NATIONAL COUNCIL OF SCIENCE MUSEUMS
KOLKATA

Name of the candidate .....
Form no. .....

SECTION-B (ELECTRONICS ENGINEERING)

APTITUDE TEST FOR CURATOR

1. The energy required to change the speed of one electron from rest to 0.6c is nearly
a) 0.085 Me V b) 0.13 Me V c) 0.26 Me V d) 0.37 Me V

2. An op-amp has open-loop gain 100000 and the open-loop upper cut-off frequency is 20Hz. The unity gain frequency of the op-amp is :
a) 2 MHz b) 1 MHz c) 3kHz d) 2kHz

3. The junction capacitance of a p – n junction depends on.
a) Doping concentration only
b) Applied voltage only
c) Both doping concentration and applied voltage
d) Barrier potential only

4. Which one of the following is used as the principle photo detector in optical fiber link.
a. Avalanche diode b. Varactor diode.
c. Semiconductor PIN diode d. Zener diode

5. The output voltage of a typical thermocouple is
a. less than 100 mV b. greater than 1 V
c. Thermocouples vary resistance, not voltage. d. None of the above

6. Determine the values of A, B, C, and D that make the sum term $\overline{A}+B+\overline{C}+D$ equal to zero
a. A = 1, B = 0, C = 0, D = 0 b. A = 1, B = 0, C = 1, D = 0
c. A = 0, B = 1, C = 0, D = 0 d. A = 1, B = 0, C = 1, D = 1

7. Applying DeMorgan's theorem to the expression $\overline{\overline{(X+Y)}+\overline{Z}}$, we get _____
a. $(X+Y)Z$ b. $(\overline{X}+\overline{Y})Z$
c. $(X+Y)\overline{Z}$ d. $(\overline{X}+\overline{Y})\overline{Z}$

8. Which of the following is correct for a gated D-type flip-flop?
a. The Q output is either SET or RESET as soon as the D input goes HIGH or LOW
b. The output complement follows the input when enabled
c. Only one of the inputs can be HIGH at a time.
d. The output toggles if one of the inputs is held HIGH

9. A basic S-R flip-flop can be constructed by cross-coupling which basic logic gates?
a. AND or OR gates b. XOR or XNOR gates
c. NOR or NAND gates d. AND or NOR gates

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10. A disc rotates at a speed of 7200rpm. It has 4000 cylinders, 16 surface and 256 sectors per track. What is the average latency time of the disk?

a) 8.33 ms b) 4.166 ms c) 41.66 ms d) 4.33 μs

11. Consider the following program:

```
PUSH    a       POP     BX
PUSH    b       ADD     AX,BX
PUSH    c
POP AX
POP BX
SUB AX, BX
```

The expression computed by the above program and stored in AX is

a) a+b-c b) c+b-a c) c-b+a d) c-b-a

12. Consider following instructions executed in 8086

```
PUSH AX; has 20 Hex in it
PUSH BX; has 43 Hex in it
POP AX;
ADD AX,BX
POP G
```

The value stored in G would be

a) 20 Hex b) 43 Hex c) 54 Hex d) 68 Hex

13. In a microprocessor when a CPU is interrupted, it

a) Stop execution of instructions
b) Acknowledges interrupt and branches of subroutine
c) Acknowledges interrupt and continues
d) Acknowledges interrupt and waits for the next instruction from the interrupting device

14. The address Bus of Intel 8085 is 16 bit and hence the memory which can be accessed by this address bus is

a) 1 k Byte b) 16 k Bits c) 32 k Bits d) 64 k Bytes

15. Consider the bit pattern 01010001. Which of the following has a Hamming distance of exactly 2 form this pattern ?

a) 01010000 b) 01010010 c) 01010011 d) 01010110

16. Which of the following instruction of an 8086 microprocessor uses the contents of a CX register as a counter? 1. LOCK 2. LOOP 3. ROTATE select the correct answer using the code given below:

a) Only 1 & 2 b) Only 1 & 3 c) Only 2 & 3 d) 1, 2 & 3

17. Which one of the following registers of 8085 microprocessor is not a part of programming model?

a) Instruction register b) Memory address register c) Status register
d) Temporary data register

18. The computer program which converts statements written in high level language to object code is known is

a) Assembler b) Complier c) Disassembler d) Operating system

19. Which one of the following statements is correct? Microwave link repeaters are typically 50 km apart.

a) Because of atmospheric attenuation b) Because of output tube power limitations
c) Because of earth's curvature d) To ensure that the applied d.c. voltage is not excessive

20. Which of the following are microwave source?

a) Klystron b) Magnetron c) IMPATT d) TWTA

21. Which ionosphere layer is responsible for return of a radiation at frequency 30 MHz?

a) D b) E c) F d) All the above three

22. Which of the following are the advantages of FM over AM ?

1. Better noise immunity is provided 2. Lower bandwidth is required 3. The transmitted power is more useful 4. Less modulating power is required

a) 1,2 and 3 b) 2,3, and 4 c) 2 and 4 d) 1,3 and 4

23. A diaphragm, has a natural frequency of 30 KHz. If both its diameter and thickness are halved, then the natural frequency will be

a) 15 kHz b) 60 kHz c) 120 kHz d) 240 kHz

24. The Lissajous pattern observed on the screen of a CRO is a straight line inclined at an angle of 45^0 to the x-axis. If the voltage applied to the x-plate is 2 sin ωt, then the voltage applied to the Y-plates will be

a) 2 sin ωt b) $2 \sin(\omega t + 45^0)$ c) $2 \sin(\omega t - 45^0)$ d) $2\,(2)^{1/2} \sin(\omega t + 45^0)$

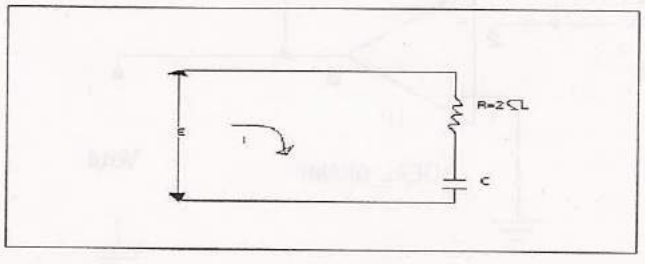
25. The equation $\Delta . J=0$ is known as

a) Poisson's equation b) Lap lace equation c) Continuity equation d) Maxwell equation

26. A composite voltage v = 10 sin 100t + 10 cos 100t applied across a series combination of a capacitor of 1μF and resistance of 10 KΩ. The average power dissipated in resistance is

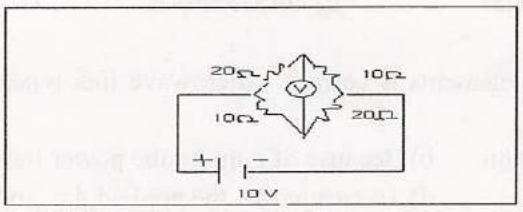
a) 5 mW b) 3.5 mW c) 2.5 mW d) 1.25 mW

27. In the series RC circuit shown in the figure, the rms value of the voltage E is I V. If the average power dissipated is equal to 500 mW, then the phase angle between the Voltage and current will be :



a) 90^0 b) 60^0 c) 45^0 d) 30^0

28. The reading of high impedance voltmeter V in the bridge circuit shown in the given figure is



a) Zero
b) 3.33 V
c)4.20 V
d) 6.66 V

29. Which one of the following is the correct relationship between the band gap of a material used in a photo detector and the energy of the incident photon ?

a) $E_g \geq (hc/\lambda)$ b) $(hv2/\lambda) \geq E_g$ c) $hv \geq E_g$ d) $(1/2)hv \leq E_g$

30. Which one of the following statements is correct? Digital modulation techniques are used in satellite communication system since

a) They are easier to handle
b) Large bandwidth utilization is possible
c) They have a spectral efficiency
d) They are less prone to interference

31. An advantage of memory interlacing is that :

a) A larger memory is obtained
b) Effective speed of the memory is increased
c) The cost of the memory is reduced
d) A nonvolatile memory is obtained

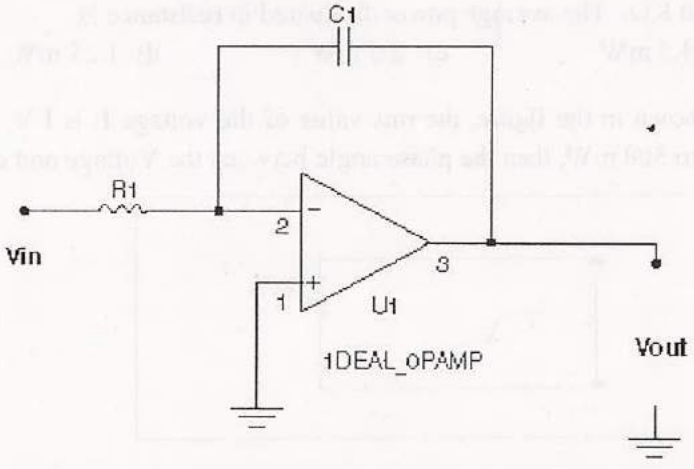
32. The equation for the output frequency of a 555 timer operating in the a stable mode is:

$$f = \frac{1.43}{(R_1 + 2R_2) \times C_1}$$

What value of C_1 will be required if $R_1 = 1\ k\Omega$, $R_2 = 1\ k\Omega$, and $f = 1$ kHz?

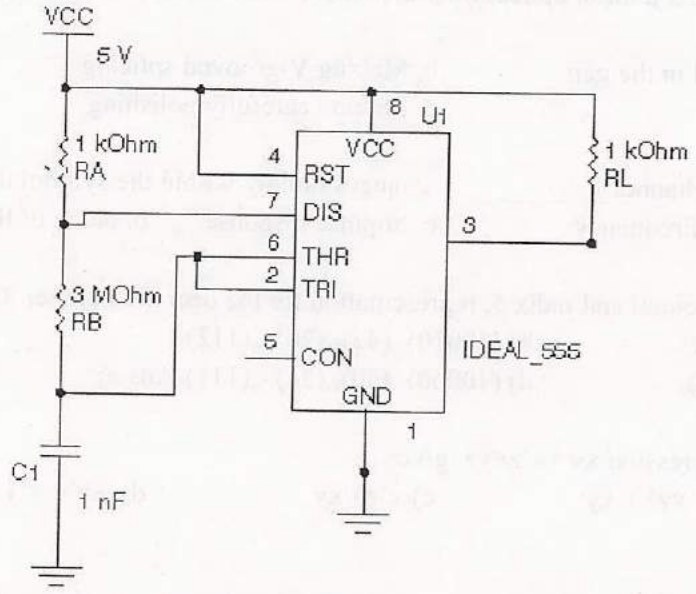
a. 0.33 μF b. 0.48 μF c. 480 μF d. 33 Nf

33. What is the output waveform?



a. sine wave b. square wave c. sawtooth wave d. triangle wave

34. What is the frequency of this 555 a stable multivibrator?

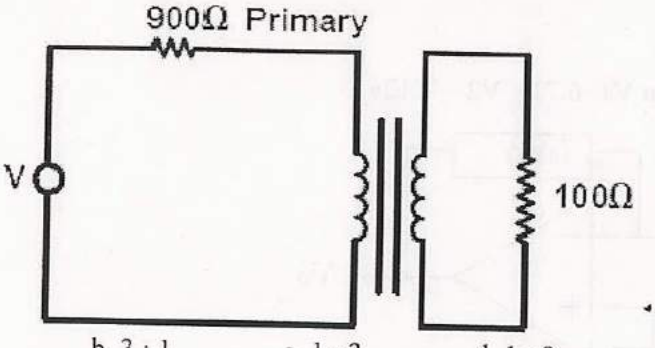


a. 278 Hz b. 178 Hz c.78 Hz d. 8 Hz

35. A Darlington transistor connection provides a transistor having a very large
a. Current gain b. Voltage gain c. Impedance gain d. Impedance matching gain

36. The spectrum of discrete-time Fourier transform will be:
a. Periodic and discrete b. Aperiodic and continuous
c. Periodic and continuous d. Aperiodic and discrete

37. Consider the circuit shown in the given figure. For maximum power transfer to the load, the primary to secondary turn's ratio must be



a 9:1 b. 3 : 1 c. 1 : 3 d. 1 : 9

38. A lamp of 100W at 200V is supplied current at 100 volts. It will be equivalent to the lamp of:
a. 50W b. 40W c. 25W d. 10W

39. In which layer Telnet and FTP works?
a. Application b. Session c. Network d. Physical

40. As we know when there is a joint in optical fiber then there will be some loss then this loss be minimized by

a. Using index matching fluid in the gap
b. Making V-grooved splicing
c. Both (a)and (b)
d. Making carefully polishing

41. Fast fading occurs if the channel_____ changes rapidly within the symbol duration.

a. Bandwidth b. Frequency c. Impulse response d. None of the above

42. The binary, octal, hexadecimal and radix 5, representation for the decimal number 32.

a) $(10000)_2,(40)_8,(20)_{16},(112)_5$
b) $(10010)_2,(45)_8,(20)_{16},(112)_5$
c)$(10000)_2,(40)_8,(20)_{16},(120)_5$
d) $(10000)_2,(40)_8,(20)_{16},(111)_5$Ans a)

43. Simplifying Boolean expression xy +x'z+yz gives

a) x'z+xy' b) xz' + xy c) x'z+ xy d) xz'+ x'y

44. Which one of the following transducers is the most suitable for the measurement of linear displacement?

A. Strain gauge B. LVDT C. Piezoelectric crystal D. Microphone

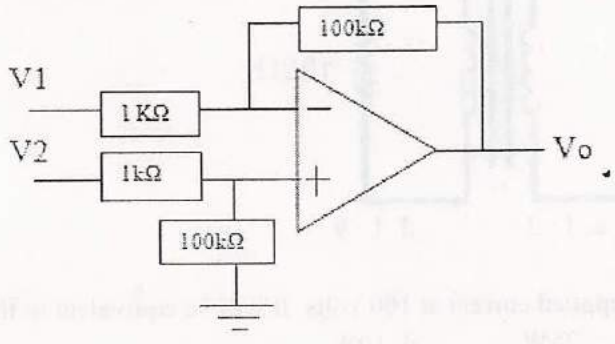
45. Which of the signal is non periodic

a. $X(t)= \sin 15\pi t$
b. $X(t)= \sin 20\pi t$
c. $X(t)= \sin 15\pi t+ \sin 20\pi t$
d. $X(t)= \sin 5\pi t+ \sin 20\pi t$

46. Two resistance of equal value are wired in parallel. What will be the power rating for the equivalent resistance if one resistance is rated 2watt and the other 6 watt .

a)4 watt b) 8 watt c) 3 watt d) 40 watt.

47. Find the output voltage given V1=6.73v, V2 = 7.12v.



a) 35 V b) 36 V c) 39 V d) 33 V

48. What would be drain current id and drain source saturation voltage Vds for Vgs = V_p /4 assume saturation current Idss = 2 mA and pinch off Voltage is V_p = -3.5 V.

a)2.33v b) 2.63 V c) 2.35 V d) 2.7V ans b)

P.T.O

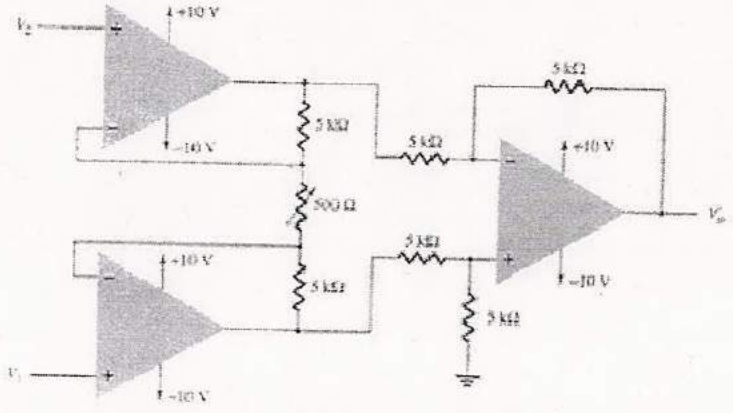
49. Given below are two statements for Class A and B type amplifier . Choose correct option.

I) Class A amplifier conducts for the entire cycle of input signal

II) Class B amplifier conducts for slightly more than half a cycle of input signal

a) Statement I is true but Statement II is false
b) Both statements are true
c) Statement I is false but statement II is true.
d) Both statement are false.

50. Calculate the output voltage for this circuit when $V_1 = 2.5$ V and $V_2 = 2.25$ V.



a. 5.25 V
b. 2.5 V
c. 2.25 V
d. 5.25 V

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SHEET FOR ROUGH WORK