CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
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 the Laplace transform of $\cos t \ \cos 2t \ \cos 3t$. **(06 Marks)**

   b. If $f(t) = \begin{cases} t, & 0 < t < a \\ 2a - t, & a < t < 2a \end{cases}$ and $f(t + 2a) - f(t)$, show that $L\{f(t)\} = \dfrac{1}{s^2} \tanh\left(\dfrac{as}{2}\right)$. **(07 Marks)**

   c. Find the Inverse Laplace transforms of :

   i) $\dfrac{2s+1}{s^2 + 6s + 13}$ ii) $\dfrac{1}{3} \log\left(\dfrac{s^2 + b^2}{s^2 + a^2}\right)$. **(07 Marks)**

OR

2 a. Express the function f(t) in terms of unit step function and find its Laplace transform, where

   $f(t) = \begin{cases} 1, & 0 < t \le 1 \\ t, & 1 < t \le 2 \\ t^2, & t > 2 \end{cases}$ **(06 Marks)**

   b. Find the Inverse Laplace transform of $\dfrac{s^2}{(s^2 + a^2)^2}$ using Convolution theorem. **(07 Marks)**

   c. Solve by the method of Laplace transforms, the equation
   $y'' + 4y' + 3y = e^{-t}$ given $y(0) = 0, y'(0) = 0$. **(07 Marks)**

Module-2

3 a. Obtain the Fourier series of the function $f(x) = x^2$ in $-\pi \le x \le \pi$. **(06 Marks)**

   b. Obtain the Fourier series expansion of

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

   c. Find the Cosine half range series for $f(x) = x(\ell - x)$, $0 \le x \le \ell$. **(07 Marks)**

OR

4 a. Obtain the Fourier series of $f(x) = |x|$ in $(-\ell, \ell)$. **(06 Marks)**

   b. Find the sine half range series for

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

   c. Obtain the constant term and the coefficients of the first cosine and sine terms in the Fourier expansion of y from the table. **(07 Marks)**

x	0	1	2	3	4	5
y	9	18	24	28	26	20

1 of 3

Module-3

5 **a.** If $f(x) = \begin{cases} 1-x^2 & , \ |x| < 1 \\ 0 & , \ |x| \ge 1 \end{cases}$. Find the Fourier transform of f(x) and hence find value of

$\displaystyle\int_0^\infty \frac{x\cos x - \sin x}{x^3}\,dx.$ **(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. Find the Z – transform of $\cos\left(\dfrac{n\pi}{2} + \dfrac{\pi}{4}\right).$ **(07 Marks)**

OR

6 **a.** Solve the Integral equation

$\displaystyle\int_0^\infty f(\theta)\cos\alpha\,\theta\,d\theta = \begin{cases} 1-\alpha & , \ 0 \le \alpha \le 1 \\ 0 & , \ \alpha > 1 \end{cases}$ hence evaluate $\displaystyle\int_0^\infty \frac{\sin^2 t}{t^2}\,dt.$ **(06 Marks)**

b. Find the Inverse Z – transform of $\dfrac{2z^2 + 3z}{(z+2)(z-4)}$. **(07 Marks)**

c. Using the Z – transform, solve $Y_{n+2} - 4Y_n = 0$, given $Y_0 = 0$, $Y_1 = 2$. **(07 Marks)**

Module-4

7 **a.** Using Taylor's series method, solve the Initial value problem

$\dfrac{dy}{dx} = x^2 y - 1$, $y(0) = 1$ at the point $x = 0.1$. Consider upto 4th degree term. **(06 Marks)**

b. Use modified Euler's method to compute y(0.1), given that $\dfrac{dy}{dx} = x^2 + y$, $y(0) = 1$ by taking

h = 0.05. Consider two approximations in each step. **(07 Marks)**

c. Given that $\dfrac{dy}{dx} = x - y^2$, find y at x = 0.8 with

x :	0	0.2	0.4	0.6
y :	0	0.02	0.0795	0.1762

By applying Milne's method. Apply corrector formula once. **(07 Marks)**

OR

8 **a.** Solve the following by Modified Euler's method

$\dfrac{dy}{dx} = x + |\sqrt{y}|$, $y(0) = 1$ at x = 0.4 by taking h = 0.2. Consider two modifications in each

step. **(06 Marks)**

b. Given $\dfrac{dy}{dx} = 3x + \dfrac{y}{2}$, $y(0) = 1$. Compute y(0.2) by taking h = 0.2 using Runge – Kutta

method of order IV. **(07 Marks)**

c. Given $\dfrac{dy}{dx} = (1+y)x^2$ and $y(1) = 1$, $y(1.1) = 1.233$, $y(1.2) = 1.548$, $y(1.3) = 1.979$,

determine y(1.4) by Adam's Bashforth method. Apply corrector formula once. **(07 Marks)**

Module-5

9 a. Given $y'' - xy' - y = 0$ with $y(0) = 1$, $y'(0) = 0$. Compute $y(0.2)$ using Runge – Kutta method. **(06 Marks)**

b. Derive Euler's equation in the form $\dfrac{\partial f}{\partial y} - \dfrac{d}{dx}\left(\dfrac{\partial f}{\partial y'}\right) = 0$. **(07 Marks)**

c. Prove that the geodesics on a plane are straight lines. **(07 Marks)**

OR

10 a. Find the curve on which functional

$$\int_0^1 [(y')^2 + 12xy]dx \text{ with } y(0) = 0 , y(1) = 1 \text{ can be extremized.}$$ **(06 Marks)**

b. Obtain the solution of the equation $\dfrac{2d^2y}{dx^2} = 4x + \dfrac{dy}{dx}$ by computing the value of dependent variable corresponding to the value 1.4 of the independent variable by applying Milne's method using the following data. Apply corrector formula once. **(07 Marks)**

x :	1	1.1	1.2	1.3
y :	2	2.2156	2.4649	2.7514
y' :	2	2.3178	2.6725	3.0657

c. A heavy cable hangs freely under gravity between two fixed points. Show that the shape of the cable is Catenary $y = c \cosh\left(\dfrac{x+a}{c}\right)$. **(07 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | 18EE32

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Electric Circuit Analysis

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Define :
    i) Linear and non linear circuit
    ii) Active and passive circuit
    iii) Unilateral and bilateral circuit.   **(06 Marks)**

  b. For the circuit shown in Fig.Q1(b) determine resistance between M and N using star/delta transformation.
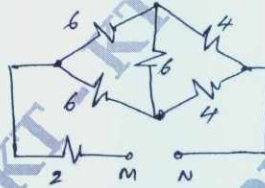

Fig.Q1(b)   **(06 Marks)**

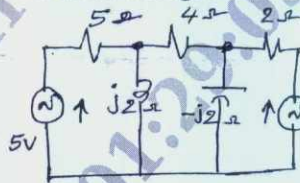 c. Use node voltage analysis to find node voltages in the network shown in Fig.Q1(c).

Fig.Q1(c)   **(08 Marks)**

OR

2 a. Derive an expression for converting Delta to Star.   **(06 Marks)**

  b. Determine potential difference between M and N using source transformation of circuit shown in Fig.Q2(b).
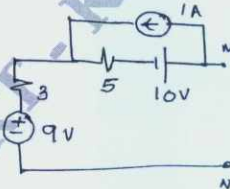

Fig.Q2(b)   **(06 Marks)**

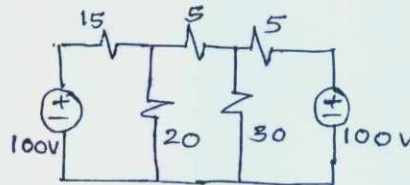 c. Use Mesh current analysis to find the current flowing in 30Ω resistor of circuit shown in Fig.Q2(c).

Fig.Q2(c)   **(08 Marks)**

1 of 4

Module-2

3 a. State and prove reciprocity theorem. (06 Marks)

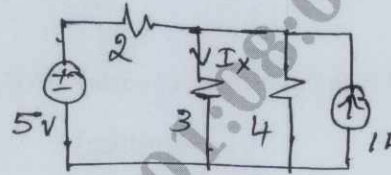b. For the circuit shown in Fig.Q3(b) find 'I_X' using super position theorem.

Fig.Q3(b) (07 Marks)

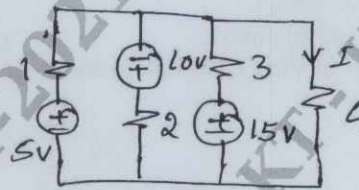c. Use Milliman's theorem to find current in the circuit shown in Fig.Q3(c).

Fig.Q3(c) (07 Marks)

OR

4 a. State and obtain condition for maximum power when load impedance is equal to pure variable resistance. (06 Marks)

b. For the network shown in Fig.Q4(b), find current 'I' using Norton's theorem.
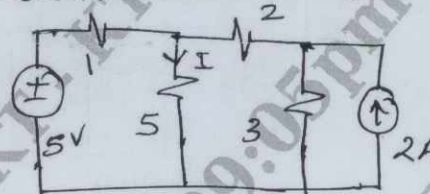
Fig.Q4(b) (07 Marks)

c. For the network shown in Fig.Q4(c). Draw Thevenin's equivalent circuit.
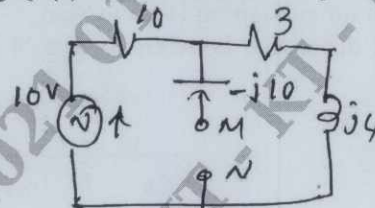
Fig.Q4(c) (07 Marks)

Module-3

5 a. Show that resonant frequency is the geometric mean of cut-off frequencies. (07 Marks)

b. A series RLC circuit has a resistance of 100Ω, an inductance of 0.5H and capacitance of $0.4\mu F$. Find the resonant frequency, half power frequencies, band width and quality factor. (07 Marks)

c. For the circuit shown in Fig.Q5(c), find the value of inductance take w = 500r/s.

Fig.Q5(c) (06 Marks)

OR

6 a. Explain the behavior of R, L and C for initial condition. (07 Marks)

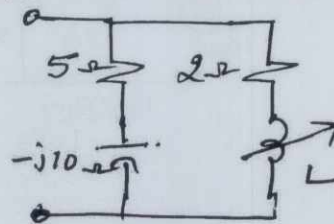b. For the network shown in Fig.Q6(b) switch is closed at t = 0. Determine current and its first and second derivative at t = 0⁺.
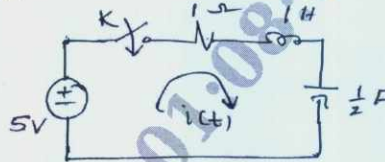
Fig.Q6(b) (07 Marks)

c. For the R – L circuit shown in Fig.Q6(c). Obtain the expression for current i(t) for t ≥ 0.
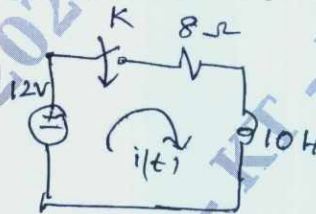
Fig.Q6(c) (06 Marks)

Module-4

7 a. State and prove initial value theorem. (06 Marks)

b. Find the inverse Laplace transform of

$$V(s) = \frac{10}{s(s+1)(s+2)}.$$ (07 Marks)

c. For the network shown in Fig.Q7(c), draw the transformed circuit and obtain the expression for current i(t) for t ≥ 0.
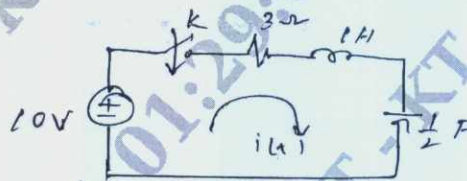
Fig.Q7(c) (07 Marks)

OR

8 a. Find the ILT of : i) step signal ii) Ramp iii) impulse signal. (06 Marks)

b. For the waveform shown in Fig.Q8(b) obtain the Laplace transform.

Fig.Q8(b) (08 Marks)

c. Find the initial and final value of following functions :

i) $V_1(s) = \dfrac{s^2 + 3s + 2}{s^3 + 3s^2 + 3s + 1}$

ii) $V_2(s) = \dfrac{10}{s(s+3)}.$ (06 Marks)

3 of 4

Module-5

9 a. A 3 phase supply with line voltage of 250V has a unbalanced Delta connected load as shown in Fig.Q9(a). Determine line currents, active and reactive power for phase sequence A B C.
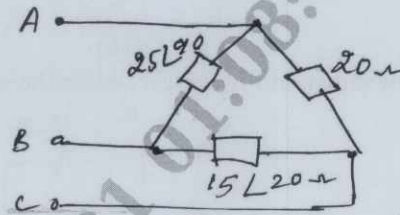
Fig.Q9(a)   (10 Marks)

b. An unbalanced 4 wire star connected load has a balanced supply of 400V. For the phase sequence ABC, calculate the line currents and total power of the circuit shown in Fig.Q9(b).
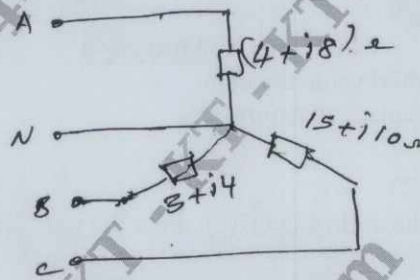
Fig.Q9(b)   (10 Marks)

OR

10 a. Obtain the Impedance parameters interms of Admittance parameters.   (10 Marks)

b. For the network shown in Fig.Q10(b) determine z-parameters.

Fig.Q10(b)   (10 Marks)

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Third Semester B.E. Degree Examination, Jan./Feb. 2021
Transformers and Generators

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Explain practical transformer on no-load. **(04 Marks)**
   b. With the help of a neat circuit diagram and phasor diagram. Explain the operation of a 3-phase star-Delta transformer. **(06 Marks)**
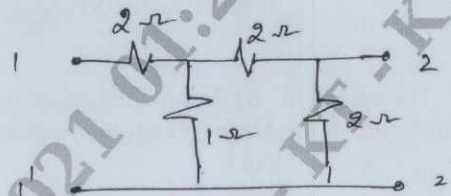   c. Draw the phasor diagram of a transformer supplying Lagging power factor load. **(04 Marks)**
   d. A 230/460V single phase transformer has a primary resistance of 0.2 ohm and a reactance of 0.5ohm and the corresponding values for the secondary are 0.75 ohm and 1.8 ohm respectively. Find the secondary terminal voltage when supplying 10A at 0.8 power factor lagging. **(06 Marks)**

OR

2 a. With neat circuit diagrams, discuss in detail how to perform OC and SC tests on single phase transformer. **(08 Marks)**
   b. Explain with circuit diagram and phasor diagram how two transformers connected in open delta can supply the power successfully. **(06 Marks)**
   c. Find the all day efficiency of a transformer having maximum efficiency of 98% at 15kVA at unity power factor and loaded an follows :
   12Hr 2kW at 0.5 power factor
   6 Hr 12kW at 0.8 power factor
   6 Hr No load. **(06 Marks)**

Module-2

3 a. With a neat circuit, explain how iron losses can be separated into hysteresis and eddy current losses in a transformer. **(08 Marks)**
   b. List the conditions to be satisfied for parallel operation of single phase and Three phase transformers. **(04 Marks)**
   c. Two 250kVA transformers supplying a network are connected in parallel on both primary and secondary sides. Their voltage ratios are same. The resistance drops are 1.5% and 0.9% and reactance drops are 3.33% and 4% respectively. Calculate the KVA loading on each transformer and its power factor. When the total load on the transformers is 500KVA at 0.707 lagging power factor. **(08 Marks)**

OR

4 a. Obtain the expression for current shared by two transformers with unequal voltage ratios connected in parallel. The transformers have unequal internal impedance. Also draw the phasor diagram. **(08 Marks)**
   b. In a 400V, 50Hz transformer, the total iron loss is 2500W. When the supply voltage and frequency reduced to 200V, 25Hz respectively the corresponding loss is 850W. Calculate the eddy current loss at normal voltage and frequency. **(06 Marks)**
   c. An auto transformer supplies a load of 3kW at 115V, unity power factor. If the applied voltage is 230V, calculate the power transferred to the load i) inductively ii) conductively. **(06 Marks)**

Module-3

5   a. What is Cooling of transformer? List different methods of cooling and explain any two of them. **(06 Marks)**

b. An 8 pole wave wound DC generator has 480 armature conductors. The armature current is 200A. Find the armature reaction demagnetizing and cross magnetizing ampere turns per pole, if the brushes are shifted 6° electrical from Geometrical natural axis. **(06 Marks)**

c. Define: i) Distribution factor   ii) Pitch factor. Derive the expressions for the factors. **(08 Marks)**

OR

6   a. Define Armature reaction in a DC generator. What are the effects of armature reaction? Explain. **(06 Marks)**

b. With necessary diagrams, explain armature reaction in alternator for lagging, unity and leading power factors. **(06 Marks)**

c. A 3 phase, 8 pole, star connected alternator has the armature coils short chorded by 1 slot. The coil span is 165° electrical. The alternator is driven at the speed of 750rpm. If there are 12 conductors per slot, and flux per pole is 50wmb, calculate the value of the induced emf across the terminals. **(08 Marks)**

Module-4

7   a. Define voltage regulation of the alternator and explain the Ampere turn method of predetermination of regulation. **(08 Marks)**

b. Define Short Circuit Ratio (SCR). Explain its significance. **(04 Marks)**

c. A 3 phase 2000KVA star connected 50Hz, 2300V alternator has a resistance between each pair of terminals as measured by direct current is 0.16ohm. The alternator gave a short circuit current of 600A for a excitation. With same excitation the open circuit voltage is 900V (line). Determine the full load regulation at i) unity power factor ii) 0.8pf lagging. **(08 Marks)**

OR

8   a. Explain the zero power factor method of predetermination of regulation of an alternator. **(08 Marks)**

b. Compare synchronous Impedance method and Ampere turn method of predetermining of regulation. **(04 Marks)**

c. A 3.5MVA, star connected alternator at 4160V at 50Hz has an pen circuit characteristics as given by the following data :

I_f, Amp	50	100	150	200	250	300	350
V_{oc}. Volts (Line)	1629	3150	4160	4750	5130	5370	5550

A field current of 200A is found necessary to circulate full load current on short circuit. Calculate by Ampere turn method full load voltage regulation at 0.8pf lagging. **(08 Marks)**

Module-5

9   a. What is synchronization? Explain with the help of a neat sketch. The three lamps dark method of synchronization. **(08 Marks)**

b. Derive an expression for the power angle characteristics of cylindrical rotor alternator. Sketch the power angle curve. **(06 Marks)**

c. An alternator has a direct axis synchronous reactance of 0.7pu and a quadrature axis synchronous reactance of 0.4pu. It is used to supply full load at rated voltage at 0.8pf. Find the induced emf on open circuit. **(06 Marks)**

OR

10 a. With the help of a circuit diagram, explain the measurement of direct axis and quadrature axis reactances by slip test. **(08 Marks)**

b. Draw and explain the capability curve of synchronous generator. **(06 Marks)**

c. What is hunting in synchronous machines? How do you eliminate hunting? **(06 Marks)**

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18EE34

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Analog Electronic Circuits

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 bias stabilization? Explain with help of load line the effect of variation of V_{CC}, I_B, on Q-point of a transistor.　**(10 Marks)**

　　b.　For the emitter bias network shown in Fig Q1(b)
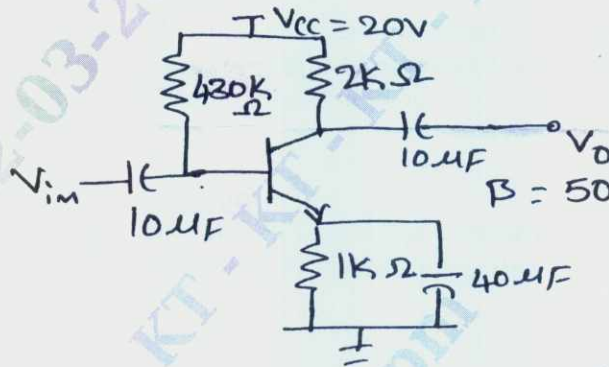
Fig Q1(b)

　　　Determine following :　i) I_B　ii) I_C　iii) V_{CE}　iv) V_C　v) V_E.　**(10 Marks)**

OR

2　a.　With circuit diagram and explain the voltage divider Biasing circuit. Also derive the I_B and V_{CE}.　**(10 Marks)**

　　b.　Draw and explain the double ended diode clipper circuit.　**(05 Marks)**

　　c.　Draw a simple +ve damper circuit and explain its operation.　**(05 Marks)**

Module-2

3　a.　State and prove miller's theorem.　**(06 Marks)**

　　b.　Compare the characteristics of CE, CC, CB configuration.　**(04 Marks)**

　　c.　Derive the expression for A_V, Z_i and Z_o of the voltage divider bias circuit using hybrid model.　**(10 Marks)**

OR

4　a.　Starting from the fundamentals, define h-parameters and obtain h-parameter equivalent circuit of common emitter configuration.　**(10 Marks)**

　　b.　Transistor used in RC coupled CE amplifiers with fixed bias has h_{ie} = 1kΩ, h_{fe} = 60, h_{ve} = 15μA/V, h_{re} = 2 × 10^{-4}, circuit has R_s = 1kΩ, R_B = 56kΩ, R_C = 10kΩ and R_L = 10kΩ. Find A_I, A_{IS}, Z_{in} and Z_o.　**(10 Marks)**

Module-3

5 a. Explain the operation of cascade connections with the help of neat diagram. **(10 Marks)**

   b. Draw the circuit of Darlington emitter follower with voltage divider bias calculate input impedance, voltage gain and output impedance. Take $\beta_1 = \beta_2 = 100$, $R_1 = R_2 = 100k\Omega$, $R_E = 5k\Omega$, Take $r_e = 0.1k\Omega$. **(10 Marks)**

OR

6 a. What are the advantages of negative feedback in amplifiers? **(06 Marks)**

   b. Draw the block diagram and explain the concept of feedback. **(04 Marks)**

   c. Derive an expression for Z_i and A_i for a Darlington emitter follower circuits. **(10 Marks)**

Module-4

7 a. With a neat diagram, explain the different types of power amplifiers. **(10 Marks)**

   b. With a circuit diagram, explain the transformer coupled class A amplifier. Also derive the expression R'_L. **(10 Marks)**

OR

8 a. With a neat diagram, explain the wein bridge oscillator circuits. **(10 Marks)**

   b. In a Hartley oscillator $L_1 = 20\mu H$, $L_2 = 2mH$ and C is variable. Find the range of C if frequency is to be varied from 1MHz to 2.5MHz. Neglect mutual inductance. **(08 Marks)**

   c. Comparison between RC phase shift and wein bridge oscillator. **(02 Marks)**

Module-5

9 a. With a neat diagram, explain the construction of n-channel JFET. **(10 Marks)**

   b. Derive an expression for saturation drain current of n-channel JFET. **(10 Marks)**

OR

10 a. Mention the different between BJT and FET. **(06 Marks)**

   b. A JFET has $g_m = 6mV$ at $V_{GS} = -1V$. Find I_{DSS} if pinch-off voltage $V_P = -2.5V$. **(04 Marks)**

   c. Explain construction, working and characteristics of n-channel depletion type MOSFET. **(10 Marks)**

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Third Semester B.E. Degree Examination, Jan./Feb. 2021
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. Define combinational logic. List the various steps in designing the combinational logic circuit and explain with a block diagram. **(06 Marks)**
   b. Explain the canonical minterm and maxterm form with examples. **(04 Marks)**
   c. Simplify the Boolean function using K-map following as
      $P = f(a, b, c, d) = \Sigma m(2, 3, 4, 5, 13, 15) + \Sigma d(8, 9, 10, 11)$
      $Q = f(w, x, y, z) = \pi(1, 4, 5, 11, 12, 13, 14, 15) \cdot d(3, 9, 10)$. **(10 Marks)**

OR

2 a. Using K-map method, obtain a minimal SOP expression and implement the function using NAND gates.
      $x = f(a, b, c, d, e) = \Sigma m(1, 3, 4, 6, 9, 11, 12, 14, 17, 19, 20, 22, 25, 27, 28, 30)$. **(08 Marks)**
   b. Simplify using Quire – McCluskey method and realize the function using a basic gates.
      $M = f(a, b, c, d) = \Sigma m(7, 9, 12, 13, 14, 15) + \Sigma d(4, 11)$. **(12 Marks)**

Module-2

3 a. Design a combinational logic circuit that will convert BCD digit to Excess-3 BCD digit using gates. Construct a truth table and simplify each output equation using K-maps. **(08 Marks)**
   b. Design a binary full adder using only 2-input NAND gates. Construct a truth table and write a Boolean expression for SUM and CARRY. **(07 Marks)**
   c. Design a 4 to 16 line decoder by cascading 2 to 4 line decoders which has the active low output and active low enable input. **(05 Marks)**

OR

4 a. Realize the following Boolean function using 8 : 1 MUX with 'wyz' as select inputs.
      $V = f(w, x, y, z) = \Sigma m(0, 1, 2, 5, 7, 8, 9, 12, 13)$. **(05 Marks)**
   b. Implement 4 bit parallel adder/subtract using 4-full adders blocks. Explain its operation if $C_{in} = 0$ the circuit should act as adder and if $C_{in} = 1$ the circuit act as subtractor. **(05 Marks)**
   c. Design a two-bit magnitude comparator with help of the truth table and simplification of the output equations using K-maps. Draw a logic diagram. **(10 Marks)**

Module-3

5 a. Explain the operation of SR Latch act as switch debouncer with help of the timing diagram. **(05 Marks)**
   b. Explain the working of a Master-slave JK flip-flop with a neat logic diagram, function table, logic symbol and timing diagram. **(10 Marks)**
   c. Obtain the characteristic equation of the JK and D flip-flops. **(05 Marks)**

OR

6 a. Differentiate the sequential logic circuit and combinational logic circuit. **(04 Marks)**
   b. Explain the operation of SR latch with a neat logic diagram and timing diagram. **(06 Marks)**
   c. Draw a neat diagram and explain the working of positive edge-trigger D-flipflop with function table, logic symbol and timing diagram. **(10 Marks)**

Module-4

7 a. Explain the working of 4-bit binary ripple counter using a positive edge trigger T-flip-flop with an enable line and relevant timing diagram. **(08 Marks)**
   b. Design a mod-8 twisted ring counter and explain its operation. Write the count sequence table. **(07 Marks)**
   c. With a neat logic diagram, explain the operation of the 4-bit SISO unidirectional shift register. **(05 Marks)**

OR

8 a. Design a synchronous counter with counting sequence. 3, 2, 5, 1, 0, 3 . . . . using D-flip-flips. **(10 Marks)**
   b. With a neat logic diagram, explain the 4-bit universal shift register using D-flip-flops and a 4 : 1 MUX. Write a mode control and register operation. **(10 Marks)**

Module-5

9 a. With a suitable block diagram, explain the Mealy and Moore model in a sequential circuit analysis. **(08 Marks)**
   b. Construct a sequential logic circuit with single input(x) and single output(z) by obtaining the state and excitation tables for the given state diagram as shown in Fig.Q9(b), using JK flip-flops.

Fig.9(b) **(12 Marks)**

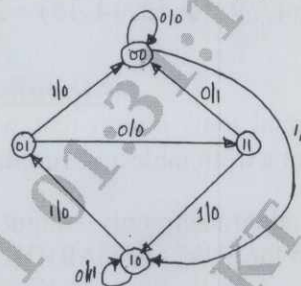**OR**

10 a. Differentiate a Mealy and Moore models. **(04 Marks)**
   b. Explain the following terms : i) ROM ii) PROM iii) Flash memory with a suitable diagram. **(06 Marks)**
   c. Analyze the following sequential logic circuit as shown in Fig.Q10(c). Obtain the excitation and output equation, transition table and state table. Also draw a state diagram.
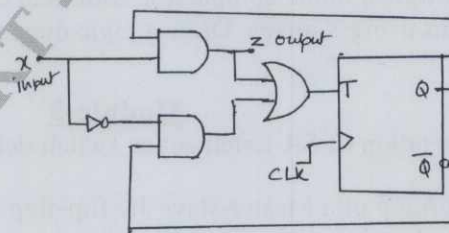

Fig.Q10(c) **(10 Marks)**

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CBCS SCHEME

18CPC39/49

USN | | | | | | | | | | |

Third/Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Constitution of India, 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.

1. Chief Minister of a state is appointed by
   a) Governor   b) President
   c) High Command of a political party   d) Chief Justice of the High Court

2. Which one of the following is not a fundamental duty?
   a) Respect the National Flag and National Anthem
   b) Not to destroy public property
   c) Protection of environment and forest
   d) Parents or wards may not send their children to school

3. The constitution empowered State Government to make special law for the protection of
   a) Factory workmen   b) Unemployed youth
   c) Women and children   d) Farmers

4. Every citizen of India is eligible to vote in an election after attaining the age of
   a) 21 years   b) 16 years   c) 25 years   d) 18 years

5. Total number of articles and schedules in Indian Constitution are
   a) 397 Articles and 6 Schedules   b) 385 articles and 8 Schedules
   c) 440 Articles and 10 Schedules   d) 445 Articles and 12 Schedules

6. In engineering ethics, "tight coupling" means
   a) Strong adhesive material   b) Binding two beams tightly
   c) Process tightly coupled   d) Erecting two pillars side by side

7. Who is the Constitutional Head of the Nation?
   a) Chief Justice of India   b) President of India
   c) Prime Minister of India   d) Union External Affairs Minister

8. The resignation letter of President can be received and accepted by
   a) Chief Justice of India
   b) Vice-President of India
   c) Prime Minister of India
   d) Speaker of Loka Sabha

9. Who can administer the oath to the Chief Minister and Cabinet Minister of State Government?
   a) President of India
   b) Governor of State
   c) Chief Justice of High Court
   d) Advocate-General of State

10. The President can promulgate on ordinance only when
    a) The parliament is not in session
    b) There is a disagreement between the two houses of parliament
    c) The bill is in pending in the parliament for a year and above
    d) The Prime Minister recommends at anytime.

11. 'Fault Tree' method is used
    a) To assess the risk
    b) In engineering research
    c) To trace the fault of engineers
    d) to assess the accuracy of work

12. Under which law, a case is filed to recover damages when harm is caused from technology?
    a) Constitutional Law   b) Industrial Law   c) Law of Torts   d) Law of Crimes

13. Revealing confidential information amounts to
    a) Misusing the truth
    b) Breach of contract
    c) Using of Copyright without the permission owner
    d) Criminal breach of trust

14. The owner of the patent right retains his patent right for
    a) 50 years
    b) 75 years
    c) 20 years
    d) 10 years

15. When a state emergency is declared, who can assume all the functions of State Government?
    a) Prime Minister
    b) President of India
    c) Governor of a State
    d) Union Cabinet

16. The Election Commission has no power to conduct the election to
    a) Parliament
    b) President
    c) Speaker of Loka Sabha
    d) State Legislature

17. Who can appoint Prime Minister of India?
    a) The people of India
    b) The President of India
    c) Ruling Legislative Party
    d) Election Commissioner

18. What is the maximum strength of Rajya Sabha?
    a) 224
    b) 250
    c) 288
    d) 543

19. Vice-President of India is elected by the
    a) People of India
    b) Members of State Legislature
    c) Members of Rajya Sabha
    d) Members of both the houses of parliament

20. What is the minimum age to become the judges of the Supreme Court?
   a) 25 years   b) 30 years   c) 35 years   d) None of these

21. Who can certify the money bill immediately when it is introduced in the Loka Sabha?
   a) Speaker   b) Deputy Speaker   c) Finance Minister   d) Prime Minister

22. Under which Article the state has been directed to secure for the citizens a 'uniform civil code' in India?
   a) Art. 44   b) Art. 45   c) Art. 48   d) Art. 54

23. Which of the following refers to dishonesty in engineering ethics?
   a) Self-interest   b) Cooking   c) Self-deception   d) Fear

24. Who among the following is empowered to suspend or revoke the license to issue digital signature certificate granted to a certifying authority?
   a) Adjudicating Officer   b) Central Government
   c) Controller   d) Cyber Appellate Tribunal

25. Who can appoint the Presiding Officer of the cyber appellate tribunal?
   a) Central Government   b) State Government
   c) President   d) Chief Justice of India

26. Software Piracy means
   a) An attacker harasses a victim on line
   b) Sending huge volumes of e-mail by an abuser to target address
   c) Illegal copying, distribution, or use of software/computer
   d) any software used to disrupt computer or mobile operations

27. Gaining and unauthorized access to the data or information stored in a computer system is called:
   a) Malware   b) Hacking   c) Phishing   d) Web Jacking

28. What is a Mobile or SIM cloning?
   a) Thefting of information
   b) Someone obtains others personal information
   c) Copying the identity of one mobile telephone to another mobile telephone
   d) All of the above

29. One of the modes of regulation of internet is ....
   a) Customs   b) Norms   c) International Law   d) Native code

30. An important law relating to Indian cyber laws is
   a) Right to Information Act   b) Right to Education Act
   c) the Information Technology Act   d) E-Commerce Code

31. Which writ can be issued to quash the decision of lower courts?
   a) Habeaus corpus   b) Mandamus   c) Prohibition   d) Certiorari

32. The rights of citizens to take out processions or meeting is conferred by
   a) Right to form an association   b) Right to move anywhere in India
   c) Right to assembly   d) Right to carryon any trade

33. Which of the following word was added to the preamble of the constitution by the 42nd Amendment Act, 1976?
    a) Secular
    b) Republic
    c) Sovereign
    d) Democratic

34. Who can appoint the Chief Justice and other Judges of the Supreme Court?
    a) Prime Minister
    b) President
    c) Law Minister
    d) Vice-President

35. The doctrine of 'Rule of Law' is profounded by
    a) Dr. A.V. Dicey
    b) Dr. B.R. Ambedkar
    c) Kelson
    d) Bentham

36. What is the source of law in India?
    a) Common law principles
    b) Constitution of India
    c) Supreme Court of India
    d) Union Legislature (Parliament)

37. Who can be removed by the process of "impeachment"?
    a) Prime Minister
    b) Governor
    c) District Judge
    d) President

38. What is the basic attitude towards responsibility of engineer?
    a) Absolute responsibility
    b) Reasonable care
    c) Personal safety
    d) Strict guidelines

39. Which fund is utilized to meet the unforeseen expenditure?
    a) Contingency Fund of India
    b) Consolidated Fund of India
    c) Public Revenue Fund
    d) Political Party Fund

40. Attorney-General of India is appointed by
    a) Prime Minister
    b) Law Minister
    c) President
    d) Chief Justice of Supreme Court

41. The punishment for identity theft (making use of the electronic signature or password fraudulently) in India is ……
    a) 6 years
    b) 3 years
    c) 10 years
    d) 3 months

42. What is serious crime in Cyber Law which attracts a prison sentence for 20 years or more?
    a) Fraud
    b) Child pornography
    c) Software Piracy
    d) Hacking

43. One of the ways of misusing the truth is
    a) Making the confused statement
    b) Falsihood
    c) Deliberate deception
    d) Misrepresentation

44. One of the aims of engineering ethics is to
    a) Acquire new skills in engineering
    b) Stimulate to conduct research
    c) Stimulate the moral imagination
    d) Train to acquire self-confidence in their duties

45. Which of the provisions cannot be suspended during national emergency?
    a) Arts. 14 and 15
    b) Arts. 23 and 24
    c) Arts. 20 and 21
    d) Arts. 17 and 18

46. The constitution expressly permits the state to make special provisions for
    a) Women and unemployed persons
    b) Socially and educationally backward class people
    c) Old, sick and disabled persons
    d) Senior citizens

47. 'Creamy layer' means
    a) Highly educated persons
    b) Illiterate persons
    c) Highly cultured persons
    d) Persons having higher incomes

48. Under fundamental rights, <u>Minority</u> may be considered on the basis of
    a) Linguistic or religious
    b) Regional or national
    c) Racial or regional
    d) Caste or racial

49. The right against exploitation prohibits
    a) Labourers
    b) Mining employees sufferings
    c) Traffic in human beings
    d) None of these

50. The Supreme Court can issue the appropriate writ when there is a violation of …..
    a) Fundamental right
    b) Fundamental duties
    c) Directive principles
    d) None of these

51. Federal type of Government means
    a) Division of powers between Centre and State
    b) Distribution of powers between legislature and executive
    c) Separation of powers between President and Prime Minister
    d) None of the above

52. How much time taken to draft the Indian Constitution to adopt?
    a) 03 years 10 months 07 days
    b) 05 years 11 months 19 days
    c) 04 years 11 months 17 days
    d) 02 years 11 months 18 days

53. The seat of Supreme Court is in
    a) Bangaluru
    b) Delhi
    c) Mumbai
    d) Chennai

54. Which article recognized the international law under constitution?
    a) Art. 32
    b) Art. 42
    c) Art. 50
    d) Art. 51

55. Writ of 'Habeaus Corpus' means
    a) To command to do a duty
    b) To quash the decision
    c) To produce the person before the court
    d) On what authority?

56. The right to public appointment has been provided in
    a) Art. 14
    b) Art. 15
    c) Art. 16
    d) Art. 20

57. Reasonable restrictions can be imposed by the state under the provision of …….
    a) Art. 19(1)(a) to (g)
    b) Art. 19 (2) to (6)
    c) Art. 20 (a) to (c)
    d) Art. 21

58. An arrested person is to be allowed to …….
    a) Choose his own advocate
    b) Contact the political people
    c) Contact nearest magistrate
    d) Contact his relative

59. Any law made by the Parliament in contravention to the fundamental rights is declared as…….
    a) Valid
    b) Illegal
    c) Void
    d) Incorrect

60. Who are not entitled to form a Union or Association?
    a) Police
    b) Students
    c) Teachers
    d) Workmen of an industry

61. Indian Constitution is silent on the concept of
   a) Deputy Speaker of Loka Sabha   b) Deputy Prime Minister
   c) Deputy Chief Minister   d) Both (b) and (c)

62. Who is the Presiding Officer of the joint-session to discuss on the controversial bill of the parliament?
   a) President   b) Vice-President
   c) Speaker of Loka Sabha   d) Prime Minister

63. Who has the power to pardon the death sentence?
   a) President   b) Chief Justice of Supreme Court
   c) Governor of a State   d) Both (b) and (c)

64. Who can disqualify the MLAs, if they act against anti-defection law?
   a) Speaker of Loka Sabha   b) Speaker of Legislative Assembly
   c) Prime Minister   d) Chief Minister of a State

65. What is the term of member of Rajya Sabha?
   a) 5 years   b) 6 years   c) 4 years   d) 2 years

66. Which bill is to be introduced only in Loka Sabha?
   a) Ordinary bill   b) Money bill   c) Amendment bill   d) None of these

67. The protection, "No person is to be forced or compelled to say the witness against himself" is
   a) Ex-Post Facto Law   b) Double Zeo Pardy
   c) Self-Incrimination   d) Testimonial Compulsion

68. Phishing is
   a) a cyber crime   b) civil wrong   c) a net work   d) a type of computer

69. Child Pornography is
   a) Exposure of social behaviour of children
   b) Exploitation of children in the porn industry
   c) Not a cyber crime
   d) appreciable one

70. Which is the India's cybercrime capital?
   a) Bombay   b) Delhi   c) Bengaluru   d) Calcutta

71. The term of the selection commissioner is
   a) 3 years
   b) 4 years
   c) 6 years or till he attains the age of 65 years
   d) 5 years or till he attains the age of 62 years

72. Which one is not a kind of trade mark?
   a) Designs   b) Symbols   c) Sounds   d) Goodwill

73. Which is the very essential element in professional ethics?
   a) Honesty   b) Responsibility   c) Risk   d) Over-confidence

74. Who is the ex-officio-chairman of Rajya Sabha?
   a) President   b) Vice-President   c) Prime Minister   d) None of these

75. Which one of the following is not a fundamental right under Art. 21?
   a) Right to life   b) Right to dignity   c) Right to privacy   d) Right to suicide

76. If the Head of the State is an elected functionary for a fixed term, it is known as
   a) Unitary   b) Federal   c) Republic   d) Democratic

77. Which schedule gives details regarding the subjects included in the three lists – Central, State and Concurrent?
   a) Schedule - VII   b) Schedule - VIII   c) Schedule - V   d) Schedule - IV

78. 'Sovereign' means
   a) Independent Supreme Authority   b) Absolutism
   c) Dependent Authority   d) Dictatorship

79. A person can move to the Supreme Court directly for any violation of his Fundamental Right under Article ....
   a) 12   b) 22   c) 32   d) 226

80. Which one of the following is not included under the definition of state in Art.12?
   a) Parliament   b) Corporations   c) Executive   d) Judiciary

81. How many members are there in the election commission including its chairman?
   a) 5   b) 4   c) 3   d) 2

82. Who is empowered to proclaim the state emergency?
   a) Union President   b) Parliament   c) Governor of a state   d) Prime Minister

83. Who is having the power to amend the provisions of the Constitution under Article 368?
   a) Parliament   b) President   c) Union cabinet   d) Supreme court

84. How many members are nominated to Rajyasabha by the President of India?
   a) Two   b) 20   c) 12   d) One

85. High Court Judge retires at the age of ....
   a) 65 years   b) 58 years   c) 60 years   d) 62 years

86. Who can appoint the Chief Justice of Supreme court of India?
   a) Prime Minister   b) Law Minister   c) President   d) Attorney-General

87. Money Bill will be introduced only in .....
   a) Cabinet   b) Loka Sabha   c) Rajya Sabha   d) Any one of these

88. "Equal Pay for Equal Work" for the men and women is included under
   a) Part-II Citizenship   b) Part-III : Fundamental Rights
   c) Part-IV DPSP   d) Part-V-A : Fundamental Duties

89. The right to freedom of press and publication are included in .....
   a) Right to personal liberty   b) Right to speech and expression
   c) Right to move anywhere in India   d) Right to trade

90. By which amendment, right to education made fundamental right and a new provision, Art.21-A was included in the constitution?
a) 44th Amendment b) 76th Amendment c) 86th Amendment d) 91st Amendment

91. The fundamental rights guaranteed by the Constitution of India to its citizens can be protected by
a) Parliament b) President
c) Supreme court d) Union Home Minister

92. Which is the key to open the minds of the makers of the constitution?
a) Preamble b) Parliament c) Judiciary d) Part – III (FRS)

93. Who was the Chairman and Chief Architect of the Indian Constitution?
a) Jawaharlal Nehru b) Mahatma Gandhi
c) Dr. B.R. Ambedkar d) Mount Batten

94. Which is the basis or test for the classification of people under Art.14?
a) Caste b) Intelligible quotient
c) Intelligible differentia d) Annual income

95. The Parliamentary system of Government of India is based on the pattern of
a) USA b) UK c) USSR d) China

96. Which of the following is not a fundamental right?
a) Right to trade b) Right to property
c) right to life d) Right to form an association or union

97. The directive principles of state policy are
a) Enforceable by court b) Not enforceable by court
c) Absolute principles d) None of these

98. The practice of untouchability is prohibited under
a) Art.14 b) Art.15 c) Art.16 d) Art.17

99. Which of the ground replaced the internal disturbance by amendment in the year 1977?
a) War b) External aggression
c) Armed rebellion d) Terrorist activities

100. Which article has amended recently to remove the special status to the state of Jammu and Kashmir?
a) Art. 368 b) Art. 370 c) Art. 372 d) Art. 380

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USN ☐☐☐☐☐☐☐☐☐☐   **18MATDIP31**

Third Semester B.E. Degree Examination, Jan./Feb. 2021
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.   Prove that $(1+\cos\theta+i\sin\theta)^n + (1+\cos\theta-i\sin\theta)^n = 2^{n+1}\cos^n\left(\dfrac{\theta}{2}\right)\cos\left(\dfrac{n\theta}{2}\right)$.   **(08 Marks)**

    b.   Express $1-i\sqrt{3}$ in the polar form and hence find its modulus and amplitude.   **(06 Marks)**

    c.   Find the argument of $\dfrac{1+\sqrt{3}i}{1-\sqrt{3}i}$.   **(06 Marks)**

OR

2   a.   If $\vec{A}=4\hat{i}+3\hat{j}+\hat{k}$ and $\vec{B}=2\hat{i}-\hat{j}+2\hat{k}$ find a unit vector $\hat{N}$ perpendicular to both $\vec{A}$ and $\vec{B}$ such that $\vec{A}$, $\vec{B}$ and N from a right handed system.   **(08 Marks)**

    b.   If $\vec{a}=\hat{i}+2\hat{j}-3\hat{k}$ and $\vec{b}=3\hat{i}-\hat{j}+2\hat{k}$ then show that $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$ are orthogonal.   **(06 Marks)**

    c.   Show that the position vectors of the vertices of a triangle $\vec{A}=3\left(\sqrt{3}\,\hat{i}-\hat{j}\right)$, $\vec{B}=6\hat{i}$ and $C=3(\sqrt{3}i+j)$ form an isosceles triangle.   **(06 Marks)**

Module-2

3   a.   Obtain the Maclaurin series expansion of $\log\sec x$ upto to the terms containing x^6. **(08 Marks)**

    b.   If $u=\tan^{-1}\left(\dfrac{x^3+y^3}{x-y}\right)$, prove that $xu_x+yu_y=\sin 2u$.   **(06 Marks)**

    c.   If $u=f(x-y,\,y-z,\,z-x)$, show that $u_x+u_y+u_z=0$.   **(06 Marks)**

OR

4   a.   Prove that $\log(1+x)=x-\dfrac{x^2}{2}+\dfrac{x^3}{3}-\dfrac{x^4}{4}\ldots$ by using Maclaurin's series notation.   **(08 Marks)**

    b.   Using Euler's theorem, prove that $x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}=3u\log u$. If $u=e^{\frac{x^2y^2}{x+y}}$.   **(06 Marks)**

    c.   If $u=x+y,\ v=y+z,\ w=z+x$, find $J\left(\dfrac{u,v,w}{x,y,z}\right)$.   **(06 Marks)**

Module-3

5   a.   A particle moves along the curve $\vec{r}=\cos 2t\,\hat{i}+\sin 2t\,\hat{j}+t\,\hat{k}$, find the velocity and acceleration at $t=\dfrac{\pi}{8}$ along $\sqrt{2}\,\hat{i}+\sqrt{2}\,\hat{j}+\hat{k}$.   **(08 Marks)**

    b.   Find the unit normal to the surface, $xy+x+zx=3$ at $(1, 1, 1)$.   **(06 Marks)**

    c.   Find the constant 'a' such that the vector field $\vec{F}=2xy^2z^2\hat{i}+2x^2yz^2\hat{j}+ax^2y^2z\hat{k}$ is irrotational.   **(06 Marks)**

OR

6 a. If $\vec{F} = (x + y + 1)\hat{i} + \hat{j} - (x + y)\hat{k}$ show that $\vec{F}.curl\,\vec{F} = 0$. **(08 Marks)**

b. If $\phi(x, y, z) = xy^2 + yz^3$, find $\nabla\phi\ \&\ |\nabla\phi|$ at $(1, -2, -1)$ **(06 Marks)**

c. Show that vector field $\vec{F} = \left[\dfrac{x\hat{i} + y\hat{j}}{x^2 + y^2}\right]$ is solenoidal. **(06 Marks)**

Module-4

7 a. Obtain a reduction for $\int_{0}^{\frac{\pi}{2}} \sin^n x\,dx\ (n > 0)$. **(08 Marks)**

b. Evaluate $\int_{0}^{1} \dfrac{x^9}{\sqrt{1 - x^2}}\,dx$. **(06 Marks)**

c. Evaluate $\iint_{R} xy\,dx\,dy$ where R is the first quadrant of the circle $x^2 + y^2 = a^2$, $x \geq 0$, $y \geq 0$. **(06 Marks)**

OR

8 a. Obtain a reduction formula for $\int_{0}^{\frac{\pi}{2}} \cos^n x\,dx$, $(n > 0)$. **(08 Marks)**

b. Evaluate $\int_{0}^{2a} x^2 \sqrt{2ax - x^2}\,dx$. **(06 Marks)**

c. Evaluate $\int_{-1}^{1}\int_{0}^{z}\int_{x-2}^{x+2}(x + y + z)\,dy\,dx\,dz$ **(06 Marks)**

Module-5

9 a. Solve $\dfrac{dy}{dx} + y\cot x = \sin x$. **(08 Marks)**

b. Solve $\cos x \sin y\,dx + \cos y \sin x\,dy = 0$. **(06 Marks)**

c. Solve $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. **(06 Marks)**

OR

10 a. Solve : $\dfrac{dy}{dx} + \dfrac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **(08 Marks)**

b. Solve : $\dfrac{dy}{dx} + \dfrac{y}{x} = y^2 x$. **(06 Marks)**

c. Solve : $\sqrt{1 - y^2}\,dx = \left(\sin^{-1} y - x\right)dy$ **(06 Marks)**

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