CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐ **18MAT31**

Third Semester B.E. Degree Examination, June/July 2023
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Find $L\left(\dfrac{\cos at - \cos bt}{t}\right)$. **(06 Marks)**

b. Express the function in terms of unit step function and hence find Laplace transform of

$$f(t) = \begin{cases} \sin t & 0 < t < \frac{\pi}{2} \\ \cos t & \frac{\pi}{2} < t < \pi \end{cases}$$ **(07 Marks)**

c. Solve $y''(t) + 4y'(t) + 3y(t) = e^t$, $y(0) = y'(0) = 1$ by using Laplace transform method. **(07 Marks)**

OR

2 a. Find : (i) $L^{-1}\left(\log\left(\dfrac{s+b}{s+a}\right)\right)$ (ii) $L^{-1}\left(\dfrac{s+3}{s^2 - 4s + 13}\right)$ **(06 Marks)**

b. Find $L^{-1}\left(\dfrac{s}{(s^2 + a^2)^2}\right)$ by using convolution theorem. **(07 Marks)**

c. Given $f(t) = \begin{cases} t & 0 < t < a \\ 2a - t & a < t < 2a \end{cases}$

where $f(t) = f(t + 2a)$ then show that $L(f(t)) = \dfrac{1}{s^2}\tan h\left(\dfrac{as}{2}\right)$ **(07 Marks)**

Module-2

3 a. Obtain Fourier series for $f(x) = \dfrac{\pi - x}{2}$, $0 < x < 2\pi$. **(06 Marks)**

b. Find Fourier series for $f(x) = 2x - x^2$, $0 < x < 2$. **(07 Marks)**

c. Find half range Fourier cosine series for

$$f(x) = \begin{cases} x, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$$ **(07 Marks)**

OR

4 a. Find Fourier series for $f(x) = |x|$, $-\pi < x < \pi$. **(06 Marks)**

b. Obtain Fourier series for $f(x) = \begin{cases} 0 & -2 < x < 0 \\ 1 & 0 < x < 2 \end{cases}$. **(07 Marks)**

c. Find the Fourier series upto first harmonic from the following table:

x	0	1	2	3	4	5
y = f(x)	4	8	15	7	6	2

(07 Marks)

Module-3

5 a. Find Fourier transform of f(x), given:

$$f(x) = \begin{cases} 1, & |x| \le 1 \\ 0, & |x| > 1 \end{cases} \text{ and hence deduce that } \int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}.$$ **(06 Marks)**

b. Find the Fourier cosine transform of

$$f(x) = \begin{cases} 4x & 0 < x < 1 \\ 4 - x & 1 < x < 4 \\ 0 & x > 4 \end{cases}$$ **(07 Marks)**

c. Solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$, given $u_0 = 0$, $u_1 = 1$ using Z - transform. **(07 Marks)**

OR

6 a. Find the Fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2} dx$. **(06 Marks)**

b. Find Z-transform of $\cos n\theta$ and $a^n \cos n\theta$. **(07 Marks)**

c. Obtain the inverse Z-transform of $\dfrac{2z^2 + 3z}{(z+2)(z-4)}$. **(07 Marks)**

Module-4

7 a. Find the value of y at x = 0.1 and x = 0.2 given $\dfrac{dy}{dx} = x^2 y - 1$, y(0) = 1 by using Taylor's series method. **(06 Marks)**

b. Compute y(0.1), given $\dfrac{dy}{dx} = \dfrac{y - x}{y + x}$, y(0) = 1 taking h = 0.1, by using Runge-Kutta 4th order method. **(07 Marks)**

c. Find the value of y at x = 0.4, given $\dfrac{dy}{dx} = 2e^x - y$ with initial conditions y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.04, y(0.3) = 2.09 by using Milne's predictor and corrector method. **(07 Marks)**

OR

8 a. Using modified Euler's method, find the value of y at x = 0.1, given $\dfrac{dy}{dx} = -xy^2$, y(0) = 2 taking h = 0.1. **(06 Marks)**

b. Solve $\dfrac{dy}{dx} = 3e^x + 2y$, y(0) = 0 at x = 0.1 taking h = 0.1, by using Runge-Kutta 4th order method. **(07 Marks)**

c. Find the value y at x = 0.8 given $\dfrac{dy}{dx} = x - y^2$ and

x	0	0.2	0.4	0.6
y	0	0.0200	0.0795	0.1762

By using Adam's Bashforth predictor and corrector method. **(07 Marks)**

Module-5

9 a. Solve $\dfrac{d^2y}{dx^2} = x\left(\dfrac{dy}{dx}\right)^2 - y^2$ for x = 0.2 given x = 0, y = 1 and $\dfrac{dy}{dx} = 0$ by using Runge-Kutta method. **(07 Marks)**

b. Derive Euler's equation in the standard form $\dfrac{\partial f}{\partial y} - \dfrac{d}{dx}\left(\dfrac{\partial f}{\partial y'}\right) = 0$. **(06 Marks)**

c. Find the extremal of the function $\displaystyle\int_0^1 [(y')^2 + 12xy]dx$ with y(0) = 0 and y(1) = 1. **(07 Marks)**

OR

10 a. Find the value of y at x = 0.8, given $\dfrac{d^2y}{dx^2} = 2y\dfrac{dy}{dx}$ and

x	0	0.2	0.4	0.6
y	1	0.2027	0.4228	0.6841
y′	1	1.041	1.179	1.468

by using Milne's method. **(07 Marks)**

b. Prove that the shortest between two points in a plane is a straight line. **(06 Marks)**

c. Find the curve on which the functional $\displaystyle\int_0^1 [x + y + (y')^2]dx$ with y(0) = 1, y(1) = 2. **(07 Marks)**

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Third Semester B.E. Degree Examination, June/July 2023
Additional Mathematics - I

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Express the complex number $\dfrac{(3+i)(1-3i)}{2+i}$ in the form x + iy. Also find its magnitude. **(06 Marks)**

   b. Find the cube roots of ℓ - i and represent them in an argand plane. **(07 Marks)**

   c. If $\vec{a} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\vec{b} = 8\hat{i} - 4\hat{j} + \hat{k}$ then show that $\vec{a}$ is perpendicular to $\vec{b}$, also find $|\vec{a} \times \vec{b}|$. **(07 Marks)**

OR

2 a. Find the modulus and amplitude of $1 - \cos\alpha + i\sin\alpha$. **(06 Marks)**

   b. If $\vec{a} = \hat{i} + \hat{j} - \hat{k}$; $\vec{b} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{c} = 3\hat{i} - \hat{j} - \hat{k}$, find
   i) $\vec{a} \cdot (\vec{b} \times \vec{c})$ ii) $\vec{b} \times (\vec{a} \times \vec{c})$. **(07 Marks)**

   c. Prove that $[\vec{a} \times \vec{b}, \ \vec{b} \times \vec{c}, \ \vec{c} \times \vec{a}] = [\vec{a}\ \vec{b}\ \vec{c}]^2$. **(07 Marks)**

Module-2

3 a. Using Maclaurin's series, prove that $\sqrt{1 + \sin 2x} = 1 + x - \dfrac{x^2}{2} - \dfrac{x^3}{6} + \dfrac{x^4}{24} - - - -$. **(06 Marks)**

   b. If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x - y}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \sin 2u$. **(07 Marks)**

   c. If $u = 1 - x$, $v = x(1-y)$, $w = xy(1-z)$, find $\dfrac{\partial(u, v, w)}{\partial(x, y, z)}$. **(07 Marks)**

OR

4 a. Obtain the Maclaurin's expansion of the function $\log(1 + e^x)$. **(06 Marks)**

   b. If $u = f(x-y, y-z, z-x)$, Prove that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = 0$. **(07 Marks)**

   c. If $u = x + y + z$, $w = y + z$, $z = uvw$, find $\dfrac{\partial(x, y, z)}{\partial(u, v, w)}$. **(07 Marks)**

Module-3

5 a. A particle moves along a curve C with parametric equations $x = t - \dfrac{t^3}{3}$, $y = t^2$ and $z = t + \dfrac{t^3}{3}$, where t is the time. Find the velocity and acceleration and any time t and also find their magnitudes at t = 3. **(06 Marks)**

   b. Find div $\vec{F}$ and Curl $\vec{F}$, where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. **(07 Marks)**

   c. Find the directional derivative of $\phi = x^2 yz^3$ at (1, 1, 1) in the direction of $\hat{i} + \hat{j} + 2\hat{k}$. **(07 Marks)**

OR

6 a. Show that the vector field $\vec{F} = yz\hat{i} + xz\hat{j} + xy\hat{k}$ is solenoidal vector field. **(06 Marks)**

   b. If $\vec{F} = (x + y + 1)\hat{i} + \hat{j} - (x + y)\hat{k}$, show that $\vec{F} \cdot \text{curl}\ \vec{F} = 0$. **(07 Marks)**

   c. Find the constants a, b, c such that $\vec{F} = (x + y + az)\hat{i} + (x + cy + 2z)\hat{k} + (bx + 2y - z)\hat{j}$ is irrotational. **(07 Marks)**

Module-4

7 a. Obtain the Reduction formula for $\int_0^{\pi/2} \cos^n x\ dx$. **(06 Marks)**

   b. Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2)\ dy\ dx$. **(07 Marks)**

   c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z)\ dx\ dy\ dz$. **(07 Marks)**

OR

8 a. Evaluate $\int_1^2 \int_0^{3-y} xy\ dx\ dy$. **(06 Marks)**

   b. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}\ dx\ dy\ dz$. **(07 Marks)**

   c. Obtain the Reduction formula $\int \sin^m x \cos^n x\ dx$. **(07 Marks)**

Module-5

9 a. Solve : $(x^2 + y)\ dx + (y^3 + x)\ dy = 0$. **(06 Marks)**

   b. Solve : $x \log x \dfrac{dy}{dx} + y = 2 \log x$. **(07 Marks)**

   c. Solve : $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. **(07 Marks)**

OR

10 a. Solve : $y\ e^y\ dx = (y^3 + 2x\ e^y)\ dy$. **(06 Marks)**

   b. Solve : $(x^2 - y^2)\ dx = 2xy\ dy$. **(07 Marks)**

   c. Solve : $[1 + (x + y) \tan y] \dfrac{dy}{dx} + 1 = 0$. **(07 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **18EC32**

Third Semester B.E. Degree Examination, June/July 2023
Network Theory

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Reduce the network shown in Fig. Q1 (a) to a single voltage source in series with a resistance between the terminals A and B.

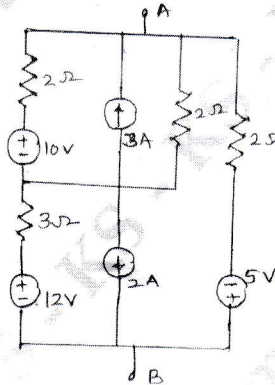Fig. Q1 (a)   **(10 Marks)**

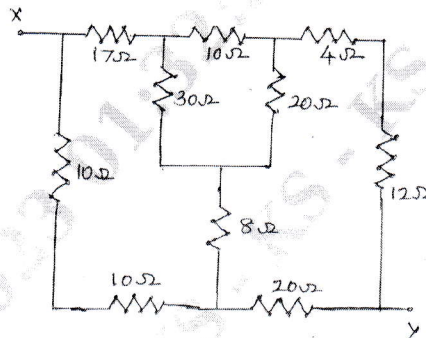   b.   Determine the equivalent resistance between X, Y in the network shown in Fig. Q1 (b) using star-delta conversion.

Fig. Q1 (b)   **(10 Marks)**

OR

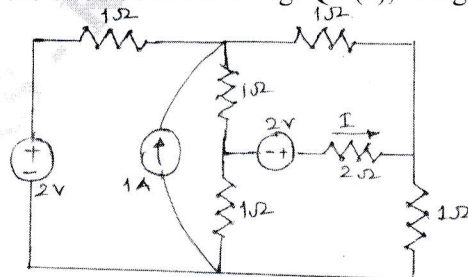2   a.   Determine the current I in the circuit shown in Fig. Q2 (a), using mesh analysis.

Fig. Q2 (a)   **(10 Marks)**

b. Determine the power supplied to the circuit shown in Fig. Q2 (b) by source $50\angle0°$ V. And also find the power dissipated by each resistor in the circuit, using nodal analysis.
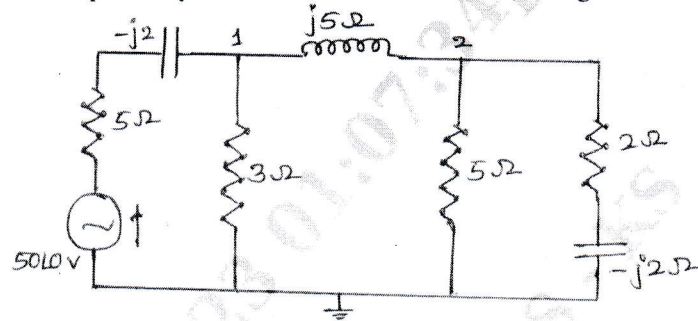

Fig. Q2 (b)   (10 Marks)

Module-2

3 a. In the network shown in Fig. Q3 (a), two voltage sources act on the load impedance connected to the terminals A, B. If this load is variable in both reactance and resistance, what load Z_L will receive maximum power? What is the value of the maximum power?
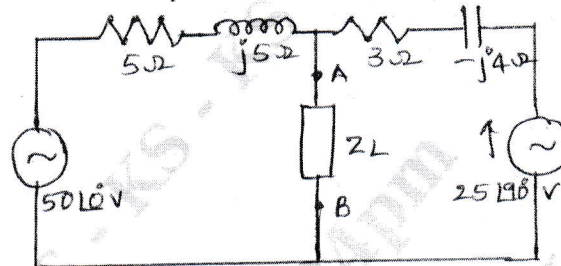

Fig. Q3 (a)   (10 Marks)

b. Find the output voltage E_o for the circuit shown in Fig. Q3 (b) using Millman's theorem.
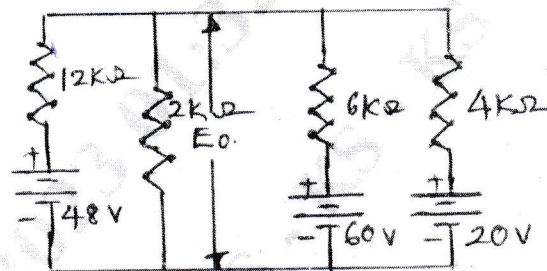

Fig. Q3 (b)   (10 Marks)

OR

4 a. Obtain Thevenin's and Norton's equivalent for the network shown in Fig. Q4 (a).
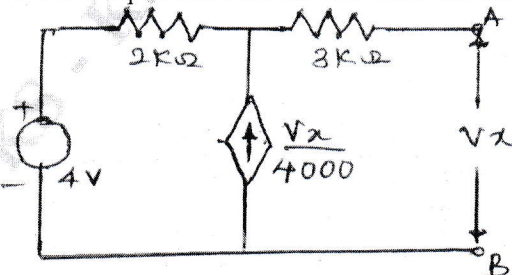

Fig. Q4 (a)   (10 Marks)

b. Determine the current through an ammeter having internal resistance of 10 Ω in the network shown in Fig. Q4 (b) using superposition theorem. Verify the answer using loop current analysis.
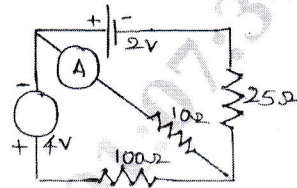

Fig. Q4 (b)   (10 Marks)

Module-3

5 a. In the network shown in Fig. Q5 (a), steady state has been reached with the switch K on position A. The switch is moved to position B at t = 0. Determine at $t(0^+)$ the values of i, $\dfrac{di}{dt}$ and $\dfrac{d^2i}{dt^2}$.
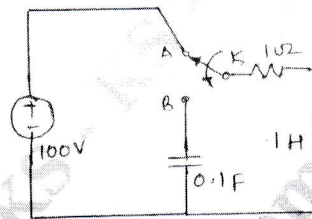
Fig. Q5 (a)   (10 Marks)

b. Explain the importance of study of initial conditions in electric circuit analysis and also explain the behavior of R, L and C elements for transients.   (10 Marks)

OR

6 a. In RLC series circuit shown in Fig. Q6 (a), find $i(0^+)$, $\dfrac{di}{dt}(0^+)$ and $\dfrac{d^2i}{dt^2}(0^+)$, if switch is closed at t = 0.
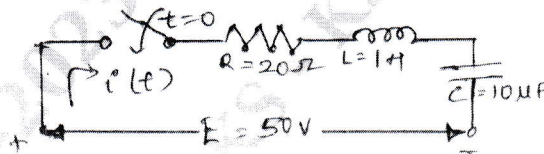
Fig. Q6 (a)   (10 Marks)

b. In the circuit shown in Fig. Q6 (b) switch K is changed from position 1 to 2 at t = 0, having been reached steady state before switching. Evaluate, i, $\dfrac{di}{dt}$ and $\dfrac{d^2i}{dt^2}$ at $t = 0^+$.
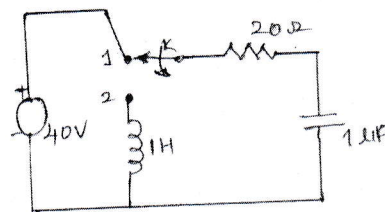
Fig. Q6 (b)   (10 Marks)
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Module-4

7 a. State and prove,
   (i) Initial value theorem.
   (ii) Final value theorem. (10 Marks)
   b. Find the Laplace transforms of following functions :
   (i) Unit step function.
   (ii) $f(t) = e^{at}$ (10 Marks)

OR

8 a. Assuming that the staircase wave of Fig. Q8 (a) is not repeated, find its Laplace transform. If this voltage wave is applied to a RL series circuit, with R = 1 Ω and L = 1 H, find the current i(t).
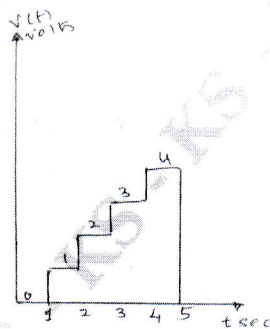
Fig. Q8 (a) (10 Marks)

   b. The network shown in Fig. Q8 (b) was in steady state before t = 0. The switch is opened at t = 0. Find i(t) for t > 0, using Laplace transform.
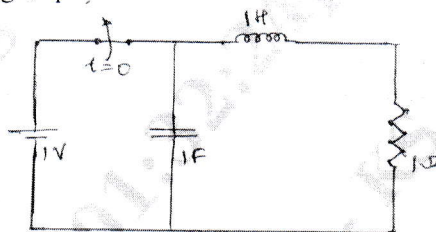
Fig. Q8 (b) (10 Marks)

Module-5

9 a. Define the following terms with reference to resonance circuit:
   (i) Resonance
   (ii) Q-factor
   (iii) Selectivity
   (iv) Band width (06 Marks)
   b. Determine R_L and R_C for which the circuit shown in Fig. Q9 (b) resonates at all frequencies.
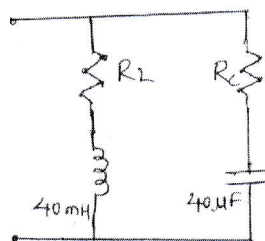
Fig. Q9 (b) (04 Marks)

c. Obtain the H-parameters for the network shown in Fig. Q9 (c).
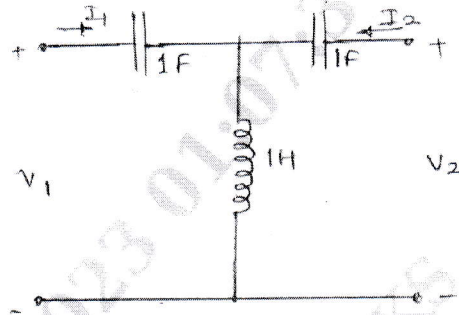
Fig. Q9 (c)   (10 Marks)

OR

10   a. Obtain ABCD parameters interms of Z-parameters and hence show that $AD - BC = 1$.

(10 Marks)

b. A series RLC circuit has $R = 10\ \Omega$, $L = 0.0\ H$ and $C = 0.01\ \mu F$ and it is connected across 10 mV supply.

Calculate (i) f_0 (ii) Q_0 (iii) Bandwidth   (iv) f_1 and f_2 (v) I_0 (10 Marks)

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USN ☐☐☐☐☐☐☐☐☐☐ **18EC33**

Third Semester B.E. Degree Examination, June/July 2023
Electronic Devices

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Explain direct and indirect semiconductors with neat sketches and giving examples.
                                                                       (06 Marks)

    b.   Define:
        i)   Intrinsic semiconductor
        ii)   Amphoteric Impurity
        iii)   Electron mobility
        iv)   Hall Effect.   **(08 Marks)**

    c.   A silicon is doped with 10^{17} Arsenic atoms/cm^3. What is the equilibrium hole concentration p_o at 300°K? Sketch the resulting band diagram showing where is E_F relative to Ei. Assume $ni^2 = 2.25 \times 10^{20}$.   **(06 Marks)**

OR

2   a.   Explain effects of temperature and doping on mobility.   **(08 Marks)**

    b.   Explain the formation of extrinsic semi conductor with covalent bonding model diagram.   **(06 Marks)**

    c.   Consider a semiconductor bar with W = 0.1mm, t = 10mm and L = 5mm. For B_2 = 10kG in the direction shown in Fig.Q.2(c) and a current of 1mA, V_{AB} = -2mV, and V_{CD} = 100mV. Find the type of semiconductor carriers and mobility of the majority carrier. Given $1KG = 10^{-5}$wb/cm^2.   **(06 Marks)**
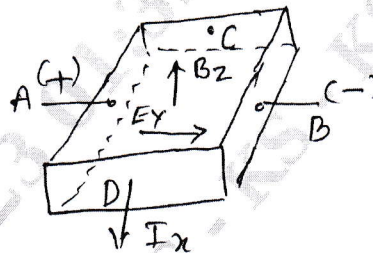

Fig.Q.2(c)

Module-2

3   a.   Differentiate Zener and Avalanche breakdown.   **(06 Marks)**

    b.   Explain the requirement for the design of rectifier diode.   **(06 Marks)**

    c.   Explain the working of solar cell and mention the applications of LED.   **(08 Marks)**

OR

4   a.   Mention the applications of photo diode.   **(06 Marks)**

    b.   Explain the current and voltage in an illuminated junction by deriving the expression for V_{OC}.   **(08 Marks)**

    c.   A solar cell has a short circuit current of 100mA, and an open circuited voltage of 0.8V under full solar illumination. What is the power delivered by the cell which is having a fill factor of 0.7?   **(06 Marks)**

Module-3

5 a. Derive the relationship between α and β of a transistor. (06 Marks)

b. Explain switching action of transistor. (08 Marks)

c. A symmetrical p^+np^- bipolar transistor has the following properties:

	Emitter	Base
$A = 10^{-4}$ cm^2	$N_a = 10^{17}$	$N_d = 10^{15}$ cm^{-3}
$W_b = 1\mu m$	$t_n = 0.1\mu s$	$t_p = 10\mu s$
	$\mu_p = 200$	$\mu_n = 1300$cm^2 v.s
	$\mu_n = 700$	$\mu_p = 450$cm^2 v.s

Assume $n_i = 1.5 \times 10^{10}$/cm^3. Find base current. (06 Marks)

OR

6 a. Explain the working of pnp transistor with necessary figures. (08 Marks)

b. Explain BJT fabrication process. (06 Marks)

c. Explain drift in the base region. (06 Marks)

Module-4

7 a. Explain n-channel PNJFET operation with its characteristics. (10 Marks)

b. Mention the difference between JFET and MOSFET. (04 Marks)

c. Explain the MOS structure with aid of parallel plate capacitor. (06 Marks)

OR

8 a. Explain the operation of p-channel depletion and enhancement type MOSFET with neat sketches. (10 Marks)

b. Mention the applications of MOSFET. (04 Marks)

c. Draw and explain small signal equivalent circuit of a n-channel PNJFET. (06 Marks)

Module-5

9 a. Mention the advantages of IC's over discrete components. (06 Marks)

b. Explain photolithography process. (06 Marks)

c. Explain the working of CMOS inverter with neat diagram. (08 Marks)

OR

10 a. Explain thermal oxidation and diffusion process of the semiconductor fabrication. (08 Marks)

b. Explain integration of other circuit elements. (08 Marks)

c. Define: i) Etching   ii) Metallization. (04 Marks)

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Third Semester B.E. Degree Examination, June/July 2023
Digital System Design

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. A switching circuit has four inputs A, B, C and D and one output F. Inputs A and B represent the bits of number N_1, and C and D represent the bits of number N_2. The output is to be logic 1 only if the product $N_1 \times N_2$ is lesser than 2. Obtain the minterm and maxterm expressions in decimal notation for the output F. **(06 Marks)**

   b. Simplify $f(A, B, C, D) = \Sigma m (1, 2, 3, 5, 6, 7, 9, 10, 11)$ using K-map to get the minimum SOP expression, as well as minimum POS expression. Among the two expressions, find out which one requires lesser number of gates for implementation? **(10 Marks)**

   c. Convert $X = \bar{a} b + bc$ to canonical SOP form. **(04 Marks)**

OR

2 a. Four chairs A, B, C and D are placed in row. Each chair may be occupied (logic 1) or not occupied (logic 0). The output Y should go high only when adjacent chairs are occupied. Draw the truth table, obtain the maxterm expression and simplify the expression using K-map to get minimum POS expression. **(08 Marks)**

   b. Simplify the function $f(A, B, C, D) = \Sigma m(9, 12, 13, 15) + \Sigma d(1, 4, 5, 7, 8, 11, 14)$ using QM technique. Identify the essential prime implicant, if any, and obtain at least two solutions. **(12 Marks)**

Module-2

3 a. Give the truth table of full adder, derive the expressions for the outputs, and design a logic circuit for the same using minimum number of 2-input NAND gates only. **(10 Marks)**

   b. Draw the block diagram of 4-bit look ahead carry adder. Derive the expressions for the carry outputs using propagate and generate inputs. **(10 Marks)**

OR

4 a. Implement full-subtractor circuit using one 3:8 decoder having active-low outputs. **(06 Marks)**

   b. Implement the Boolean function $f(w, x, y, z) = \Sigma m(3, 5, 6, 8, 11, 13, 14, 15)$ using one 4 to 1 multiplexer and additional gates. Connect w and x inputs to select lines. **(06 Marks)**

   c. Explain what is FPGA? Show how a 6-varibale function can be implemented using 4-input function generators and additional hardware and implemented as FPGA. **(08 Marks)**

Module-3

5 a. Show how an SR latch can be used for switch debouncing. Explain with waveforms. **(06 Marks)**

   b. Bring out the differences between gated SR latch and master-slave SR flip-flop. Draw the circuits of both. **(06 Marks)**

   c. Draw the block diagram of 3-bit bidirectional shift register capable of serial and parallel load and explain its operation. **(08 Marks)**

1 of 2

OR

6 a. Draw the Q and $\overline{Q}$ output waveforms if the waveforms given in Fig.Q.6(a) is fed to a positive edge-triggered JK flip flop. **(04 Marks)**

Fig.Q.6(a)

b. Using K-map simplification, obtain the characteristic equations of SR, JK and T flip-flops, and hence construct SR, JK and T flip flops using edge-triggered D flip flop. **(10 Marks)**

c. Construct a ripple counter that counts from 111 to 000 and repeats, using negative edge-triggered toggle flip-flops. Draw the waveforms showing one complete count cycle. **(06 Marks)**

Module-4

7 a. Design a synchronous counter using JK flip flops, having the count sequence: 0, 1, 3, 5, 7 and repeats. The counter should be self-correcting if in case it goes into an unused state. **(12 Marks)**

b. Construct the transition table, state table and state diagram for the sequential circuit shown in Fig.Q.7(b). **(08 Marks)**

Fig.Q.7(b)
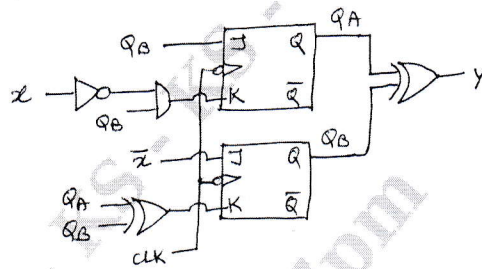
OR

8 a. Design a sequential circuit using JK flip flops for the state diagram shown in Fig.Q.8(a). **(12 Marks)**

Fig.Q.8(a)
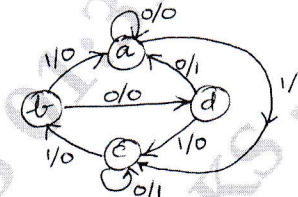
b. With block diagrams, explain what are Moore and Mealy models of sequential circuits. Explain with one simple example each. What difference do you notice in drawing the state diagrams for both the models? **(08 Marks)**

Module-5

9 a. Design a Mealy sequential circuit with one input and one output, using D flip flops, to detect the sequence 10110 with overlap. **(14 Marks)**

b. Draw the block diagram of a serial adder capable of adding two 4-bit numbers. Illustrate its working with an example. **(06 Marks)**

OR

10 a. Obtain the state diagram, state table and reduced state table for a 4-bit BCD to excess-3 sequential circuit with one input and one output. **(12 Marks)**

b. Draw the block diagram of a serial multiplier that can multiply two 4-bit unsigned numbers. Illustrate by multiplying the numbers 1011 and 1101. **(08 Marks)**

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USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **18EC35**

Third Semester B.E. Degree Examination, June/July 2023
Computer Organization and Architecture

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Explain with a neat diagram, the basic Operational concept of a Computer.   (08 Marks)
    b. Explain how to measure the performance of a Computer.   (06 Marks)
    c. Write a note on Types of Computers.   (06 Marks)

OR

2   a. Explain IEEE standard for Floating point number.   (08 Marks)
    b. Explain the methods to improve the performance of Computer.   (08 Marks)
    c. Write a note on Processor clock.   (04 Marks)

Module-2

3   a. What is an Addressing Mode? Explain any four addressing mode with an example.
                                                                        (10 Marks)
    b. With an example, explain the concept of BIG – ENDIAN and LITTLE – ENDIAN Assignment of Memory Storage.   (10 Marks)

OR

4   a. Explain the concept of Stacks and Queues.   (08 Marks)
    b. What are Assembler directives? Explain the various assembler directives with examples.
                                                                        (08 Marks)
    c. With an example, explain Shift and Rotate Instructions.   (04 Marks)

Module-3

5   a. Define Interrupt. Explain Daisy chain and Priority Structure methods of handling interrupts from multiple devices.   (10 Marks)
    b. With a neat diagram, explain DMA Controller Operation with its Interface Registers.
                                                                        (10 Marks)

OR

6   a. Define Exceptions. Explain the different types of Exceptions.   (06 Marks)
    b. Explain the Tree structure of USB with Split bus operation.   (06 Marks)
    c. With a neat diagram, explain Centralized and distributed bus arbitration schemes.   (08 Marks)

Module-4

7   a. Define Cache Memory. Explain various types with neat diagram.   (08 Marks)
    b. Write a note on Classification of a Memory Structure.   (04 Marks)
    c. Define the following terms :
       i)   Memory Latency   ii)   Memory Bandwidth
       iii) Memory Access time   iv)   Memory Cycle time.   (08 Marks)

OR

8 a. Explain with block diagram, the Operation of SD RAM.   **(10 Marks)**
     b. Define ROM Point out and explain various types of ROM's.   **(10 Marks)**

Module-5

9 a. Explain with neat diagram, Single Bus Organisation of data path inside a processor.
                        (10 Marks)
     b. What are the actions required to execute a Complete Instruction Add(R3), R1?   **(10 Marks)**

OR

10 a. Explain Hardwired Control Unit Organisation.   **(10 Marks)**
      b. Explain Multiple bus / three bus Organization, with a neat diagram.   **(10 Marks)**

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18EC36

Third Semester B.E. Degree Examination, June/July 2023
Power Electronics and Instrumentation

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What is Power Electronic Converter System? Mention any four application of such system. **(04 Marks)**
   b. Using two transistor model, explain the operation of SCR and derive anode current and gate relation. **(08 Marks)**
   c. Explain different types of Power Electronic Converter Systems. Draw their Input / Output characteristics. **(08 Marks)**

OR

2 a. Mention different Thyristor turn – ON method. Mention the advantages of gate triggering. **(04 Marks)**
   b. Explain the operation of Self Commutation by LC Circuit {Class – B} with relevant circuit and waveforms. **(08 Marks)**
   c. With a neat circuit and waveforms, explain the operation of RC Full wave firing circuit. **(08 Marks)**

Module-2

3 a. Explain the effect of Free Wheeling Diode used in Controlled Rectifier. **(04 Marks)**
   b. With a neat circuit diagram and waveform, explain the principle operation of Step – down Chopper. Derive the expression for average and r.m.s output voltage. **(08 Marks)**
   c. A single phase half wave controlled rectifier has a purely resistive load of R and the delay angle is $\alpha = \pi/3$. Determine Efficiency, Form Factor , Transformer Utilization Factor and Ripple Factor. **(08 Marks)**

OR

4 a. A Step – up Chopper is used to deliver load voltage of 500V from a 220V d.c source. If the blocking period of the thyristor is 80μF, compute the required pulse width. **(04 Marks)**
   b. With a neat circuit diagram and wave form, explain the operation of Step Up / Down Choppers. Derive the expression for average output voltage. **(08 Marks)**
   c. Explain with the help of neat circuit diagram, the operation of a single phase full converter with resistive load. Draw the associated waveform. Derive expression for r.m.s and average output voltage. **(08 Marks)**

Module-3

5 a. Define Inverters. Classify the inverts according to the input source. **(04 Marks)**
   b. What are Static Errors? Explain them in details. **(08 Marks)**
   c. Explain Multirange Ammeter and Multirange Voltmeter. **(08 Marks)**

OR

6 a. Define the terms : i) Measurement   ii) Resolution   iii) Precision   iv) Sensitivity.
                                                                                                      (04 Marks)
   b. Explain the Operation of Single Phase Half Bridge Inverter connected to resistive load with the help of circuit diagram and waveforms. Derive the r.m.s output voltage.   **(08 Marks)**
   c. Explain with a neat circuit and waveforms, the Operation of Flyback Converters.   **(08 Marks)**

Module-4

7 a. The wheat stone's bridge consists of following parameters $R_1 = 10k\Omega$, $R_2 = 15k\Omega$ and $R_3 = 40k\Omega$. Find the unknown resistance R_X.   **(04 Marks)**
   b. With a neat block diagram, explain the working of Function Generator.   **(08 Marks)**
   c. Explain with a block diagram, the Operating principle of Ramp type DVM.   **(08 Marks)**

OR

8 a. A Wein bridge circuit consists of the following : $R_1 = 4.7k\Omega$, $C_1 = 5nf$, $R_2 = 20k\Omega$, $C_2 = 10nf$, $R_3 = 10k\Omega$, $R_4 = 100k\Omega$. Determine the frequency of the circuit.   **(04 Marks)**
   b. Explain with a neat block diagram, the Operation of Successive Approximations type DVM.
                                                                                                      (08 Marks)
   c. Explain with a neat circuit inductance comparison bridge. Also find the equivalent series circuit off the unknown impedance. An inductance comparison bridge is used to measure inductive impedance at a frequency of 5KHz. The bridge constant at balance are $L_S = 10mA$, $R_1 = 10k\Omega$, $R_2 = 40k\Omega$ and $R_3 = 10k\Omega$.   **(08 Marks)**

Module-5

9 a. Define Transducers. List the important parameters of Electrical transducer.   **(04 Marks)**
   b. Explain Construction and Principle Operation of LVDT.   **(08 Marks)**
   c. Explain the Operation of a Resistance thermometer and mention its advantages.   **(08 Marks)**

OR

10 a. What are features of Instrumentation Amplifiers? How it differs from the Ordinary Op Amp?   **(04 Marks)**
   b. Explain with neat diagram the PLC structure.   **(08 Marks)**
   c. Explain Instrumentation Amplifier using transducer bridge with the help of circuit diagram.
                                                                                                      (08 Marks)

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USN ☐☐☐☐☐☐☐☐☐☐   Question Paper Version : A

Third/Fourth Semester B.E Degree Examination, June/July 2023
Constitution of Indian, Professional Ethics and Cyber Law
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]   [Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries **ONE mark**.

2. Use only **Black ball point pen** for writing / darkening the circles.

3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**

4. Darkening two circles for the same question makes the answer invalid.

5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. The constitution of India was enacted by a constitution assembly set up,
   a) Union Cabinet mission plan 1946.
   b) Under Indian Independence Act 1947
   c) Under resolution of provincial government.
   d) By Indian National Congress.

2. On December 11, 1946 the Constituent Assembly elected _____ as its permanent chairman.
   a) Jawaharlal Nehru   b) Dr. Rajendra prasad
   c) Dr. B. R. Ambedkar   d) K. M. Munshi

3. The drafting committee of the constitution including the chairman comprised of,
   a) 7 members   b) 9 members
   c) 11 members   d) 5 members

4. The constitution of India is,
   a) Rigid   b) Flexible
   c) Partly rigid partly flexible   d) Very very rigid

5. The preamble of constitution declares India to be,
   a) Sovereign democratic republic
   b) Socialist democratic republic
   c) Sovereign, Socialist, Secular democratic and Republic
   d) None of these

6. In which case did the supreme court give a ruling preamble was part of the constitution.
   a) Berubari case
   b) Golaknath case
   c) Keshavananda Bharathi case
   d) None of these

7. What is the chief source of political powers in the country?
   a) The constitution
   b) The people
   c) The legislature
   d) The parliament

8. The original constitution classified. The "Fundamental Rights" into seven categories but now there are.
   a) 4 categories
   b) 5 categories
   c) 6 categories
   d) 7 categories

9. Which one of the following fundamental Right was described by Dr.B.R. Ambedkar as "the heart and soul of constitution".
   a) Right to Equality
   b) Right to constitutional Remedies
   c) Right to Freedom
   d) Right to Religion

10. The main objective of cultural and educational right granted to the citizens is,
    a) To preserve rich cutlture and heritage of India.
    b) To evolve single integrated Indian culture
    c) To help minorities to conserve their culture.
    d) All the above

11. For enforcement of fundamental Right the court can issue,
    a) A Decree
    b) An ordinance
    c) A writ
    d) A notification

12. Which of the following literally means you may have the body,
    a) A Mandomus
    b) Habeaus corpus
    c) Prohibition
    d) Quo-warranto

13. "Equal work for equal pay" is a
    a) Fundamental Right
    b) Directive principle
    c) Fundamental duty
    d) Statutory provision is labour law

14. 73rd and 74th amendment is pertaining to
    a) Stalehood of Goa
    b) Extention of reservation to SC and ST
    c) Local self government
    d) Land reforms

15. The enforcement of Directive principles depends upon,
    a) The resources available with the Government
    b) The president
    c) The Court
    d) Chief justice of India

16. Common Civil code means,
    a) Common civil procedure code
    b) Common civil law applicable to all
    c) Civil law applicable to common man
    d) None of the above

17. The concept of DPSP is borrowed from the constitution of,
    a) Ireland
    b) Russia
    c) Great Britain
    d) USA

18. The constitution of India adopted fundamental duty from,
    a) America   b) Russia   c) Ireland   d) Britain

19. Fundamental duties did not form to be original part of Indian constitution they were added under _____ amendment.
    a) 42nd Amendment Act   b) 44th Amendment Act
    c) 86th Amendment Act   d) None of these

20. At present how many "Fundamental duties" are their in the constitution of India.
    a) 6 duties   b) 8 duties   c) 10 duties   d) 11 duties

21. Article 370 which gave special status to Jammu and Kashmir existed in the Indian constitution because of the agreement between,
    a) Jawaharlal and Farukh Abdullah   b) Jawaharlal and Maharaja Hari sing
    c) Vallabh bhai Patel and Maharaj Harising d) Mohammed Ali Jinnah and J.L.Nehru

22. Which is the Indian constitution day?
    a) Jan-26   b) August-15   c) November-26   d) April-20

23. Legislate means,
    a) Make law   b) Make constitutional amendment
    c) Form government   d) Put administrative machinery into action

24. The Parliamentary form of government in India is based on,
    a) Great Britain   b) Japan   c) Russia   d) France

25. What is the system used to elect the president of India?
    a) Preferential system   b) Secret Ballot
    c) Direct election   d) Proportional representation

26. Who discharge the duty of the president in the event of president and vice president being not available?
    a) The prime minister   b) The chief justice of India
    c) The speaker of lok sabha   d) Vice president

27. Who represents the nation but does not rule the nation?
    a) President   b) Attorney general   c) Chief Justice of India   d) Vice President

28. Which one of the following house is presided by a non member?
    a) Rajya Sabha   b) Lok Sabha   c) Vidhana Sabha   d) Vidhana parishad

29. Respite means,
    a) Painless death   b) Death due to drowning
    c) Due to stragulation   d) awarding lesser punishment

30. The total number of union council of minister including the prime minister shall not exceed.
    a) 10% of loksabha strength   b) 15% of loksabha strength
    c) 18% of loksabha strength   d) no such restriction

31. Uni-Cameral means,
    a) Presence of no house in the state
    b) Presence of one house in the state
    c) Presence of two house in the state
    d) Present of half house in the state

32. The age qualification for becoming the member of Rajya Sabha and Lok Sabha is,
    a) 25 yrs and 30 yrs
    b) 30 yrs and 25 yrs
    c) 35 yrs and 30 yrs
    d) 30 yrs and 40 yrs

33. The state legislative Assembly is prorogued by,
    a) Governor
    b) Chief minister
    c) Speaker of assembly
    d) Chief justice of High court

34. Which of the following statement is not correct?
    a) Money bill cannot be introduced in legislative council
    b) The money bill is presented by chief minister of the state
    c) The legislative council has no right to change the money bill
    d) All of the above

35. Power of the supreme court to decide the dispute between the centre and the state fall under its,
    a) Constitutional jurisdiction
    b) Appellate jurisdiction
    c) Advisory jurisdiction
    d) Original jurisdiction

36. The High court judge unless resign earlier retire at the age of,
    a) 58 years
    b) 60 years
    c) 62 years
    d) 65 years

37. A bill presented in the parliament becomes law.
    a) If passed by both the houses
    b) The prime minister has signed it
    c) The supreme court has decided or declared it.
    d) When the president gives his assent

38. The judges of Supreme Court after retirement are not permitted to carry on practice before.
    a) Supreme Court of India
    b) High Court
    c) District and Session Court
    d) Any of these

39. One third of Rajya Sabha member retires,
    a) Every year
    b) Every two year
    c) Every three years
    d) Every four years.

40. Which among following is not a standing committee?
    a) Public Committee
    b) Ethics Committee
    c) Railway convention Committee
    d) Business advisory Committee

41. Election to the local self government is conducted by,
    a) State Election Commission
    b) Regional EC
    c) Election commission
    d) Governor

42. The citizens of India have got a right to cast his vote after attaining the age of _____ years.
    a) 16 years
    b) 18 years
    c) 21 years
    d) 24 years

43. Election to Loksabha and Legislative Assembly in India are conducted on the basis of,
    a) Single transferable vote
    b) Proportional representation
    c) Limited Suffarage
    d) Audult franchise

44. The Election Commissioner hold office till,
    a) For 5 years
    b) For 6 years
    c) During the pleasure of president
    d) 6 years or 65 years whichever is early

45. This is not a ground to declare National Emergency.
    a) Internal disturbance
    b) War
    c) External agression
    d) Armed rebellion

46. How many times has a National Emergency has been declared so far?
    a) Once
    b) Twice
    c) Thrice
    d) Never

47. Break down of constitutional machinery in a state is popularly known as,
    a) State Emergency
    b) National Emergency
    c) Financial Emergency
    d) All of these

48. When National Emergency declared, the following Fundamental Right is suspended.
    a) Right to Equality (Art 14)
    b) Title (Art 18)
    c) Right to Freedom (Art 19)
    d) Right to life (Art 21)

49. Which type of emergency has not yet declared till now?
    a) National Emergency
    b) State Emergency
    c) Financial Emergency
    d) None of these

50. Who is considered to be a Vulnerable group?
    a) Women and Children
    b) SCs
    c) STs
    d) All of these

51. How many members will be nominated by President / Governor from Anglo Indian community?
    a) 2 / 1
    b) 1 / 2
    c) 3 / 2
    d) 2 / 3

52. Seats for SCs and STs are not reserved in,
    a) Lok Sabha
    b) Legislative Assembly
    c) Rajya Sabha
    d) All of these

53. Which of the Constitutional amendment reduced the voting right from 21 years to 18 years?
    a) 54th Amendment
    b) 36th Amendment
    c) 62th Amendment
    d) 61st Amendment

54. Which of the following amendment Act makes the Right to education as the fundamental right to all the children under the age of 6 to 14 years by inserting Art 21A to the constitution.
    a) 86th Amendment Act 2002
    b) 87th Amendment Act 2003
    c) 88th Amendment Act 2003
    d) 89th Amendment Act 2003

55. Which of the following amendment was passed during the emergency?
   a) 42nd Amendment Act
   b) 44th Amendment Act
   c) 47th Amendment Act
   d) 50th Amendment Act

56. In how many ways the constitutional amendments in India can take place?
   a) 2
   b) 3
   c) 4
   d) 5

57. The 7th Amendment of Indian constitution was done to implement recommendations of state on the basis of,
   a) linguistic
   b) Religion
   c) Population
   d) All of these

58. Which constitutional Amendment is done to pass the GST bill?
   a) 101st
   b) 120th
   c) 122nd
   d) 115th

59. The Ninety fourth Amendment of the constitution of India made provision for the appointment of minister in charge of tribal welfare in the state of,
   a) Bihar
   b) Chattisgarh and Jarkhand
   c) Madya Pradesh
   d) All the above

60. The 10th Amendment of the constitution of India Act 1961 incorporated _____ as seventh union territory of India.
   a) Dadar & Nagar Haveli
   b) Daman & Diu
   c) Andaman & Nicobar
   d) None of these

61. Engineering ethics is,
   a) Scientifically developed ethics
   b) Preventive ethics
   c) Developing ethics
   d) Natural ethics

62. A Fault tree is used to,
   a) Improve safety
   b) Take free consent
   c) Claim compensation
   d) Assess the risk involved

63. One of the characteristic of profession is
   a) It demands hard work
   b) It is based on honesty
   c) It is having taught competation
   d) usually its is having monopoly

64. One of impediment to responsibility is,
   a) Rampant corruption at higher level
   b) Self defection
   c) Interference by higher officers
   d) Interference by politicians

65. Good work means,
   a) Superior work done with great care and skill
   b) Work above and beyond the call of duty.
   c) Responsible work
   d) Work involving high risk

66. "Egocentric tendencies" means
   a) Interpreting situation from limited view
   b) Superior complex
   c) Arrogant and irresponsible behaviour
   d) habit of condemning the view of other

67. Tight couple means,
    a) Erecting two pillars side by side
    b) binding two beam tightly
    c) Process tightly coupled
    d) strong adhesive material

68. Lying is,
    a) intentionally conveying false or misleading information
    b) deception
    c) False hood
    d) None of these

69. Trimming is,
    a) Smoothing of irregularities to make the data appear accurate and precise
    b) Retaining the entire data
    c) Consolidating the data
    d) None of these

70. As applies to responsibility avoiding blame or being safe is the prime concern in,
    a) Minimalistic approach
    b) Considerable view
    c) Good work view
    d) Resonable care view

71. It is not a kind of trade mark.
    a) symbols
    b) designs
    c) good will
    d) sounds

72. Conflicts of interest may be,
    a) potential
    b) false
    c) created
    d) imaginary

73. The owner of patent right retains his patent right for _____ years.
    a) 20
    b) 50
    c) 75
    d) 100

74. _____ protects the expression of the Ideas but not the ideas themselves is,
    a) Plagiarism
    b) Patent
    c) Copy right
    d) Trade mark

75. Risk estimation can be done by,
    a) Cooking
    b) Trimming
    c) Event tree
    d) None of these

76. A compound measure of the probability and magnitude of adverse effect is known as,
    a) benefit
    b) risk
    c) accident
    d) compensation

77. The formula for MTR sambar masala is example of,
    a) Patent
    b) Copy right
    c) Trade mark
    d) Trade secret

78. Purpose of professional code is to,
    a) Guide themselves
    b) Educate the members
    c) Discipline the members
    d) All of these

79. What does NSPE stands for,
    a) National science professional engineers
    b) National society of professional engineers
    c) National science personal ethics
    d) National society of professional educator

80. The obligation and prerogatives associated with a specific role is referred to as,
    a) duty
    b) responsibility
    c) role morality
    d) none of these

81. The first publicity available internet service in India was launched by _____ on 15th August 1995.
    a) Bharath Sanchar Nigam limited
    b) Videsh Sanchar Nigam limited
    c) Indian Institute of technology
    d) None of these

82. Which is the Act which provides legal frame work for e-Governance in India?
    a) Indian Penal Code
    b) IT (amendment) Act 2008
    c) IT Act 2000
    d) None of these

83. Which of the following is an example of Intellectual property?
    a) Trade mark   b) Copy right   c) Patent   d) All of the these

84. Which is the appeal court on the orders issued by cyber appealate tribunal?
    a) Munciff court   b) District court   c) High court   d) Supreme court

85. What are the types of cyber terror capability?
    a) Simple unstructured
    b) Simple unstructured and Advanced structured
    c) Complex co-ordinated
    d) Simple unstructured, Advanced structured, Complex co-ordinated

86. The mechanism for establishing net neutrality in India are at present mainly enforced by the,
    a) Telecom Regulatory Authority of India (TRAI)
    b) Bharatiya Sanchar Nigam Ltd. (BSNL)
    c) Videshi Sanchar Nigam Ltd. (VSNL)
    d) All the above

87. An attempt to harm damage or cause threat to a system or network is broadly termed as,
    a) Cyber crime   b) System hijacking   c) Cyber attack   d) Digital crime

88. Criminal minded individuals who work for terrorist organization and stean information if nation are,
    a) State sponspored hackers
    b) Cyber terrorist
    c) Blue hat hackers
    d) White hat hackers

89. Cyber crimes can be classified into,
    a) 2   b) 3   c) 4   d) 5

90. What is the updated version of IT Act 2000?
    a) IT Act 2007
    b) IT Act 2008
    c) Advanced IT Act 2002
    d) Advanced IT Act 2001

91. TRAI has ruled in favour of,
    a) Net neutrality   b) Airtel zero   c) Free basics   d) None of the these

92. Which of the following is not a type of cyber crime,
    a) Data theft
    b) Forgery
    c) Damage to Data and System
    d) Installing antivirus for protection

93. The imaginary location where the word of the parties meet in conversation is referred to as,
    a) cyber space   b) Cyber net   c) Space   d) Cyber dyne

8 of 9

94. Nitizen means,
   a) A person who is citizen of a country
   b) A person who has dual citizenship
   c) A person who uses internet
   d) None of these

95. What is the punishment for hacking of computers?
   a) Three years imprisonment or 10 lac rupees or both
   b) Life imprisonment
   c) Three lac rupees or 3 years imprisonment
   d) Three years imprisonment or 5 lac rupees penalty or both

96. What is the proposed punishment for cyber Terrorism in IT Act?
   a) 1 crore rupees penalty
   b) Life imprisonment
   c) 10 years imprisonment
   d) 6 years imprisonment

97. What is the term of office of the presiding officer of cyber appellate tribunal?
   a) 3 years   b) 4 years   c) 5 years   d) 6 years

98. What is the full form of ITA 2000?
   a) Information tech act 2000
   b) Indian technology act 2000
   c) International technology act 2000
   d) Information technology Act 2000

99. The first computer virus is,
   a) I love you   b) Blaster   c) Sasser   d) Creeper

100. Who is usually against net neutrality,
   a) Content providers
   b) Consumers / end users
   c) telecom companies
   d) All of these

* * * * *