M.TECH ENTRANCE TEST-2022

SCHOOL OF APPLIED SCIENCE & TECHNOLOGY
Subject (Embedded Systems & Solutions)

Total Questions: 60
Time Allowed : 70 Minutes

Roll No.

SEAL

Instructions for Candidates

1. Write your roll number in the space provided at the top of this page of question booklet and fill up the necessary information in the spaces provided on OMR Answer sheet.

2. OMR Answer sheet has an original copy and a candidate's copy glued beneath it at the top. While making entries in the original copy, candidate should ensure that the two copies are aligned properly so that the entries made in the original copy against each item are exactly copied in the candidate's copy.

3. All entries in the OMR answers sheet including answers to questions are to be recorded in the original copy only.

4. Use only blue/ black ball point pen to darken the circle of correct / most appropriate response. In no case gel/ ink pen or pencil should be used.

5. Do not darken more the one circle of option for any question. A question with more than one darkened response shall be considered wrong.

6. There will be "**Negative Marking**" for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.

7. Only those candidates who would obtain positive score in entrance test examination shall be eligible for admission

8. Do not make any stray mark on the OMR sheet

9. Calculators and mobiles shall not be permitted inside the examination hall

10. Rough work, if any, should be done on the blank sheets provided with the question booklet.

11. OMR answer sheet must be handled carefully and it should not be folded or mutilated in such case it will not be evaluated.

12. Ensure that your OMR Answer sheet has been signed by the invigilator and the candidate himself/herself.

13. At the end of the examination hand over the OMR answer sheet to the invigilator who will first tear off the original OMR sheet in presence of the candidate and hand over the candidate's copy to the candidate.

14. If any of the information in the response sheet/question paper has been found missing or not mentioned as stated above the candidate is solely responsible for that lapse.

1. The directional derivative of the function $f(x, y, z) = x + y$ at the point $P(1,1,0)$ along the direction $\vec{\imath} + \vec{\jmath}$ is

   A) $-\frac{1}{\sqrt{2}}$

   B) $\sqrt{2}$

   C) $-\frac{\sqrt{2}}{3}$

   D) $\frac{2}{3}$

2. The rank of a 3x3 matrix C(=AB), found by multiplying a non-zero column matrix A of size 3x1 and a non-zero row matrix B of size 1x3, is

   A) 0

   B) 4

   C) 2

   D) $\sqrt{3}$

3. The series S=1-1+1-1............... is

   A) Convergent

   B) Monotonous

   C) Uniformly c

   D) Divergent

4. The third term in the Taylor series expansion of e^x about a would be

   A) $e^a(x + a)$

   B) $\frac{e^a}{2}(x - a)$

   C) $\frac{3x^2}{2}$

   D) $\frac{e^a}{6}(x + a)^3$

5. If $e^z = y^{1/y}$, then y has a

   A) Maximum at $y = e$

   B) Minimum at $y = e$

   C) Maximum at y=1/e

   D) Minimum at y=1/e

6. For $|x| \ll 1, Coth(x)$ can be approximated as

   A) x

   B) x^2

   C) $1/x$

   D) $1/x^2$

7. For the differential equation $\frac{d^2y}{dx^2} + k^2y = 0$ the boundary conditions are

   i.   y=0 for x=0 and
   ii. y=0 for x=a

   The form of non-zero solutions of y (where m varies over all integers) are

   A) $y = \sum_m A_m \sin\frac{m\pi x}{a}$
   B) $y = \sum_m A_m \cos\frac{m\pi x}{a}$
   C) $y = \sum_m A_m x^{\frac{m\pi}{a}}$
   D) $y = \sum_m A_m x^{m\pi x/a}$

8. The differential equation for the variation of the amount of salt x in a tank with time t is given by $\frac{dx}{dt} + \frac{x}{10} = 20$, where x is in kg and t is in minutes. Assume that there is no salt in the tank initially, the time (in min) at which the amount of salt increases to 100 kg is

   A) 20 ln 2
   B) 60 ln 2
   C) 10 ln 2
   D) 40 ln 2

9. The complex conjugate of $\frac{1}{1+i}$ is

   A) $\frac{1}{1-i}$
   B) $2(1 + i)$
   C) $0.5(1 + i)$
   D) In the first quadrant of the complex plane

10. The system of simultaneously equations: x+2y+z=6; 2x+y+2z=6; x+y+z=5 has

    A) Unique solution
    B) Infinite number of solutions
    C) No solution
    D) Exactly two solution

11. Two dice are thrown. What is the probability that the sum of the numbers on the two dice is eight?

    A) 5/36
   B) 13/18
    C) 11/41
    D) 11/31

12. If the arithmetic mean of two numbers is 10 and the their geometric mean is 8, the numbers are:

    A) 20, 5
    B) 16, 4
    C) 15, 5
    D) 12, 8

13. In Series RLC circuit at resonance with Q=10, the voltage across the inductor is

    A) Equal to the applied voltage
    B) Greater than the applied voltage
    C) Less than the applied voltage
    D) May be greater than or less than the applied voltage

14. The pole zero diagram of Z(s)=V(s)/I(s) is shown in following figure, i(t)=cos t, v(t) is given by
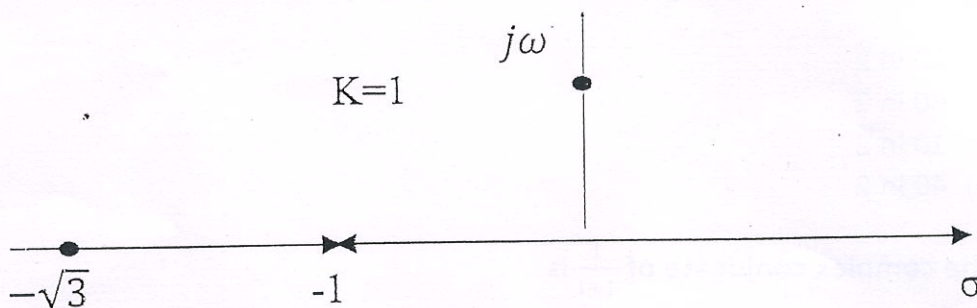
    A) $\frac{1}{\sqrt{2}}\cos(t+15^0)$
    B) $\sqrt{2}\cos(t-15)$
    C) $\sqrt{3}$
    D) None of these

15. In the interconnection of ideal sources shown in the following figure, it is known that the 60V source is absorbing power.
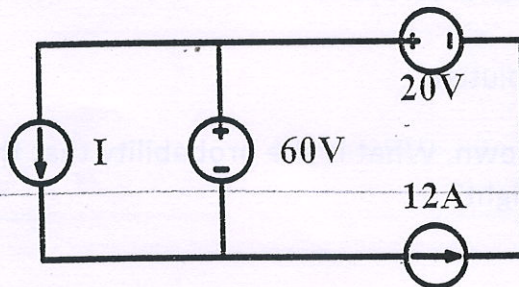
    Which of the following can be the value of the current source, I.

    A) 10A

B) 13A
C) 15A
D) 18A

16. In certain two terminal device a positive current of 10A enters at terminal B, what is the power absorbed in the device when (a) Voltage at a is 10V positive with respect to b, (b) Voltage at b is 10V positive with respect to c, (c) the voltage at a is -10V positive with respect to b.

A) 100W,100W,100W
B) -100W,100W,100W
C) -100W, -100W,100W
D) 100W,-100W,100W

17. The discrete time equation
$y(n + 1) + 0.5n\, y(n) = 0.5\, x(n + 1)$ is NOT attributable to a

A) Memoryless system
B) Time varying system
C) Linear system
D) Causal system

18. If $\delta(t)$ denotes a unit time impulse, then the Laplace transform of $\frac{d^2 \delta(t)}{dt^2}$ will be

A) 1
B) S^2
C) S
D) S^{-2}

19. The minimum number of delay elements required in realizing a digital filter with transfer function $H(z) = \frac{1+az^{-1}+bz^{-2}}{1+cz^{-1}+dz^{-2}+ez^{-3}}$ is

A) 2
B) 3
C) 4
D) 5

20. If $H_1(z) = (1 + 1.5z^{-1} - z^{-2})$ and $H_2(z) = (z^2 + 1.5z - 1)$, then

A) The poles and zeros of the function will be the same
B) The poles of the function will be identical but not zeros
C) The zeros of the function will be identical but not poles
D) Neither poles nor zeros of the two functions will be identical

21. An ideal photodiode is made of a material with a bandgap energy of 2.35 eV. It operates at 300 K and is illuminated by monochromatic light with wavelength of 400 nm. What is its maximum efficiency?

    A) 50.5%
    B) 35.8%
    C) 97.7%
    D) 75.7%

22. The H_2O solution utilised to prevent printing in the non-print areas is called the

    A) Laser solution
    B) Electro photocopy solution
    C) Fountain solution
    D) Dye solution

23. Two MOSFETs are connected in parallel to carry a total current of 20A. The drain to source voltage of one MOSFET (M_1) is 2.5V and other MOSFET (M_2) is 3V. Calculate the drain currents of M_1 and M_2 when the current sharing series resistance are each of 0.5Ω.

    A) 10.5 A & 9.5A
    B) 9.5 A & 10.5A
    C) 11.5 A & 9.5A
    D) 10.5 A & 10.5A

24. With low-power transistor packages, the base terminal is usually the:

    A) Tab end
    B) Middle
    C) Right end
    D) Stud mount

25. A $1ns$ pulse can be converted into a $1ms$ pulse by using

    A) A monostable multivibrator
    B) A bistable multivibrator
    C) An astable multivibrator
    D) A J-K flip-flop

26. Upper 3-dB cut-off of CE amplifier depends on

    A) E-B junction capacitance
    B) Capacitances of both junctions
    C) C-B junction capacitance
    D) Coupling capacitor capacitance

27. If V_{in} to the following circuit is a sine wave, the output will be
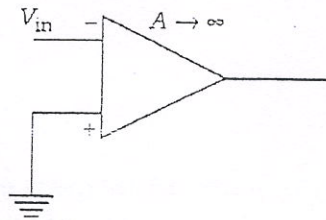
   A) Half-wave rectified sine wave
   B) Triangular wave
   C) Full-wave rectified sine wave
   D) Square wave

28. Thermal runaway is not possible in FET because as the temperature of the FET increases

   A) Mobility decreases
   B) Drain current decreases
   C) Transconductance increases
   D) Mobility increases

29. Which characteristic of IC in Digital Circuits represents a function of the switching time of a particular transistor?

   A) Fan – out
   B) Fan – in
   C) Power dissipation
   D) Propagation delay

30. What determines the output from the combinational logic circuit in Digital Electronics?

   A) Input signals from the past condition
   B) Input signals at the present moment
   C) Input signals from both past and present
   D) Input signals expected in future

31. What is the length of bits in IEEE-754 double-precision format to represent floating point numbers.

   A) 64
   B) 48
   C) 32
   D) 16

32. The Boolean expression AB + AB'+ A'C + AC is independent of the Boolean variable

    A) A
    B) B
    C) C
    D) None of these

33. With respect to 8085 Microprocessor, which of the following statements is False ?

    A) The INTR input is the only non-vectored interrupt
    B) TRAP is the only non-maskable interrupt in the 8085
    C) RST 5.5, RST 6.5, RST 7.5 are all Software Interrupts
    D) TRAP is also automatically vectored

34. Which of the following is a 16-bit register in 8085 Microprocessor?

    A) Accumulator
    B) Register B
    C) Register H
    D) Stack Pointer

35. What should be the correct sequence of ALP instructions (Instruction 1 and Instruction 2) in the given program for 8085 microprocessor which performs addition of two 8-bit numbers stored at memory locations 3000H and 3001H and stores the sum at memory location 3002H and carry at memory location 3003H.

    MVI C, 00
    LDA 3000h
    MOV B, A
    LDA 3001h
    Instruction 1
    JNC SKIP
    Instruction 2
   SKIP: STA 3002h
    MOV A, C
    STA 3003h
    HLT

    A) Instruction 1 = ADD C and Instruction 2 = INC B
    B) Instruction 1 = ADD B and Instruction 2 = INC C
    C) Instruction 1 = INC B and Instruction 2 = ADD C
    D) Instruction 1 = ADD B and Instruction 2 = INC B

36. When 8255 is used in BSR mode, port C can be used which of the following:

   A Set and Reset the individual ports
   B) Set the individual ports
   C) Program I/O ports
   D) None of the Above

37. Which of the following is the transfer function of the system given below
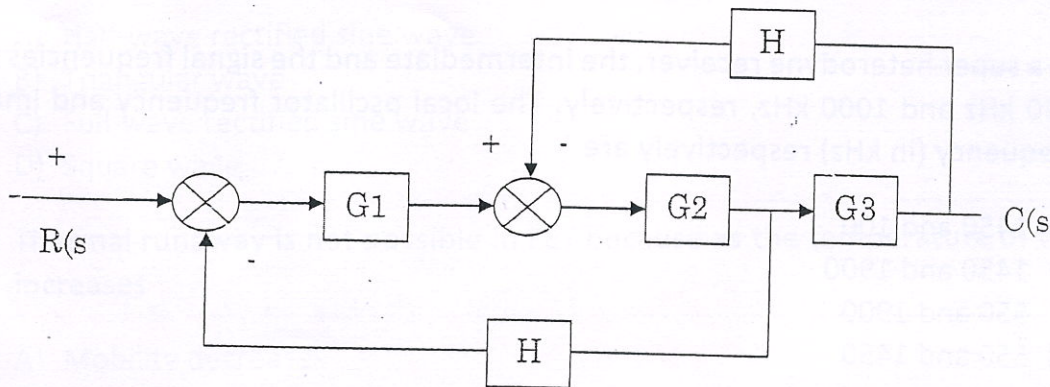
   A) G1G2G3/(1+H2G2G3+G2G1H1)
   B) G1G2G3/(1+G1G2G3H2H1)
   C) G1G2G3/(1+G1G2G3H1+G1G2G3H2)
   D) G1G2G3/(1+G1G2G3H1)

38. A system with the polynomial $s^4+5s^3+s^2+6s+5=0$ is?

   A) Unstable
   B) Marginally stable
   C) In equilibrium
   D) Stable

39. A centroid in the root locus is a point where?

   A) The branches of the root locus intersect with the imaginary axis.
   B) The branches of the root locus tend to infinity.
   C) The asymptotes cross the real axis.
   D) The branches of the root locus terminate on the real axis.

40. In a bode-plot of a unity feedback control system, the value of phase of G(jω) at the gain crossover frequency is -115 degrees. The phase margin of the system is?

   A) 115 degree
   B) -57.5 degree
   C) -65 degrees
   D) 65 degrees

41. An angle modulated signal is expressed by $f(t) = \cos(2 \times 10^8 \, \pi t + 75 \sin 2 \times 10^3 \, \pi t)$. The peak frequency deviation of the carrier is

    A) 1 kHz
    B) 75 kHz
    C) 7.5 kHz
    D) 100 MHz

42. In a super heterodyne receiver, the intermediate and the signal frequencies are 450 kHz and 1000 kHz, respectively. The local oscillator frequency and image frequency (in kHz) respectively are

    A) 1450 and 100
    B) 1450 and 1900
    C) 550 and 1900
    D) 550 and 1450

43. In FDM systems used for telephone, which modulation scheme is used

    A) AM
    B) SSB-SC
    C) DSB-SC
    D) FM

44. FM broadcast standards specify a maximum frequency deviation of 75 kHz and a maximum modulating frequency of 15 kHz. What is the modulation index for FM wave?

    A) 1/5
    B) 60
    C) 5
    D) 1125

45. Which of the following helps in maintaining the step size?

    A) Delta modulation
    B) PCM
    C) DPCM
    D) Adaptive Delta Modulation

46. What is the total block length 'n' of a Hamming code?

    A) 2^r
    B) $2^r - 1$
    C) $2^{r-1} - 1$

D) $2^r + 1$

47. Which of the following is the equivalent circuit representation of an antenna

A) Series R, L, C
B) Parallel R, L, C
C) Series R, L parallel to C
D) Parallel R, C series to L

48. The leakage current in the transmission lines is referred to as the

A) Resistance
B) Radiation
C) Conductance
D) Polarisation

49. In public key cryptography, if X adds a digital signature σ to a message M, encrypts (M, σ) and sends it to Y, where it is decrypted. Which one of the following sequence of keys is used for operations?

A) Encryption : X's private key followed by Y's private key. Decryption : X's public key followed by Y's public key.
B) Encryption : X's private key followed by Y's public key; Decryption : X's public key followed by Y's private key
C) Encryption : X's private key followed by Y's public key; Decryption : Y's private key followed by X's public key.
D) Encryption : X's public key followed by Y's private key; Decryption : Y's public key followed by X's private key.

50. Consider the following e-mail activity: 1: Send an e-mail from a mail client to mail server; 2: Download e-mail headers from mail box and retrieve mails from server to a cache; and 3: Check e-mail through a web browser. The application level protocol used for each activity in the sequence is

A) SMTP, POP, IMAP
B) SMTP, IMAP, HTTPS
C) SMTP, IMAP, POP
D) SMTP, HTTPS, IMAP

51. Range of IP Address from 224.0.0.0 to 239.255.255.255 are

A) Used for multicast packets
B) Reserved for loopback
C) Reserved for future addressing
D) Reserved for broadcast

52. The IEEE standard for WiMax technology is

    A) IEEE 802.36
    B) IEEE 806.16
    C) IEEE 806.16
    D) IEEE 802.16

53. A RAM chip has a capacity of 1024 words of 8 bits each (1K × 8). What is the number of 2 × 4 decoders with enable line required to construct a 16K × 16 RAM from 1K × 8 RAM chips?

    A) 7
    B) 6
    C) 5
    D) 4

54. Which of the following mapping is not used for mapping process in cache memory?

    A) Associative mapping
    B) Direct mapping
    C) Set-Associative mapping
    D) Segmented - page mapping

55. Arrange the following configurations for CPU in decreasing order of operating speeds; Hardwired Control, Vertical Microprogramming, Horizontal Microprogramming

    A) Hardwired Control, Horizontal Microprogramming, Vertical Microprogramming.
    B) Vertical microprogramming, Horizontal Microprogramming, Hardwired control.
    C) Horizontal Microprogramming, Vertical Microprogramming, Hardwired control.
    D) Hardwired Control, Vertical Microprogramming, Horizontal Microprogramming.

56. In case of zero-address instruction method the operands are stored in?

    A) Stack
    B) Accumulator
    C) Registers
    D) Cache

57. What will be the output of the following C program? (assume int

```
int main()
{
    char var='2';
    printf("%d ", sizeof("1"));
    printf("%d ", sizeof('2'));
    printf("%d ", sizeof(12));
    printf("%d ", sizeof(var));
}
```

A) 1 1 1 1
B) 2 1 2 1
C) 2 2 2 1
D) 2 2 2 2

58. What will be the output of the following program?

```
#include <stdio.h>
    void main()
    {
        char *MyStr = "";
        do
        {
    printf("University of Kashmir");
        } while (*MyStr);
    }
```

A) University of Kashmir is printed infinite number of times
B) Syntax Error
C) University of Kashmir is printed Once
D) Nothing is Printed

59. What will be the output of the following C program?

```
void MyFunct();
    int main()
    {
        Int i=0;
        for (i=0;i<3;i++) MyFunct ();
    }
    void MyFunct()
    {
        static int k = 20;
        printf("%d ", k);
        k++;
    }
```

A) 20 20 20

B) 20 21 21
C) 20 21 22
D) Compiler error.

60. What is the syntax of CALLOC to allocate memory to an array at runtime?

A) int *p;
   p = (int*)calloc(10, sizeof(int));

B) int *p;
   p = (int*)calloc(10*sizeof(int));

C) int *p;
   p = (int*)calloc(sizeof(int), 10);

D) int *p;
   p = (int*)calloc(10, sizeof(int *));