an electron density of $2·5 \times 10^5$/cc is

(A) 4·5 MHz

(B) 45 kHz

(C) 9 MHz

(D) 25 MHz

54. The cavity magnetron uses stropping to

(A) prevent mode jumping.

(B) prevent cathode back heating.

(C) ensure bunching.

(D) improve the phase focussing effect.

55. Microwave source used for a microwave oven is

(A) reflex klystron

(B) magnetron

(C) BWO

(D) IMPATT diode

56. The electric field component of an em wave is given by $\vec{E} = 10 \cos (10^7 + kz)\vec{a}_y$ V/m

It can be inferred that

(A) the wave propagates along $\vec{a}_y$.

(B) the wavelength $\lambda = 188·5$m.

(C) the wave number k = 0·33 rad/m.

(D) the wave attenuates as it travels.

57. Gap between two successive holes of a multihole directional coupler is

(A) λ_g

(B) $\lambda_g/4$

(C) $\lambda_g/2$

(D) $\lambda_g/6$

58. Microwave frequencies are used for communication with deep space probes primarily because they do not suffer

(A) refraction by ionosphere.

(B) attenuation in space.

(C) velocity distortion and phase distortion.

(D) fading.

59. For an IMPATT diode, which is a transit time limited device, if the optimum operating frequency is increased by 20%, the output mocrowave power will

(A) decrease by 20·45%

(B) decrease by 10·14%

(C) increase by 35·67%

(D) decrease by 69·44%

60. If the transit time through the Gunn diode be 0·1 nsec., then the Gunn oscillation frequency will be

    (A) 0·1 GHz

    (B) 10 GHz

    (C) 100 MHz

    (D) 1 GHz

61. A microwave circulator is a

    (A) reciprocal device.

    (B) non-reciprocal device.

    (C) when a microwave signal enters port-3, it emerges from port-2.

    (D) passive device which can not be converted into a isolator by any means.

62. Which one of the following statements is *incorrect*?

    (A) For a hollow waveguide with rectangular cross-section, the dominant mode is TE_{10}.

    (B) TEM mode can always propagate through a hollow waveguide with rectangular cross-section.

    (C) The cut-off wavelength for the dominant mode in a hollow rectangular waveguide is '2a' where 'a' is the longer dimension of the cross-section.

    (D) $v_p \cdot v_g = c^2$ where v_p = phase velocity and v_g = group velocity of the microwave signal inside the hollow waveguide, 'c' is the vacuum velocity of light.

63. Identify which of the following expressions do not correspond to Maxwell's equations for time-varying fields.

    (A) $\vec{\nabla} \cdot \vec{J} + \dfrac{\partial \rho_v}{\partial t} = 0$

    (B) $\vec{\nabla} \cdot \vec{D} = \rho_v$

    (C) $\oint \vec{H} \cdot d\vec{l} = \int \left(\sigma \vec{E} + \varepsilon \dfrac{\partial \vec{E}}{\partial t} \right) \cdot d\vec{S}$

    (D) $\vec{\nabla} \cdot \vec{E} = -\dfrac{\partial \vec{B}}{\partial t}$

64. The magnitude of Poynting vectors for current I flowing through a wire of length L and radius *a* with potential difference V between the ends is

    (A) $S = \dfrac{VI}{\pi a^2 L}$

    (B) $S = \dfrac{VI}{2\pi a L}$

    (C) $S = \dfrac{VI^2}{\mu_0 \pi a L}$

    (D) $S = \dfrac{VI}{\mu_0 L}$

65. The adverse effect of noise in a communication system is maximum in

    (A) Encoder

    (B) Channel

    (C) Receiver

    (D) Source

66. Quantitization noise occurs in

    (A) PWM

    (B) FDM

    (C) TDM

    (D) PCM

67. To generate PCM, the signal is sampled and converted into

    (A) PWM

    (B) PPM

    (C) PAM

    (D) PDM

68. If the peak pulse power in a transmitter be 500 kW with a pulse width of 2 μsec and the pulse repetition frequency be 1kHz then the average power of the transmitter will be

    (A) 1 kW

    (B) 100 kW

    (C) 1 MW

    (D) 100 W

69. If the bandwidth of ith channel is 'w_i' and the total number of channels accomodated in a time interval of T is 'N', then the minimum bandwidth B_{min} for TDM is equal to

(A) $N\sum_{i=1}^{N} w_i$

(B) $\sum_{i=1}^{N} w_i \big/ N$

(C) $\sum_{i=1}^{N} w_i$

(D) $\sum_{i=1}^{N} w_i \big/ N^2$

70. In FDM systems used for telephone, which modulation scheme adopted?

(A) AM

(B) DSB-SC

(C) SSB-SC

(D) FM

71. A rectangular waveguide having TE_{10} mode as dominant mode is having a cut-off frequency of 18GHz for TE_{30} mode. The inner broad wall dimension of the rectangular waveguide is

(A) 5/3 cm

(B) 5 cm

(C) 5/2 cm

(D) 10 cm

72. A transmission line of characteristic impedance 50Ω is terminated in a load impedance Z_L. The VSWR of the line is measured as 5 and the first of the voltage maxima in the line is observed at a distance of λ/4 from the load. The value of Z_L is

(A) 10Ω

(B) 250Ω

(C) 19·23 + j 46·15Ω

(D) 19·23 − j 46·15Ω

73. For VSWR = 2, the reflection co-efficient value is

(A) $\rho = 1/2$

(B) $\rho = 1/3$

(C) $\rho = \pm 1/3$

(D) $\rho = \pm 1/2$

74. In a linear array of 4 centre-fed half-wave dipole antennas excited in phase, the major lobes in the radiation pattern will lie

(A) perpendicular to the line of the array.

(B) along the line of the array.

(C) in a direction making an angle of π/4 radian with the line of the array.

(D) in a direction making an angle of 120° with the line of the array.

75. For a 50% modulated AM signal, the ratio of total sideband power to carrier power at the output spectrum is

(A) 1 : 4

(B) 2 : 3

(C) 1 : 3

(D) 1 : 8

76. The envelope voltage of a DSB + C, AM signal varies from 3 volt to 1 volt. The AM index is

(A) 33%

(B) 50%

(C) 40%

(D) 23%

77. In a superheterodyne radio receiver, the received station frequency is 800 kHz and the intermediate frequency is 455 kHz. The local oscillator frequency should be selected as

(A) 1255 kHz

(B) 345 kHz

(C) 1·71 MHz

(D) 910 kHz

78. An FM transmitter has a modulation sensitivity of 20 kHz/volt. The FM index for the 5 kHz sinsusoidal modulation of amplitude 0·5 volt is
  (A) 4
  (B) 2
  (C) 2·5
  (D) 10

79. A UJT has
  (A) stable negative resistance characteristics.
  (B) low firing current.
  (C) use as a waveform generator.
  (D) All of these characteristics.

80. The TRIAC can be used only in
  (A) inverter
  (B) rectifier
  (C) multi-quadrant chopper
  (D) cycloconverter

81. If the core radius of a single mode optical fiber be 'a', the wavelength of propagating lightwave be 'λ', the index of refraction of the core and cladding be n_1 and n_2 respectively, then the V-number of the fiber is expressed as

  (A) $V = \dfrac{2\pi a}{\lambda} \sqrt{n_1^2 - n_2^2}$

  (B) $V = \dfrac{2\pi \lambda}{a} \sqrt{n_1^2 - n_2^2}$

  (C) $V = \dfrac{2\pi \lambda}{a} \dfrac{1}{\sqrt{n_1^2 - n_2^2}}$

  (D) $V = \dfrac{a}{\lambda} \dfrac{1}{n_1^2 - n_2^2}$

82. The total power in a Gaussian laser beam having I_o as the peak (on-axis) beam intensity and ω_o as the spot size is given by

  (A) $\pi\, I_o\, \omega_o^2$

  (B) $\sqrt{2}\, \pi\, I_o\, \omega_o^2$

  (C) $2\, I_o\, \omega_o^2$

  (D) $I_o\, \omega_o^2$

83. A linear array of two half-wave dipole antennas seperated by a distance of twice the wavelength of radiation and excited in phase will have 'n' number of lobes in the radiation field pattern where 'n' equals to
  (A) 2
  (B) 4
  (C) 5
  (D) 8

84 The profile function q in the following refractive index distribution of a graded index fiber given as

$$n^2(r) = n_1^2 \left[1 - \left(\frac{r}{a}\right)^q \right], \quad r < a$$

$$= n_1^2 [1 - 2\delta] \qquad , \quad r > a$$

with symbols having usual correspond to the following values for triangular, parabolic and step index fibers respectively.
  (A) q = 1, q = ∞ and q = 2
  (B) q = 1, q = 2 and q = ∞
  (C) q = 2, q = ∞ and q = 1
  (D) q = 2, q = 1 and q = ∞

85. A pulsed laser generates 500 kW with full width at half maximum of 10 ns at a repetition rate of 200 Hz. Making simplifying assumptions about pulse power, what is the average power?
  (A) 1 V
  (B) 1 mV
  (C) 10 V
  (D) 1 nV

86. What is the cut-off wavelength for the first higher order mode corresponding to a step-index single mode fiber with a core diameter of 6 μm and NA = 0·12?
  (A) 0·94 μm
  (B) 2 μm
  (C) 1·5 μm
  (D) 0·5 μm

87. A laser emits a 2 mm diameter beam of highly collimated light at a power level of 100 W. Ignoring any divergence of the beam, what is its irradiance?

    (A) 100 kW/m^2

    (B) 50 kW/m^2

    (C) 63·6 kW/m^2

    (D) 31·8 kW/m^2

88. One of the following is not the characteristic of an electrical transducer:

    (A) Repeatability

    (B) Non-linearity

    (C) Ruggedness

    (D) Physical size

89. Transducer for measurement of rotational displacement is

    (A) shaft recorder

    (B) differential capacitor

    (C) LVDT

    (D) strain gauge

90. Apart from LVDT, linear displacement can also be sensed by

    (A) RVDT

    (B) capacitance transducer

    (C) thermocouple

    (D) thermistor

91. The purpose of the synchronising control in a CRO is to

    (A) focus the spot on the screen.

    (B) lock the display of signal.

    (C) adjust the amplitude of display.

    (D) control the intensity of the spot.

92. The common mode error voltage in a DVM can be eliminated by using at its input

    (A) a differential amplifier.

    (B) a wideband amplifier.

    (C) a turned amplifier.

    (D) a low-pass filter.

93. The phenomenon of creeping occurs in

    (A) Ammeter

    (B) Voltmeter

    (C) Current meters

    (D) Ohm-meters

94. Which of the following meter has same calibration for both ac and dc?

    (A) Electrodynamometer type

    (B) Moving iron type

    (C) Moving coil type

    (D) Induction type

95. Kelvin's double bridge is used to measure

    (A) very low resistance.

    (B) very high resistance.

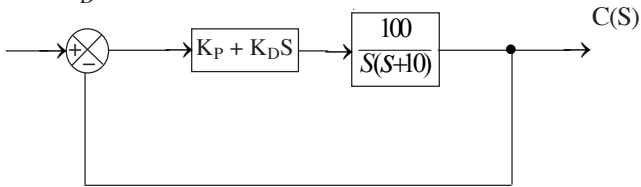   (C) capacitor and its reactance.

    (D) inductor and its reactance.

96. Which one of the following gives gauge factor of a strain gauge?

    (A) $\dfrac{\Delta L}{L} \Big/ \dfrac{\cdot \Delta R}{R}$

    (B) $\dfrac{\Delta R}{R} \Big/ \dfrac{\Delta l}{l}$

    (C) $\dfrac{\Delta R}{R} \Big/ \dfrac{\Delta D}{D}$

    (D) $\dfrac{\Delta R}{R} \Big/ \dfrac{\Delta \rho}{\rho}$

97. Moving coil permanent magnet instruments can be used for the measurement of

(A) AC and DC

(B) AC only

(C) DC only

(D) half wave rectified dc

98. A control system with a PD controller is shown in the figure. If the velocity error constant $K_v = 1000$ and the damping ratio $\xi = 0.5$, then the values of K_P and K_D are

(A) $K_P = 100$, $K_D = 0.09$

(B) $K_P = 100$, $K_D = 0.9$

(C) $K_P = 10$, $K_D = 0.09$

(D) $K_P = 10$, $K_D = 0.9$

99. Which one of the following characteristic equation can result in the stable operation of the feedback system?

(A) $S^3 + 4S^2 + S - 6 = 0$

(B) $S^3 - S^2 + 5S + 6 = 0$

(C) $S^3 + 4S^2 + 10S + 11 = 0$

(D) $S^4 + S^3 + 2S^2 + 4S + 6 = 0$

100. Using Routh's criterion, the number of the roots in the right half S-plane for characteristic equation

$S^4 + 2S^3 + 2S^2 + 3S + 6 = 0$ is

(A) one

(B) two

(C) three

(D) four

ROUGH WORK