SRI JAGADGURU MURUGHARAJENDRA UNIVERSITY

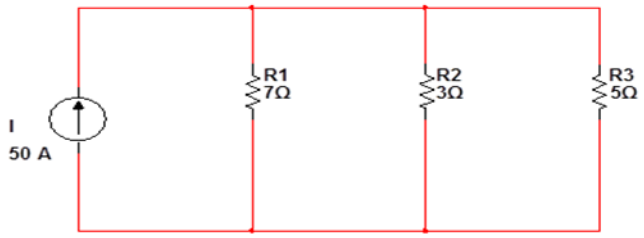
(Established under SJM University Act 2020)

Part – A
Subject Specific (Engineering Discipline)
Electrical and Electronics Engineering
Model Question Paper - 50 Marks

1. With some initial change at t = 0+, a capacitor will act as _____
   a) Open circuit
   b) Short circuit
   c) A current source
   d) A voltage source

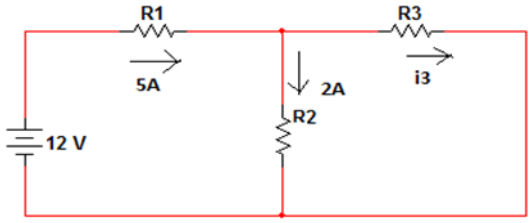
2. A constant current source supplies a electric current of 200 mA to a load of 2kΩ. When the load changed to 100Ω, the load current will be _____
   a) 9mA
   b) 4A
   c) 700mA
   d) 12A

3. Determine the current in all resistors in the circuit shown below.



   a) 2A, 4A, 11A
   b) 5A, 4.8A, 9.6A
   c) 9.3A, 20.22A, 11A
   d) 10.56A, 24.65A, 14.79A

4. Find the current i3 in the circuit shown below.



   a) 2A
   b) 1A
   c) 3A
   d) 0.5A

5. Electric field intensity (E) at point in an electric field is equal to
   a) potential gradient.
   b) (potential gradient)2.
   c) (potential gradient)1/2.
   d) (potential gradient)1/3.

6. The Coulomb law is an implication of which law?
   a) Ampere law
   b) Gauss law
   c) Biot Savart law
   d) Lenz law

7. The charge density of a electrostatic field is given by
   a) Curl of E
   b) Divergence of E
   c) Curl of D
   d) Divergence of D

8. The Gauss law for magnetic field is valid in
   a) Air
   b) Conductor
   c) Dielectric
   d) All cases

9. How many bits must each word have in one-to-four line de-multiplexer to be implemented using a memory?
   a). 8 bit
   b). 4 bits
   c). 2 bits
   d). 1 bits

10. The total amount of memory is depends upon _____
   a) The organization of memory
   b) the size of the address bus of the microprocessor
   c) the size of the decoding unit
   d) the structure of memory

11. In a transistor CE mode, VCC = +30 V. If the transistor is in cut off region, what is the value of V_{CE}?
   a) +30V
   b) - 20V
   c) 1V
   d). 0V

12. When the JFET is no longer able to control the current, this point is called
   a) Depletion region.
   b) pinch-off region
   c) saturated point.
   d) breakdown region

13. An ideal operational amplifier has
   a) Infinite output impedance
   b) Zero input impedance
   c) Infinite bandwidth
   d) All of the above

14. If the input to a comparator is a sine wave, the output is a:
   a).Ramp voltage
   b).Sine wave
   c).Rectangular wave
   d).Saw tooth wave

15. A microcontroller at-least should consist of:
   a) RAM, ROM, I/O ports and timers
   b) CPU, RAM, I/O ports and timers
   c) CPU, RAM, ROM, I/O ports and timers
   d) CPU, ROM, I/O ports and timers

16. Unlike microprocessors, microcontrollers make use of batteries because they have
   a) High power dissipation
   b) Low power consumption
   c) Low voltage consumption
   d) Low current consumption

17. The process of conversion of continuous time signal into discrete time signal is known as,
a) Sampling b) aliasing
c) Convolution d) none of the above

18. Which of the following signal is the example for deterministic signal?
a) Step b) ramp
c) Exponential d) all of the above

19. The product of two odd signals is:
a) Odd b) Even
c) Both (a) and (b) d) Zero

20) The system given by $y(n) = x(n) + 1/x(n - 1)$ is:
a) Linear b) Causal
c) Both (a) and (b) d) None of the above

21. The purpose of the transformer core is to provide _____
a) Low reluctance path b) High inductive path
c) High capacitive path d) High reluctance path

22. Primary winding of a transformer _____
a) Could either be a low voltage or high voltage winding b) is always a high voltage winding
c) Cannot be determined d) is always a low voltage winding

23. For a transformer with primary turns 400, secondary turns 100, if 20A current is flowing through primary, we will get _____
a) 800A at secondary b) 40A at secondary
c) 80A at secondary d) 5A at secondary

24. Voltage regulation of transformer is given by _____
a) V2-E2/E2 b) V2-E2/V2
c) E2-V2/V2 d) E2-V2/E2

25. The armature core of a D.C. generator is usually made of
a) Silicon steel b) Copper
c) Nonferrous material d) Cast-iron

26. A shunt generator running at 1000 r.p.m. has generated e.m.f. as 200 V. If the speed increases to 1200 r.p.m., the generated e.m.f. will be nearly
a) 150 V b) 175 V
c) 240 V d) 290 V

27. A 4 pole, 50 Hz alternator will turn at:
    a) 1500 RPM
    b) 3000 RPM
    c) 6000 RPM
    d)12000 RPM

28. Which of the following rule is used to determine the direction of rotation of D.C motor?
    a) Columb's Law
    b) Lenz's Law
    c) Fleming's Right-hand Rule
    d) Fleming's Left-hand Rule

29. Which part of the DC motor can sustain maximum temperature rise?
    a) Armature Winding
    b) Field winding
    c) Slip Ring
    d) Commutator

30. The efficiency of the DC motor at maximum power is
    a) 90%
    b) 100%
    c) Around 80%
    d) Less than 50%

31. In an induction motor, no-load the slip is generally
    a) Less than 1%
    b) 5%
    c) 2%
    d) 4%

32. A 3-phase 440 V, 50 Hz induction motor has 4% slip. The frequency of rotor current will be
    a) 50 Hz
    b) 25 Hz
    c) 5 Hz
    d) 2 Hz

33. The starting torque of a squirrel-cage induction motor is
    a) Full-load torque
    b) Slightly more than full-load torque
    c) Low
    d) Negligible

34. A 50 Hz, 3-phase induction motor has a full load speed of 1440 r.p.m. The number of poles in the motor is
    a) 2 pole
    b) 4 pole
    c) 6 pole
    d) 8 pole

35. The operating voltage of super-tension cables is up to
    a) 3.3 kV
    b) 6.6 kV
    c) 11 kV
    d) 33 kV..

36. Which of the following relays is used on long transmission lines?
    a) Impedance relay
    b) Mho's relay..
    c) Reactance relay
    d) None of the above

37. A Triac is a ……..Switch.
    a) Bidirectional
    b) Unidirectional
    c) Mechanical
    d) None of the above

38. The device that does not have the gate terminal is……

a) Triac b) FET

c) SCR d) Diac

39. The normal way to turn on a diac is by……

a) Gate Current b) Gate Voltage

c) Break over voltage d) None of the above

40. In a UJT, the P-type emitter is ……..doped

a) Lightly b) Heavily

c) Moderately d) None of the above

41. For operating power frequency voltages, a surge arrester has to be a

a) Conductor b) Non-conductor..

c) Semiconductor d) None of these

42. The spark over voltage

a) Increases with humidity..

b) Decreases with the partial pressure of water vapor in air

c) Humidity effect decreases with the size of spheres

d) Humidity is minimum for uniform field gaps

43. In large impulse generators, the spark gaps are generally

a) Sphere gaps b) Hemispherical gaps

c) Square gaps d) Either (a) or (b)

44. The critical clearing time of a fault is power system is related to

a) Reactive power limit b) Short circuit limit

c) Steady-state stability limit d) Transient stability limit

45. For complete protection of a three-phase transmission line, we require

a) Three phase and three earth fault relays b) Three phase and two earth fault relays

c) Two phase and two earth fault relays d) two phase and one earth fault relays

46. In power system, if a voltage controlled bus is treated as a load bus then which one of the following

limits would be violated?

a) Voltage b) Active power

c) Reactive power d) Phase angle

47. Gauss-Seidel iterative method can be used for solving a set of
    a) Linear differential equations only
    b) Linear algebraic equations only..
    c) Both linear and nonlinear algebraic equations
    d) Both linear and nonlinear algebraic differential equations

48. Which among these quantities are to be determined in slack bus?
    a) P and Q
    b) Q and |V|
    c) |V| and δ
    d) Q and δ

49. In load flow studies PV bus is treated as PQ bus when
    a) Phase angle become high
    b) Voltage at the bus become high
    c) Reactive power goes beyond limit..
    d) Any of the above

50. The active recovery voltage in a circuit breaker depends on:
    a) Circuit condition
    b) Armature reaction
    c) Power factor
    d) All of these.

Part –B

General Aptitude Entrance Test Question paper for Ph.D- 30 marks
Common to all branches

1) In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?

(A) 720 (B) 520

(C) 420 (D) 630

2) There are 7 non-collinear points. How many triangles can be drawn by joining these points?

(A) 45 (B) 85

(C) 35 (D) 25

3) A is 3 years older to B and 3 years younger to C, while B and D are twins. How many years older is C and D?

(A) 7 (B) 5

(C) 6 (D) 8

4) The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 kms in 4 hours, then the speed of the first train is:

(A) 78.5 km/hr (B) 52 km/hr

(C) 60 km/hr (D) 87.5 km/hr

5) Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

(A) 4:5 (B) 5:4

(C) 6:5 (D) 2:5

6) Three unbiased coins are tossed. What is the probability of getting at most two heads?

(A) 5/7 (B) 5/4

(C) 7/8 (D) 3/6

7) If an angle is its own complementary angle, then its measure is

(A) 45^0 (B) 55^0

(C) 60^0 (D) 70^0

8) The digit in unit's place of the product

(A) 2 (B) 1

(C) 0 (D) 4

9) When he

P : did not know

Q : he was nervous and

R : heard the hue and cry at midnight

S : what to do

The Proper sequence should be:

(A) RQPS (B) PQRS

(C) SPQR (D) QPRS

10) Correct the sentence "He was very tired as he is working since 6'0 clock in the morning".

(A) he was working (B) he had been working

(C) he has been working (D) he will be working

11) Pain: sedative

(A) Day: Night (B) Dengue: Mosquito

(C) Malaria: Water (D) Grief: Consolation

12) Find the missing term of the given expression: 18.834 + 818.34 -? = 618.43

(A) 217.644 (B) 218.744

(C) 217.744 (D) 217.844

13) The amount of uncertainty in a system of the symbol is called.

(A) bandwidth (B) Entropy

(C) loss (D) quantum

14) Buffering is….

(A) The process of temporarily storing the data to allow for small variation in device speeds.

(B) A method to reduce cross-talks

(C) Storage of data within the transmitting medium until the receiver is ready to receive

(D) A method to reduce the routing overhead

15) What is the name of the virus that fool a user into downloading and executing them by pretending to be useful applications?

(A) Trojan Horses (B) keylogger

(C) worm (D) ransomware

16) Which among the following is NOT a web browser?

(A) SpaceTim

(B) NeoPlanet

(C) Sputnik

(D) MeeGo

17) Which of the following comprise the software components of a computer?

(A) Programs

(B) Keyboard

(C) BIOS

(D) Memory

18) Which of the following are the features of a Spreadsheet?

(A) Layers an Lines (B) Rows and Columns

(C) Layers and Planes (D) Height and Width

19) Which of these IEEE standards represent wireless local area network?

(A) 802.11 (B) 802.3

(C) 802.12 (D) 802.1

20) Which of these protocols is used by TFTP for data transport?

(A) TCP (B) UDP

(C) Both A&B (D) None of the Above

21) The last Sunday of March, 2006 fell on which date?

Statements:

I. The first Sunday of that month fell on 5th.

II. The last day of that month was Friday.

(A) I alone is sufficient while II alone is not sufficient

(B) II alone is sufficient while I alone is not sufficient

(C) Either I or II is sufficient

(D) Neither I nor II is sufficient

22) Five persons - A, B, C, D and E are sitting in a row. Who is sitting in the middle?

Statements:

I. B is between E and C.

II. B is to the right of E

III. D is between A and E.

(A) Only I and II

(B) Only II and III

(C) Only I and III

(D) All I, II and III

23) All the trees in the park are flowering trees. Some of the trees in the park are dogwoods. All dogwoods in the park are flowering trees. If the first two statements are true, the third statement is

(A) True

(B) False

(C) Uncertain

(D) None of the above

24) 5 : 150 :: 8 : __

(A) 576 (B) 567

(C) 512 (D) 520

25) Find the number of parallelograms.

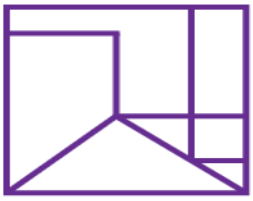
(A) 8

(B) 10

(C) 15

(D) None of These

26) How many triangles are there in the following figure?



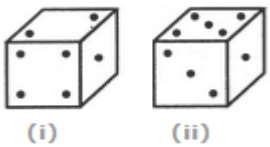
(A) 2

(B) 3

(C) 4

(D) More than 4

27) Two positions of a cube are shown below. When the number 4 will be at the bottom, then which number will be at the top?



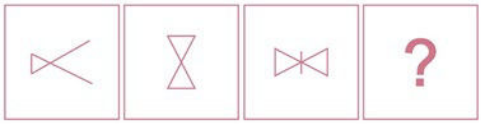
(A) 3

(B) 5

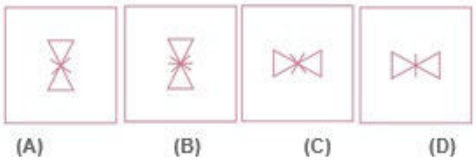
(C) 6

(D) None of these

28) Questions Figures



Answer figures



(A) A

(B) C

(C) D

(D) B

29) A man is facing west. He turns 45 degrees in the clockwise direction and then another 180 degrees in the same direction and then 270 degrees in the anticlockwise direction. Find which direction he is facing now?

(A) South

(B) West

(C) South West

(D) East

30) Statement 1: Pens cost more than pencils. Statement 2: Pens cost less than erasers. Statement 3: Erasers cost more than pencils and pens. If the first two statements are true, the third Statement is

(A) True

(B) False

(C) Uncertain

(D) Cannot be determined

Part –C

Mathematics Entrance Test Question paper for Ph.D- 20 Marks
Common to all branches

1. For the linear transformation, $X = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 1 & 2 \\ 1 & 0 & -2 \end{bmatrix}$Y, find the Y co-ordinates for (1, 2, -1) in X.
   a) (0, -2, 0)
   b) (-1, 3, 1)
   c) (-1, -2, 0)
   d) (-1, 3, 0)
2. Which of the following statements is true about the regression line?
   a) A regression line is also known as the line of the average relationship
   b) A regression line is also known as the estimating equation
   c) A regression line is also known as the prediction equation
   d) All of the above
3. If the values of two variables move in the same direction, _____
   a) The correlation is said to be non-linear
   b) The correlation is said to be linear
   c) The correlation is said to be negative
   d) The correlation is said to be positive
4. Which of the following are types of correlation?
   a) Positive and Negative
   b) Simple, Partial and Multiple
   c) Linear and Nonlinear
   d) All of the above
5. A is 5×5 matrix, all of whose entries are 1, then
   a) A is not diagonalizable
   b) A is idempotent
   c) A is nilpotent
   d) The minimal polynomial and the characteristics polynomial of A are not equal.
6. $T : R^3 \to R^3$ such that $T(a, b, c) = (0, a, b)$, for $(a, b, c) \in R^3$. Then $T + I$ is a zero of the polynomial:
   a) t
   b) t^2
   c) t^3
   d) None of above

7. $T : P_2(R) \to P_3(R)$ such that $T(f(x)) = 2f'(x) + 3\int_0^x f(t)dt$. Then rank of T is

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

8. The minimal polynomial of $\begin{pmatrix} 2 & 1 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 5 \end{pmatrix}$ is

a) $(x-2)$

b) $(x-2)(x-5)$

c) $(x-2)^2(x-5)$

d) $(x-2)^3(x-5)$

9. Number of linearly independent Eigen vectors of $\begin{pmatrix} 2 & 2 & 0 & 0 \\ 2 & 1 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 1 & 4 \end{pmatrix}$ is

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

10. A is a 4-square matrix and $A^5 = 0$. Then

a) $A^4 = I$ b) $A^4 = A$ c) $A^4 = 0$ d) $A^4 = -I$

11. Solve the following equations by Gauss Elimination Method.

x+4y-z = -5, x+y-6z = -12, 3x-y-z = 4

a) x = 1.64791, y = 1.14085, z = 2.08451

b) x = 1.65791, y = 1.14185, z = 2.08441

c) x = 1.64691, y = 1.14095, z = 2.08461

d) x = 1.64491, y = 1.15085, z = 2.09451

12. Find the values of x, y, z in the following system of equations by gauss Elimination Method. 2x + y – 3z = -10, -2y + z = -2, z = 6

a) 2, 4, 6

b) 2, 7, 6

c) 3, 4, 6

d) 2, 4, 5

13. In Gauss Jordan method which of the following transformations are allowed?

a) Diagonal transformation

b) Column transformation

c) Row transformation

d) Square transformation

14. Solve the equations using Gauss Jordan method.

x + 2y + 6z = 15, 3x + 4y + z = 16, 6x - y - z = 20

a) $x = 3.735, y = 0.795, z = 1.612$

b) $x = 3.735, y = 3.735, z = 1.612$

c) $x = 3.735, y = 1.612, z = 3.735$

d) $x = 1.612, y = 0.795, z = 3.735$

15. Gauss Seidal method is also termed as a method of _____

a) Successive displacement

b) Eliminations

c) False positions

d) Iterations

16. Which of the following is not Dirichlet's condition for the Fourier series expansion?

a) f(x) is periodic, single valued, finite

b) f(x) has finite number of discontinuities in only one period

c) f(x) has finite number of maxima and minima

d) f(x) is a periodic, single valued, finite

17. If the function f(x) is odd, then which of the only coefficient is present?

a) a_n

b) b_n

c) a_0

d) Everything is present

18. Find b_n if the function $f(x) = x^2$.

a) finite value

b) infinite value

c) zero

d) can't be found

19. What is the coefficient of x^{101729} in the series expansion of cos(sin(x))?

a) 0 b) $1/101729!$ c) $-1/101729!$ d) 1

20. The angle between Radius vector r=a(1-cosθ)and tangent to the curve is ∅ given by _____

a) ∅=π/ 2 b) ∅=π c) ∅=−π/2 d) ∅=0