Question Paper For ITI Tranees for PSU Exams.

For Electronics Students

Set-7

1. For reflection co-efficient |r| = 1/2 VSWR is

(A) 2

(B) 3   **(Ans)**

(C) C

(D) 8

2. Radiation resistance of a half wave dipole is

(A) 73 Ω **(Ans)**

(B) 377 Ω

(C) 300 Ω

(D) 50 Ω

3. Which of the following is not Maxwell's equation ?

(A) $B = \mu H$

(B) $E = D/\varepsilon$

(C) $E = J/\sigma$

(D) $E = \varepsilon D$ **(Ans)**

4. A medium is called isotropic when

(A) ε is zero

(B) ε is a scalar constant   **(Ans)**

(C) $\varepsilon = \mu$

(D) $\varepsilon = \mu\sigma$

5. Which of the following is not a wide band antenna

(A) marconi **(Ans)**

(B) helical

(C) rhombic

(D) folded dipole

6. The wave which "lies down and dies" is called

(A) ground wave **(Ans)**

(B) sky wave

(C) space wave

(D) spherical wave

7. When cathode is positive with respect to anode in an SCR, the number of p-n junction is
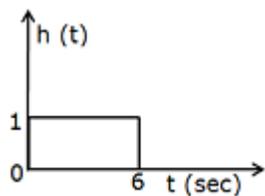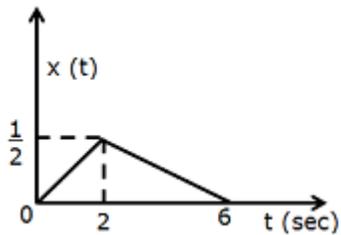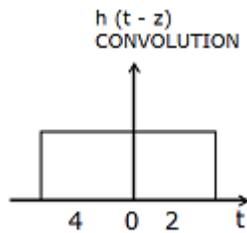
(A) 1

(B) 2 **(Ans)**

(C) 3

(D) 4

8. The impulse response and the excitation function of a linar time invariant causal system are shown in Fig. (a) and (b) respectively. The output of system at t = 2 sec is equal to
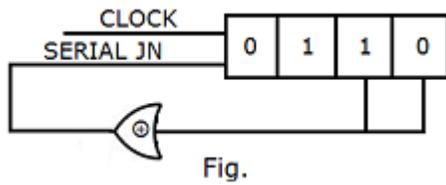
(A) 0

(B) 1/2 **(Ans)**

(C) 3/2

(D) 2

Solution : $y(y) = f x(t) h(t - t) dt$

h (t - z)
CONVOLUTION

4   0   2   t

Out Put   = 1/2 * 2 1/2 = 1/2

9. The initial contents of the 4-bit serial-in-parallel-out right-shift, Shift Register shown in Fig.is 0110. After three clock pulses are applied, the contents of the Shift Register will be

CLOCK
SERIAL JN | 0 | 1 | 1 | 0 |

Fig.

(A) 0000

(B) 0101

(C) 1010 **(Ans)**
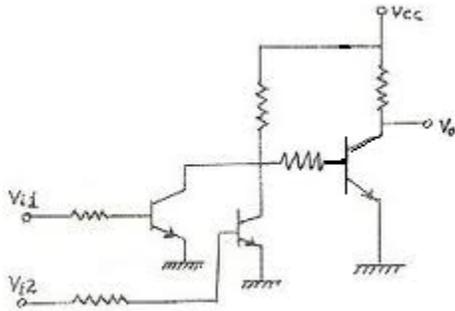
(D) 1111

Solution : 4-bit SIPO

1 XOR (1, 0) = 1 1011

2 XOR (1, 1) = 0 0101

3 XOR (0, 1) = 1 1010

contents will be 1010.

10. Fig. shows the circuit of a gate in the Resistor Transistor Logic (RTL) family. The circuit represents a

(A) NAND

(B) AND

(C) NOR

(D) OR   **(Ans)**

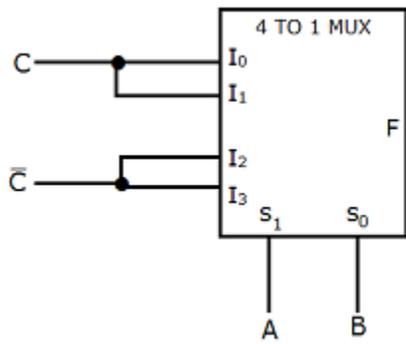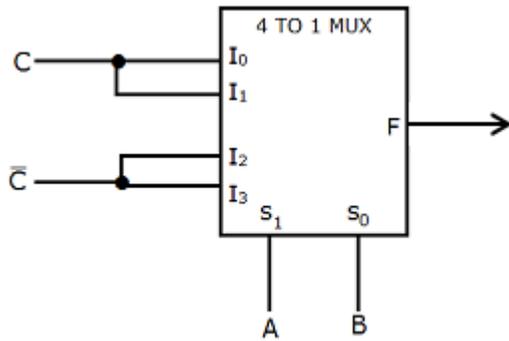| V_{i1}	V_{i2}	V_x	V_0	Q_1	Q_2	Q_3
L	L	H	L	OFF	OFF	ON
L	H	L	H	OFF	ON	OFF
H	L	L	H	ON	OFF	OFF
H	H	L	H	ON	ON	OFF

The circuit represent an OR. Hence choice is d.

11. The logic realized by the circuit shown in Fig.

4 TO 1 MUX

(A) $F = A \cdot C$

(B) $F = A + C$ **(Ans)**

(C) $F = B \cdot C$

(D) $F = B + C$

4 TO 1 MUX

S_0	S_1	F
B	A	
O	0	C
1	0	C
0	1	$\overline{C}$
1	1	$\overline{C}$

F = does not depend on B.

$F = A C + A C = A \oplus C$

12. A Lissajous pattern, as shown in Fig below, is observed on the screen of a CRO when voltage of frequencies f_x and f_y are applied to the x and y plates respectively. $f_x : f_y$ is then equal to
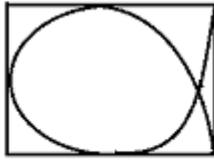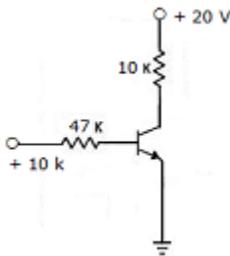
Fig.

(A) 3 : 2

(B) 1 : 2 **(Ans)**

(C) 2 : 3

(D) 2 : 1

Solution : f_x/f_f = Points of tangency to vertical line/Points of tangency to horizontal line = 1/2

or $f_x : f_y = 1 : 2$

13. In the transistor circuit shown in Fig. below, collector-to-ground voltage is + 20 V. Which of the following is the probable cause of error ?

(A) Collector-emitter terminals shorted

(B) Emitter to ground connection open   **(Ans)**

(C) 10 k Ω resistor open

(D) collector-base terminals shorted

14. To neglect a voltage source, the terminals across the source are

(A) open circuited

(B) short circuited   **(Ans)**

(C) replaced by some resistance

(D) replaced by an inductor

15. Current I_0 in the given circuit will be
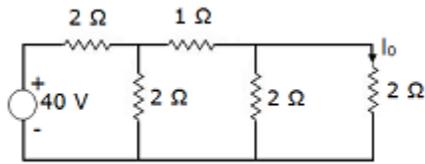
Fig.

(A) 10 A

(B) 3.33 A   **(Ans)**

(C) 20 A

(D) 2.5 A

Solution : $R_T = 2 + 2 \parallel [1 + (2 \parallel 2)]$

$= 2 + 2 \parallel (1 + 1)$

$= 2 + 2 \parallel 2 = 2 + 1 = 3 \, \Omega$

So $I = \dfrac{40}{3}$ A

By current division $I_0 = \dfrac{1}{2} * \dfrac{1}{2} * \dfrac{40}{3} = \dfrac{10}{3}$ A

$I_0 = 3.33$ A

16. In a resonant circuit, the power factor at resonance is

(A) zero

(B) unity   **(Ans)**

(C) 0.5

(D) 1.5

17. In the given circuit voltage V is reduced to half. The current will become
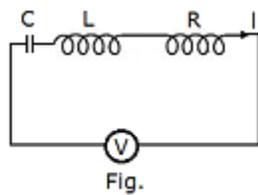
Fig.

(A) $I/2$ **(Ans)**

(B) $2I$

(C) $1.5 I$

(D) $I / \sqrt{R^2 + (X_L + X_C)^2}$

Solution : I a V if V reduced half current becomes $\dfrac{I}{2}$.

18. One electron volt is equivalent to

(A) $1.6 * 10^{-10}$ J

(B) $1.6 * 10^{-13}$ J

(C) $1.6 * 10^{-16}$ J

(D) $1.6 * 10^{-19}$ J **(Ans)**

19. Which of the following is donor impurity element ?

(A) Aluminium

(B) Boron

(C) Phosphorous **(Ans)**

(D) Indium.

20. The diameter of an atom is of the order

(A) 10^{-6} m

(B) 10^{-10} m **(Ans)**

(C) 10^{-15} m

(D) 10^{-21} m

21. The following Figure represents

Image - BSNL- MB (J.T.O.) RE 2001 - Part A - Qno. 9

(A) LED   **(Ans)**

(B) Varistor

(C) SCR

(D) Diac

22. If the d.c. valve of a rectified output is 300 V and peak to peak ripple voltage is 10 V, the ripple factor is

(A) 1.18%

(B) 3.33%   **(Ans)**

(C) 3.36%

(D) 6.66%

 Solution : rms value of output

$= \sqrt{300^2 + 10^2} = 300.166$ V

Average value = 300 V

Form factor $\frac{\text{RMS value}}{\text{Average value}} = \frac{300.166}{300} = 1.00055$.

Ripple factor $= \sqrt{(\text{Form factor})^2 - 1}$

 $= \sqrt{(1.0005)^2 - 1} = 0.0333$

$= 3.33\%$.

23. Full wave rectifier output has ripple factor of

(A) 1.11   **(Ans)**

(B) 1.21

(C) 1.41

(D) 1.51

24. In a common base connection I_E = 2 mA, I_C = 1.9 mA. The value of base current is

(A) 0.1 m **(Ans)**

(B) 0.2 mA

(C) 0.3 mA

(D) zero

Solution : I_E = 2 mA I_C = 1.9 mA

$I_b = I_E - I_C = (2 - 1.9) = 0.1$ mA.

25. For the action of transistor the base region must be

(A) P-type material

(B) N-type material

(C) very narrow   **(Ans)**

(D) highly doped

26. Compared to a CB amplifier the CE amplifier has higher

(A) current amplification

(B) output dynamic resistance

(C) leakage current

(D) input dynamic resistance

(E) all of the above   **(Ans)**

27. When a transistor is biased to cut-off its Y is

(A) 0.5

(B) 0

(C) 1.0   **(Ans)**

(D) 0.8

28. An ideal voltage amplifier should have

(A) $R_i = 0$, $R_0 = 0$

(B) $R_i = 0$, $R_0 = ¥$

(C) $R_i = ¥$, $R_0 = 0$ **(Ans)**

(D) $R_i = 0$, $R_0 = ¥$

29. Barichausen criterion for sustained oscillator is

(A) $A\beta = 1 Ð0^0$ **(Ans)**

(B) $A\beta = 0$

(C) $A\beta = 1 Ð180^0$

(D) $A = 1/\sqrt{\beta}$

30. The value of plastic capacitance for a triode may range from

(A) 2 µF to 12 µF

(B) 20 µF to 120 µF

(C) 2 pF to 12 pF   **(Ans)**

(D) 20 pF to 120 pF

31. A colpitts oscillator uses

(A) tapped coil

(B) inductive feedback

(C) tapped capacitance   **(Ans)**

(D) no tuned LC circuit

32. A typical frequency for a *RC* feedback oscillator is

(A) 1 KHz   **(Ans)**

(B) 100 MHz

(C) 1000 MHz

(D) 1 GHz

33. In pulse transmitter the ratio of time on to time off is called

(A) efficiency

(B) duty cycle   **(Ans)**

(C) base

(D) bandwidth

34. FM broadcast band generally lies in

(A) LF

(B) HF

(C) VHF   **(Ans)**

(D) SHF

35. The following filter is generally used in SSB generation

(A) active filter

(B) mechanical filter   **(Ans)**

(C) LC filter

(D) crystal filter

36. Which is a digital communication system ?

(A) FM

(B) AM

(C) PCM   **(Ans)**

(D) PAM

37. A transistor is basically an amplifying device for

(A) power

(B) voltage

(C) current   **(Ans)**

(D) all of these

38. The function $\dfrac{3\,s}{(s+1)\,(s+2)}$ has

(A) one zero, two poles   **(Ans)**

(B) no zero, one pole

(C) no zero, two poles

(D) one zero, no pole

Solution : $G\,(s) = \dfrac{3s}{(s+1)\,(s+2)}$ has one zero at $s = 0$ and two poles at $s = -1, -2$.

39. The drain of an n-channel MOSFET is shorted to the gate so that VGS = VDS. The threshold voltage (VT) of MOSFET is 1 V. If the drain current (ID) is 1 mA for VGS = 2V, then for VGS = 3V, ID is

A) 2 mA
B) 3 mA
C) 9 mA
D) 4 mA

Answer : (D)

40. The first and the last critical frequency of an RC-driving point impedance function must respectively be

A) a zero and a pole
B) a zero and a zero
C) a pole and a pole
D) a pole and a zero

Answer : (D)

41. In what range should Re(s) remain so that the Laplace transform of the function e(a+2)t+5 exits?

A) Re (s) > a + 2
B) Re (s) > a + 7
C) Re (s) < 2
D) Re (s) > a + 5

Answer : (A)

42. A parallel plate air-filled capacitor has plate area of l0-4 m2 and plate separation of 10-3 m. It is connected to a 0.5 V, 3.6 GHz source. The magnitude of the displacement current is (e0 = 1/36p x 10-9 F/m)

A) 10 mA
B) 100 mA
C) 10 A
D) 1.59 mA

Answer : (A)

43. For the polynomial P(s) = s5 + s4 + 2s3 + 2s2 + 3s + 15, the number of roots which lie in the right half of the s-plane is

A) 4
B) 2
C) 3
D) 1

Answer : (B)

44. The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the TE10 mode is

A) equal to its group velocity
B) less than the velocity of light in free space
C) equal to the velocity of light in free space
D) greater than the velocity of light in free space

Answer : (D)

45. A device with input x(t) and output y(t) is characterized by: y(t) = x2(t). An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

A) 370 kHz
B) 190 kHz
C) 380kHz
D) 95kHz

Answer : (C)

46. The Q - meter works on the principle of

A) mutual inductance
B) self inductance
C) series resonance
D) parallel resonance

Answer : (C)

47. The Fourier transform of a conjugate symmetric function is always

A) imaginary
B) conjugate anti-symmetric
C) real
D) conjugate symmetric

Answer : (C)

48. An ideal op-amp is an ideal

A) voltage controlled current source
B) voltage controlled voltage source
C) current controlled current source
D) current controlled voltage source

Answer : (B)
49. A system has poles at 0.01 Hz, 1 Hz and 80 Hz; zeros at 5 Hz, 100 Hz and 200 Hz. The approximate phase of the system-response at 20 Hz is

A) - 90°
B) 0°
C) 90°
D) - 180°

Answer : (A)

50. In an abrupt p-n junction, the doping concentrations on the p-side and n-side are NA = 9x 1016/cm3 and ND = 1 x 1016/cm3 respectively. The p-n junction is reverse biased and the total depletion width is 3 m m. The depletion width on the p-side is

A) 2.7 mm
B) 0.3 mm.
C) 2.25 mm
D) 0.75 mm

Answer : (B)

51. A master-slave flip-flop has the characteristic that

A) change in the input immediately reflected in the output
B) change in the output occurs when the state of the master is affected
C) change in the output occurs when the state of the slave is affected
D) both the master and the slave states are affected at the same time

Answer : (C)

52. A parallel plate air-filled capacitor has plate area of I0-4 m2 and plate separation of 10-3 m. It is connected to a 0.5 V, 3.6 GHz source. The magnitude of the displacement current is (e0 = 1/36p x 10-9 F/m)

A) 10 mA
B) 100 mA
C) 10 A
D) 1.59 mA

Answer : (A)

53. The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the TE10 mode is

A)equal to its group velocity
B) less than the velocity of light in free space
C) equal to the velocity of light in free space
D) greater than the velocity of light in free space

Answer : (D)

54. Noise with uniform power spectral density of N0W/Hz is passed through a filter H (w) = 2 exp(-jwtd) followed by an ideal low pass filter of bandwidth BHz. The output noise power in Watts is

A) 2N0B
B) 4N0B
C) eN0B
D) 16 N0B

Answer : (B)

55. The cascade amplifier is a multistage configuration of

A) CC-CB
B) CE-CB
C) CB-CC
D) CE-CC

Answer : (B)

56. Consider a lossless antenna with a directive gain of +6dB. If 1 mW of power is fed to it the total power radiated by the antenna will be

A) 4 mW
B) 1 mW

C) 7 mW
D) 1/4 mW

Answer : (A)

57. The bandgap of Silicon at room temperature is

A) 1.3 eV
B) 0.7 eV
C) 1.1 eV
D) 1.4 eV

Answer : (C)

58. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

A) 8/6
B) 12
C) 16
D) 8

Answer : (C)

59. A device with input x(t) and output y(t) is characterized by: $y(t) = x^2(t)$. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

A) 370 kHz
B) 190 kHz
C) 380kHz
D) 95kHz

Answer : (C)

60. For the polynomial $P(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15$, the number of roots which lie in the right half of the s-plane is

A) 4
B) 2
C) 3
D) 1

Answer : (B)

61. An AM signal is detected using an envelope detector The carrier frequency and modulating signal frequency are 1 MHz and 2 kHz respectively. An appropriate value for the time constant of the envelope detector is

A) 500 msec
B) 20 msec
C) 0.2 msec

D) 1 msec

Answer : (B)

62. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

A) 8/6
B) 12
C) 16
D) 8

Answer : (C)

63. Consider the following statements S1 and S2.
S1: The b of a bipolar transistor reduces if the base width is increased.
S2: The b of a bipolar transistor increases if the doping concentration in the base is increased.
Which one of the following is correct?

A) S1 is FALSE and S2 is TRUE
B) Both S1 and S2 are TRUE
C) Both S1 and S2 are FALSE
D) S1 is TRUE and S2 is FALSE

Answer : (D)

64. A digital-to-analog converter with a full-scale output voltage of 3.5 V has a resolution close to 14m V. Its bit size is

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

Answer : (B)

65. A single-phase half-controlled rectifier is driving a separately excited dc motor. The dc motor has a back emf constant of 0.5 V/rpm. The armature current is 5 A without any ripple. The armature resistance is 2W. The converter is working from a 280 V, single phase ac source with a firing angle of 80°. Under this operating condition, the speed of the motor will be

A) 339 rpm
B) 359 rpm
C) 366 rpm
D) 386 rpm

Answer : (C)

66. In relation to the synchronous machines, which one of the following statements is false?

A) In salient pole machines, the direct-axis synchronous reactance is greater than the quadrature-axis synchronous reactance
B) The damper bars help the synchronous motor self start

C) Short circuit ratio is the ratio of the field current required to produce the rated voltage on open circuit to the rated armature current
D) The V-curve of a synchronous motor represents the variation in the armature current with field excitation, at a given output power

Answer : (C)

67.A parallel plate air-filled capacitor has plate area of l0-4 m2 and plate separation of 10-3 m. It is connected to a 0.5 V, 3.6 GHz source. The magnitude of the displacement current is (e0 = 1/36p x 10-9 F/m)

A) 10 mA
B) 100 mA
C) 10 A
D) 1.59 mA

Answer : (A)

68. The 8085 assembly language instruction that stores the content of H and L registers into the memory locations 2050H and 2051H, respectively, is

A) SPHL 2050H
B) SPHL2051H
C) SHLD 2050H
D) STAX 2050H

Answer : (C)

69. If E is the electric field intensity, $\tilde{N}(\tilde{N} \times E)$ is equal to

A) E
B) | E |
C) null vector
D) zero

Answer : (D)

70. The insulation strength of an EHV transmission line is mainly governed by

A) load power factor
B) switching over-voltages
C) harmonics
D) corona

Answer : (B)

71. The Q - meter works on the principle of

A) mutual inductance
B) self inductance
C) series resonance
D) parallel resonance

Answer : (C)

72. A 800 kV transmission line is having per phase line inductance of 1.1 mH/km and per phase line capacitance of 11.68 nF/km. Ignoring the length of the line, its ideal power transfer capability in MW is

A) 1204 MW
B) 1504 MW
C) 2085 MW
D) 2606 MW

Answer : (C)

73. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

A) 8/6
B) 12
C) 16
D) 8

Answer : (C)

74. At an industrial sub-station with a 4 MW load, a capacitor of 2 MVAR is installed to maintain the load power factor at 0.97 lagging. If the capacitor goes out of serivce, the load power factor becomes

A) 0.85
B) 1.00
C) 0.80 lag
D) 0.90 lag

Answer : (C)

75.The conduction loss versus device current characteristic of a power MOSFET is best approximated by

A) a parabola
B) a straight line
C) a rectangular hyperbola
D) an exponentially decaying function

Answer : (A)