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15MAT31

Third Semester B.E. Degree Examination, June/July 2017
Engineering Mathematics - III

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-1

1 a. Obtain the Fourier series expansion of

$$f(x) = \begin{cases} \pi x & 0 \le x \le 1 \\ \pi(2-x) & 1 \le x \le 2 \end{cases}$$ **(08 Marks)**

and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$.

b. Obtain the constant term and first sine and cosine terms in the Fourier expansion of y from the following table. **(08 Marks)**

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

OR

2 a. Expand $f(x) = |x|$ as a Fourier series in $-\pi \le x \le \pi$ and deduce that **(06 Marks)**

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}.$$

b. Obtain the half range cosine series for the function $f(x) = x \sin x$ in $0 < x < \pi$. **(05 Marks)**

c. The following table gives variations of periodic current over a period T. Show that there is a direct current part of 0.75 amp in the variable current and obtain the amplitude of first harmonic. **(05 Marks)**

t(sec)	0	$\frac{T}{6}$	$\frac{T}{3}$	$\frac{T}{2}$	$\frac{2T}{3}$	$\frac{5T}{6}$
A (amp)	1.98	1.3	1.05	1.3	-0.88	-0.25

Module-2

3 a. Find the Fourier Transform of

$$f(x) = \begin{cases} 1 - x^2 & |x| \le 1 \\ 0 & |x| > 1 \end{cases}$$ **(06 Marks)**

Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos \frac{x}{2}\, dx$.

b. Find the Fourier cosine transform of

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2 - x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$ **(05 Marks)**

c. Find the inverse Z – transform of

$$\frac{3z^2 + 2z}{(5z-1)(5z+2)}.$$ **(05 Marks)**

OR

4 a. Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, $a > 0$. **(06 Marks)**

b. Find the Z – transform of i) $\cosh n\theta$ ii) n^2. **(05 Marks)**

c. Solve the difference equation $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ with $y_0 = 0$, $y_1 = 1$. **(05 Marks)**

Module-3

5 a. Find the coefficient of correlation and two regression lines for the following data : **(06 Marks)**

x	1	2	3	4	5	6	7	8	9	10
y	10	12	16	28	25	36	41	49	40	50

b. Fit a curve of the form $y = ae^{bx}$ for the following data : **(05 Marks)**

x	5	6	7	8	9	10
y	133	55	23	7	2	2

c. Use Newton – Raphson method to find a real root of the equation $x \sin x + \cos x = 0$ near $x = \pi$. **(05 Marks)**

OR

6 a. In a partially destroyed lab record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate $\bar{x}$, $\bar{y}$ and coefficient of correlation between x and y. **(06 Marks)**

b. Fit a second degree parabola to the following data : **(05 Marks)**

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

c. Use the regula – falsi method to obtain a root of the equation $2x - \log_{10}x = 7$ which lies between 3.5 and 4. Carryout 2 iterations. **(05 Marks)**

Module-4

7 a. The population of a town is given by the table **(06 Marks)**

Year	1951	1961	1971	1981	1991
Population in thousands	19.96	39.65	58.81	77.21	94.61

Using Newton's forward and backward interpolation formula, calculate the increase in the population from the year 1955 to 1985.

b. Use Lagrange's interpolation formula to find y at x = 10, given **(05 Marks)**

x	5	6	9	11
y	12	13	14	16

c. Given the values

x	2	4	5	6	8	10
y	10	96	196	350	868	1746

Construct the interpolating polynomial using Newton's divided difference interpolation formula. **(05 Marks)**

OR

8 a. From the following table, estimate the number of students who obtained marks between 40 and 45. **(06 Marks)**

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

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b. Apply Lagrange's formula inversely to obtain the root of the equation f(x) = 0, given f(30) = -30 , f(34) = -13 , f(38) = 3 , f(42) = 18. **(05 Marks)**

c. Use Simpson's $\frac{1}{3}$ rule to find $\int_0^{0.6} e^{-x^2} dy$ by taking 7 ordinates. **(05 Marks)**

Module-5

9 a. Find the work done in moving a particle in the force field $\vec{F} = 3x^2 i + (2xz - y)j + z k$ along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from x = 0 to x = 2. **(06 Marks)**

b. Verify Stoke's theorem for $\vec{F} = (x^2 + y^2)i - 2xy j$ around the rectangle $x = \pm a$, $y = 0$, $y = b$. **(05 Marks)**

c. Solve the Euler's equation for the functional $\int_{x_0}^{x_1} (1 + x^2 y^1) y^1 dx$. **(05 Marks)**

OR

10 a. Verify Green's theorem for $\int_c (xy + y^2)dx + x^2 dy$, where c is bounded by y = x and $y = x^2$. **(06 Marks)**

b. Evaluate the surface integral $\iint_s \vec{F}$. Nds where $\vec{F} = 4xi - 2y^2 j + z^2 k$ and s is the surface bounding the region $x^2 + y^2 = 4$, z = 0 and z = 3. **(05 Marks)**

c. Show that the shortest distance between any two points in a plane is a straight line. **(05 Marks)**

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15EE32

Third Semester B.E. Degree Examination, June/July 2017
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Transform the network given in Fig Q1(a) in to a single voltage source using source transformation technique. **(05 Marks)**

b. Find the currents i_1, i_2 and i_3 in the network given Fig Q1(b)using mesh analysis. **(06 Marks)**

c. Find current through 0.5Ω resistance in the Fig Q1(c) using node analysis. **(05 Marks)**

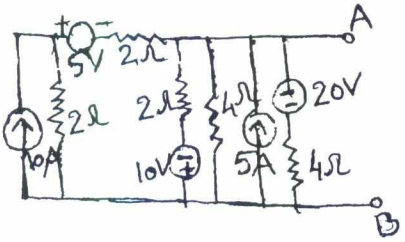

Fig Q1(a)

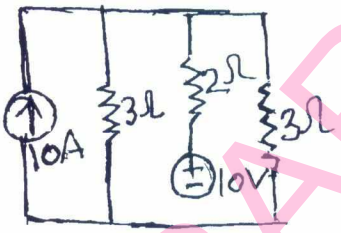

Fig Q1(b)

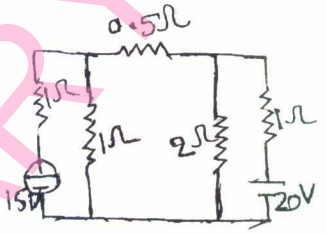

Fig Q1(c)

OR

2 a. Determine the equivalent resistance between the terminals A and B in the network in the Fig Q2 (a) using star Delta, transformation. **(06 Marks)**

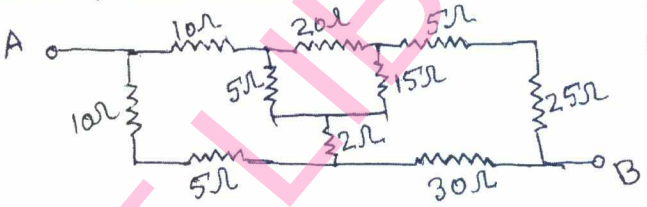

Fig Q2(a)

b. Derive expression for resonant frequency in series RLC circuit. **(05 Marks)**

c. Give the comparison between series and parallel resonance. **(05 Marks)**

Module-2

3 a. State and explain superposition theorem. **(05 Marks)**

b. Obtain the current I_x in the circuit shown in Fig Q3(b) using Thevenin's theorem. **(05 Marks)**

c. Find the Norton's equivalent circuit at the terminals A and B in the network given in Fig Q3(c). **(06 Marks)**

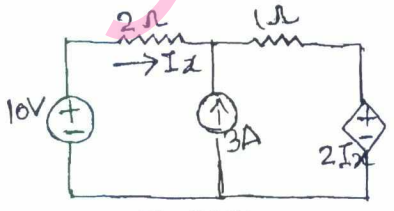

Fig Q3(b)

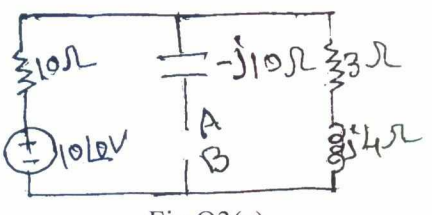

Fig Q3(c)

OR

4 a. State and explain Millman's theorem. **(05 Marks)**

b. Verify Reciprocity theorem for the network given in Fig Q4(b). **(05 Marks)**

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c. Find the value of load resistance R_L for maximum power to be transferred to the load and also find maximum power for the network shown in Fig Q4(c) **(06 Marks)**

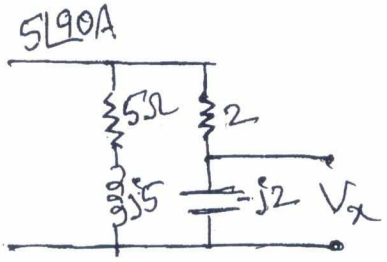

Fig Q4(b)

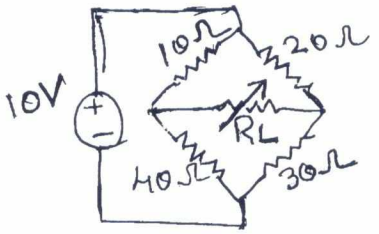

Fig Q4(c)

Module-3

5 a. Switch K is opened at time t = 0 after reaching steady state in the circuit shown in Fig Q5(a). Find V_k, $\frac{dV_k}{dt}$ and $\frac{d^2v_k}{dt^2}$ at time $t = 0^+$ **(05 Marks)**

b. In the circuit shown in Q5 (b) switch is opened at time t = 0. Find the values of V, $\frac{dV}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$ **(05 Marks)**

c. In the circuit shown in Fig Q5(c), find the current i(t). The circuit has reached steady state with switch closed and switch is open at t = 0. **(06 Marks)**

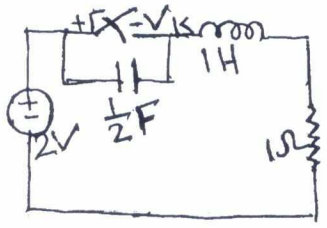

Fig Q5(a)

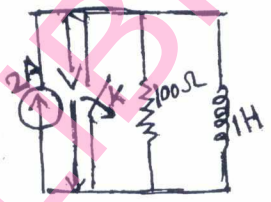

Fig Q5(b)

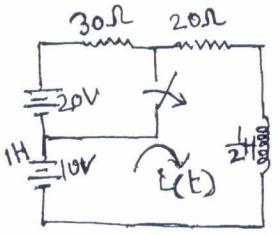

Fig Q5(c)

OR

6 a. Switch is closed at time t = 0 in the circuit shown in Fig.Q6(a). Find the values of i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$ at time $t = 0^+$. **(05 Marks)**

b. Switch K is opened after the circuit has reached steady state at t = 0 in the network shown in Fig.Q6(b). Find the expression for V_2 (t) for time t > 0. **(05 Marks)**

c. In the circuit shown in Fig.Q6(c) the relay is adjusted to operate at a current of 5A. Switch is closed at time t = 0 and relay is found to operate at t =0.347 sec. Find the value of inductance. **(06 Marks)**

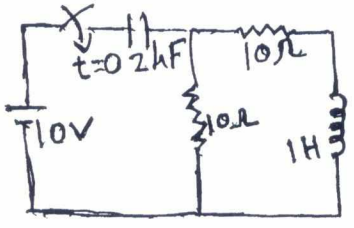

Fig.Q6(a)

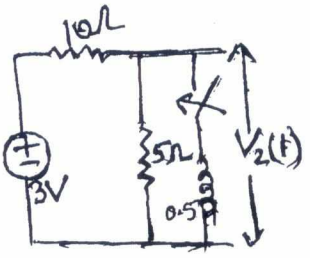

Fig.Q6(b)

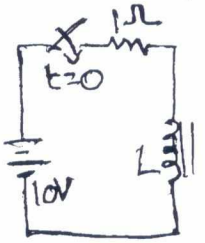

Fig.Q6(c)

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Module-4

7 a. Find Laplace transform of the following functions i) sin wt ii) cos wt iii) te^{-at}. **(05 Marks)**

b. State and prove initial value theorem. **(05 Marks)**

c. In the circuit shown in Fig Q7(c) find the expression for current if switch is closed at t =0. Assume initial charge on capacitance is zero. **(06 Marks)**

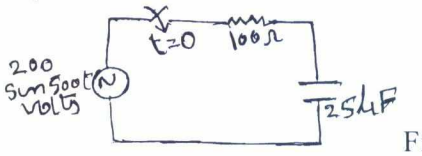

Fig Q7(c)

OR

8 a. Find inverse Laplace transform of the following functions.

i) $\frac{S^2+5}{S(S^2+4S+4)}$ ii) $\frac{2S+6}{S^2+6S+25}$ **(05 Marks)**

b. Using initial and final value theorems, where they apply, find f(0) and f(∞) for the following functions.

i) $\frac{S^3+7S^2+5}{S(S^3+3S^2+4S+2)}$ ii) $\frac{S(S+4)(S+8)}{(S+1)(S+6)}$ **(05 Marks)**

c. Find i(t) using Laplace transforms switch is closed at time t = 0 with zero initial conditions. **(06 Marks)**

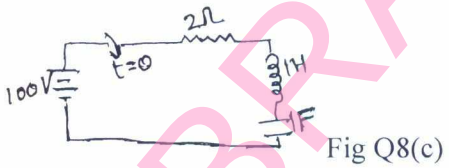

Fig Q8(c)

Module-5

9 a. Explain the method of analyzing a 3-ph star connected load by using Millman's theorem. **(05 Marks)**

b. A delta connected three phase load with impedance is connected across a 3-ph 230V, 50Hz symmetrical RYB supply. The impedances are (28 + j0)Ω, (25 + j45)Ω and (0 – j65)Ω. Find line and phase currents. **(06 Marks)**

c. Find z parameters of the circuit shown in Fig.Q9(c). **(05 Marks)**

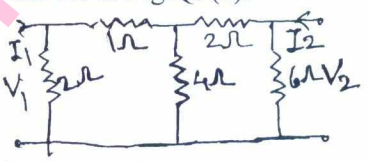

Fig Q9(c)

OR

10 a. A star connected load with (3+j0) Ω (2+j3) Ω and (2 – j1) Ω connected in 3-ph, 4 wires, Y connected system with phase sequence ACB. Find line currents and neural current. **(06 Marks)**

b. Explain the concept of unbalanced load. State various types of unbalanced loads. **(05 Marks)**

c. Find 'T' parameters of the circuit in Fig.Q10(c). **(05 Marks)**

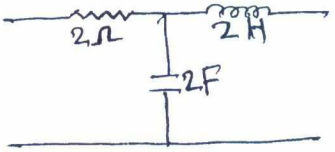

Fig Q10(c)

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15EE33

Third Semester B. E Degree Examination, June/July 2017
Transformers and Generators

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. With the help of phasor diagram. Explain the operation of practical transformer on load. **(06 Marks)**

b. A 3-phase step down transformer with per phase turns ratio 47.6:1 connected in delta/star and is supplying a load of 400kW, 0.8 p.g lagging at 400V. Calculate different line voltages and currents. **(06 Marks)**

c. Write a short note on All day efficiency. **(04 Marks)**

OR

2 a. State the advantages of single 3-phase unit transformer over bank of single phase transformers. **(06 Marks)**

b. Show that open delta connection of 3-phase transformers has KVA rating of 57.7% of that of delta-delta connection. Show the connection diagram. **(05 Marks)**

c. A 4-KVA, 200/400V single phase transformer supplying full load current of 0.8 p.f lagging. The OC/SC test results are : OC Test : 200V, 0.8A, 70W
SC Test : 20V, 10 A, 60W (HV side)
Calculate : Efficiency **(05 Marks)**

Module-2

3 a. Derive an expression for the currents and load shared by two transformers connected in parallel supplying a common load when no load voltages of these are equal. **(06 Marks)**

b. The primary and secondary voltages of an autotransformer are 230V and 75V respectively. Calculate the currents in the different parts of the winding when load current is 200A. Also calculate saving of copper. **(06 Marks)**

c. Explain why tertiary winding is used. **(04 Marks)**

OR

4 a. Explain how stabilization is achieved using tertiary winding. **(04 Marks)**

b. With the help of sketches explain the working of on load tap changer. **(06 Marks)**

c. Two single phase transformers, rated at 250KVA each are operated in parallel on both sides. Impedances of transformers are $(1+j6)\Omega$ and $(1.2 + j4.8)\Omega$ respectively. Find the load shared by each when the total load is 500KVA at 0.8 p.f lagging. **(06 Marks)**

Module-3

5 a. Write a short note on Noise in Transformer. **(04 Marks)**

b. A 4-pole, lap wound armature running at 1400rpm delivers a current of 100A and has 64 commutator segments. The brush width is equal to 1.4 commutator segments and inductance of each armature coil is 0.05mH. Calculate the value of the reactance voltage assuming linear commutation. **(06 Marks)**

c. Explain the methods used to reduce harmonics in three phase alternators. **(06 Marks)**

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OR

6 a. Draw and explain the characteristics of DC shunt generator. **(06 Marks)**

b. Explain the polarity test with the help of connection diagram. **(04 Marks)**

c. A 4-pole, 3-phase, 50Hz star connected alternator has 60 slots with 4 conductors/slot. The coils are short pitched by 3 slots. If the phase spread is 60°, find the phase voltage induced for a flux/pole of 0.943 wb. sinusoidally distributed in space. All the turns/phase are in series. **(06 Marks)**

Module-4

7 a. Define voltage regulation of an alternator. **(03 Marks)**

b. A 3-phase, 50Hz, 2-pole alternator is excited to generate the bus bar voltage of 11KV at no. load. Calculate synchronizing power per degree of mechanical displacement of the rotor. The machine is star connected and the short circuit current for this excitation is 1200A. Neglect the armature winding resistance. **(06 Marks)**

c. With phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. **(07 Marks)**

OR

8 a. Explain the behaviour of synchronous generator on no load under variable excitation connected to infinite bus bar. **(08 Marks)**

b. A 3-phase star connected synchronous of generator supplies current of 10A having phase angle of 20° lagging at 400V. Find the load angle and components of armature current I_d and I_q if $x_d = 10\Omega$ and $x_q = 6.5\Omega$. Assume armature resistance to be negligible. **(08 Marks)**

Module-5

9 a. Write a short note on hunting and dampers. **(06 Marks)**

b. A 50KVA, 500V, single phase alternator gave the following test results :
OC Test : A field current of 12A produced an emf. of 300 volts.
SC Test : A field current of 12A caused a current of 175A to flow in the short circuited armature
The effective armature resistance is 0.2Ω.

i) Calculate the synchronous impedance and synchronous reactance

ii) If alternator is supplying full load current of 100A at 0.8p.f lagging, to what value would the terminal voltage rise if the load were removed? Also find the voltage regulation for this load and p.f. **(10 Marks)**

OR

10 a. Explain Potier reactance method. **(08 Marks)**

b. A 2300V, 50Hz, 3-phase star connected alternator has an armature resistance of 0.2Ω. A field current of 35A produces a current of 150A on short circuit and an open circuit emf 780V (line). Calculate the voltage regulation at 0.8 p.g lagging and 0.8p.f leading for the full load current of 25A. **(08 Marks)**

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15EE34

Third Semester B.E. Degree Examination, June/July 2017
Analog Electronic Circuits

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-1

1 a. Explain DC analysis of collector to base bias circuit. **(05 Marks)**

b. For the biasing circuit as shown in Fig.Q1(b), calculate I_E, I_C, V_C and V_{CE}. Given that $V_{EE} = -8V$, $R_E = 2.2\ k\Omega$, $R_B = 1.8k\Omega$, $\beta = 100$. **(05 Marks)**

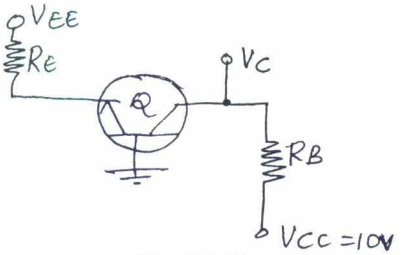

Fig.Q1(b)

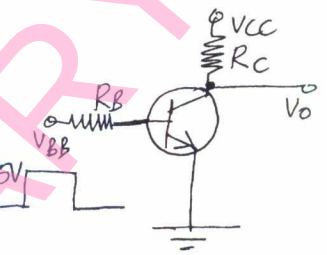

Fig.Q2(c)

c. For emitter stabilized bias circuit $V_{CC} = 10V$, $R_C = 1k\Omega$, $R_E = 500\Omega$, $R_B = 100\ k\Omega$, $\beta = 100$. Calculate I_B, I_C, V_{CE}, V_E and V_C. Draw the circuit diagram. **(06 Marks)**

OR

2 a. For the fixed bias circuit, derive expressions for S_{ICO}, S_β and S_{VBE}. **(06 Marks)**

b. For a voltage divider bias circuit, $R_C = 1k\Omega$, $R_E = 470\Omega$, $R_1 = 10k\Omega$, $R_2 = 5\ k\Omega$,, $\beta = 100$. Determine the stability factor S_{ICO}. Draw the circuit diagram. **(05 Marks)**

c. For the circuit shown in Fig.Q2(c), calculate the value of R_B that just saturates the transistor when $V_i = +5V$. Given that $R_C = 1k\Omega$, $\beta = 100$, $V_{CC} = 5V$, $V_{CE\,sat} = 0.2V$. **(05 Marks)**

Module-2

3 a. Explain hybrid equivalent model for a transistor. Develop h-parameter model for a transistor in CE, CB and CC modes. **(08 Marks)**

b. For the common base circuit shown in Fig.Q3(b), $R_C = 10\ k\Omega$, $R_E = 5\ k\Omega$, $R_S = 1\ k\Omega$, $R_L = 12\ k\Omega$, $h_{ib} = 22\Omega$, hob = 0.49 $\mu A/V$, $h_{rb} = 2.9 \times 10^{-4}$, $h_{fb} = -0.98$, Use exact h–parameter model. Calculate A_I, Z_I, A_V and A_{VS}. **(08 Marks)**

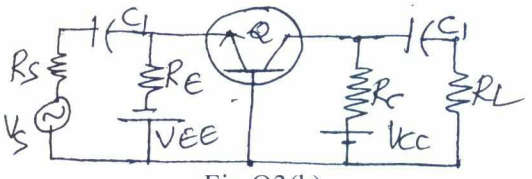

Fig.Q3(b)

OR

4 a. Explain the low frequency response by considering input RC network, output RC network. **(08 Marks)**

b. Calculate the high frequency response of amplifier circuit. Assume $R_C = 2.2k\Omega$, $R_E = 1k\Omega$, $R_1 = 68k\Omega$,, $R_2 = 22k\Omega$, $R_S = 680\Omega$, $\beta = 100$, $C_{Wi} = 6pF$, $C_{Wo} = 8pF$, $C_{ce} = 1pF$, $C_{be} = 20\ pF$, $C_{bc} = 4pF$, $h_{ie} = 1.1\ k\Omega$, $V_{CC} = 10V$. Draw the circuit diagram. $R_L = 10k\Omega$. **(08 Marks)**

Module-3

5 a. For the 2-stage amplifier circuit as shown in Fig.Q5(a), R_S = 1 kΩ, R_{C1} = 3.3 kΩ, R_{E2} = 4.7 kΩ, h_{ie} = 2 kΩ, h_{fe} = 50, h_{re} = 0, h_{oe} = 0, calculate the overall voltage gain Av and overall Z_0. **(08 Marks)**

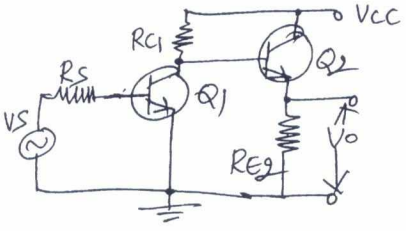

Fig.Q5(a)

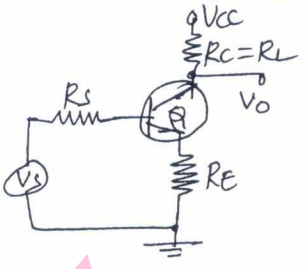

Fig.Q6(b)

b. For Darlington emitter follower circuit, obtain an expression for overall current gain A_I. **(08 Marks)**

OR

6 a. For voltage series feedback topology obtain expressions for Av and R_{if}. **(08 Marks)**

b. For the current series feedback as shown in Fig.6(b), R_L = 2.2 kΩ, R_E = 1.2 kΩ,, R_B = 1 kΩ, h_{ie} = 1.1 kΩ, h_{fe} = 50, calculate G_M, β, D, G_{MF}. **(08 Marks)**

Module-4

7 a. For transformer coupled class A power amplifier, obtain DC and AC operation and expression for maximum efficiency. **(08 Marks)**

b. A class B push pull amplifier drives a load of 16Ω, V_{CC} = 25V, number of turns in primary = 200 and that in secondary is 90. Calculate maximum power output, efficiency and maximum power dissipation per transistor. **(08 Marks)**

OR

8 a. State and explain Barkhausen criterion for sustained oscillations. **(05 Marks)**

b. Derive an expression for frequency of oscillations in Wien bridge oscillator. **(08 Marks)**

c. Calculate the frequency of oscillations of colpitts oscillator if C_1 = 150 pF, C_2 = 1.5 nF and α = 50 μH. **(03 Marks)**

Module-5

9 a. What are the advantages and drawback of FET Vs BJT? **(05 Marks)**

b. For the circuit shown in Fig.Q9(b), calculate V_{GSQ}, I_{DQ}, V_{DSQ} and V_D given I_{DSS} = 10mA and V_p = –4V. **(05 Marks)**

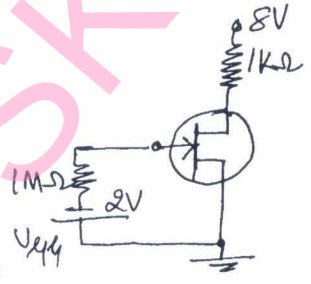

Fig.Q9(b)

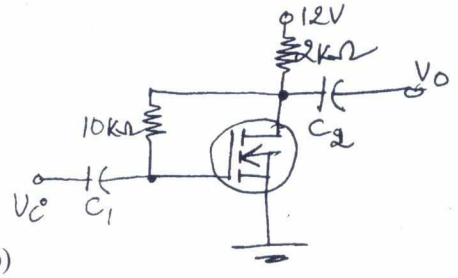

Fig.Q10(b)

c. For JFET, obtain the condition for zero current drift. **(06 Marks)**

OR

10 a. Explain construction, working and characteristics of n-channel depletion type MOSFET. **(08 Marks)**

b. For the circuit shown in Fig.Q10(b), calculate V_{GS}, I_D and V_{DS}. Given, $I_{D\ ON}$ = 6mA, $V_{GS\ ON}$ = 8V, $V_{GS\ TH}$ = 3V. **(08 Marks)**

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15EE35

Third Semester B.E. Degree Examination, June/July 2017
Digital System Design

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume Missing Data if any suitably

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Write the truth table of the logic circuit having 3 inputs: A, B and C and an output $Y = AB\overline{C} + \overline{A}BC + ABC$. Also simplify the Boolean expression and implement the logic circuit using NAND gates only. **(06 Marks)**

b. Using Quine – McCluskey method, simplify: $f(a, b, c, d) = \sum m(2, 3, 4, 5, 13, 15) + dc(8, 9, 10, 11)$. **(10 Marks)**

OR

2 a. Define Canonical Minterm formula and Canonical maxterm formula with an example for each. **(04 Marks)**

b. Simplify the Boolean expression using 'd' as MEV for $f(a, b, c, d) = \sum m(2, 3, 4, 5, 8, 9, 10, 11, 13, 15)$ **(06 Marks)**

c. Design a three input, A, B and C and one output ; 'Y'; minimal, two level gate combinational circuit which has an output equal to 'zero' when majority of its inputs are at logic '1'. **(06 Marks)**

Module-2

3 a. Design a comparator to check if two N-bit numbers are equal. Configure this using cascaded stages of 1 – bit comparator. **(04 Marks)**

b. Write the compressed truth table for a 4 to 2 line priority encoder with a valid output and simplify the same using K-Map. Design the logic circuit as well. **(06 Marks)**

c. Implement the following Boolean function using a 4:1 MUX with A and B as select lines $Y = f(A, B, C, D) = \sum m(0, 1, 2, 4, 6, 9, 12, 14)$. **(06 Marks)**

OR

4 a. Write a short note on 4-bit parallel Adder. **(04 Marks)**

b. Using active high output 3:8 line decoder, implement the following functions
$f_1(A, B, C, D) = \sum m(0, 1, 2, 5, 7, 11, 15)$
$f_2(A, B, C, D) = \sum m(1, 3, 4, 11, 13, 14)$ **(06 Marks)**

c. Design an 8:1 MUX Tree using only 2:1 multiplexers. **(06 Marks)**

Module-3

5 a. With a neat logic diagram, explain working of a Master slave JK Flip-Flop along with waveforms. Also brief about Race-around condition. **(08 Marks)**

b. Convert a T – Flip-Flop to a D – Flip-Flop. **(04 Marks)**

c. Write a short note on shift Registers. **(04 Marks)**

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OR

6 a. Design Synchronous Mod – 6 counter using SR Flip-Flops. **(08 Marks)**

b. Compare Asynchronous and Synchronous counters. **(04 Marks)**

c. Explain working of a 4-bit binary ripple down counter configured using negative edge triggered JK Flip-Flop with timing diagram. **(04 Marks)**

Module-4

7 a. Explain Melay and Moore models with neat block diagrams. **(04 Marks)**

b. Analyse the synchronous circuit of the Fig Q7(b) shown below.

i) Write down excitation and output functions.

ii) Form the excitation and state tables

iii) Give description of the circuit operation. **(12 Marks)**

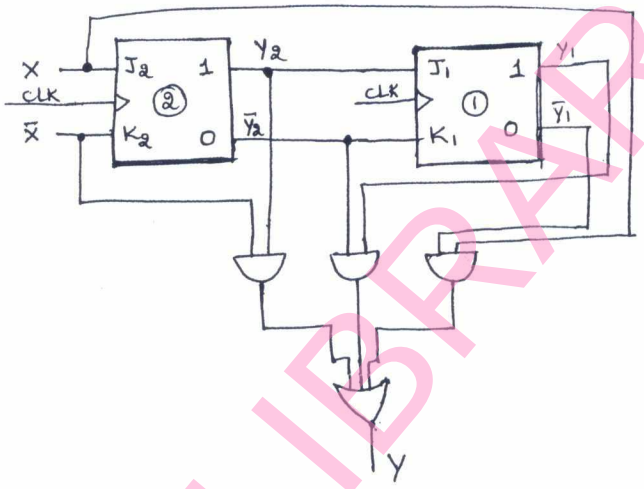

Fig Q7(b)

OR

8 a. Define state, present state, state diagram and state table. **(04 Marks)**

b. Construct Moore and Melay model state diagrams to detect input sequence 10110. When the input pattern is detected, output 'Z' is asserted HIGH. **(06 Marks)**

c. Construct a state diagram for synchronous decade UP/DOWN counter. The mode control; 'M' decides the pattern of counting operation. When M = 0 'Counter counts UP and when M = 1; the counter counts DOWN. When the counter reaches terminal count Y = 1 (for UP count) and Z = 1 (for DOWN count). Label the state diagram in M/YZ mode. **(06 Marks)**

Module-5

9 a. Mention styles/types of HDL description. Explain behavioral type with half adder example in both VHDL and verilog. **(08 Marks)**

b. Compare VHDL and verilog. **(04 Marks)**

c. Explain verilog data types. **(04 Marks)**

OR

10 a. Tabulate Rotate operators used in HDL with example operand A = 1110. **(08 Marks)**

b. Draw the block diagram of 3-bit carry look ahead adder. Write verilog code for the same. **(08 Marks)**

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15EE36

Third Semester B.E. Degree Examination, June/July 2017
Electrical & Electronic Measurements

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-1

1 a. Derive the dimensions of, (i) emf (ii) Magnetic flux density (iii) Electric flux density (iv) Current density (v) Permeability (vi) Resistivity in LMTI system of dimensions. **(06 Marks)**

b. With neat sketch, explain the operation of the Megger. **(06 Marks)**

c. The four impedances of ac bridge are $z_1 = 400\angle 50^\circ\Omega$, $z_2 = 200\angle 40^\circ\Omega$, $z_3 = 800\angle -50^\circ\Omega$, $z_4 = 400\angle 20^\circ\Omega$. Find out whether the bridge is balanced under these condition or not. **(04 Marks)**

OR

2 a. Mention the applications and limitations of wheatstone bridge. **(06 Marks)**

b. With neat circuit diagram, explain the operation of modified Desautys bridge. **(06 Marks)**

c. Show that w^2LC is non dimensional, w being the angular frequency of the applied voltage. **(04 Marks)**

Module-2

3 a. What are the errors and adjustments in dynamometer type wattmeter? **(06 Marks)**

b. With a neat sketch, explain the operation of Weston frequency meter. **(05 Marks)**

c. A 230 V single phase watt-hour meter has a constant load of 4 A passing through it for 6 hrs at unity power factor. If the meter disc makes 2208 revolution during this period. What is the meter constant in revolution per kwh? Calculate the power factor of the load if the number of revolution made by the meter are 1472 when operating at 230 V, 5 A for 4 hrs. **(05 Marks)**

OR

4 a. Explain the operation of LPF dynamometer type wattmeter. **(06 Marks)**

b. Explain the working principle and construction of single phase electrodynamometer power factor meter. **(06 Marks)**

c. Write a note on phase sequence indicator. **(04 Marks)**

Module-3

5 a. Describe with neat sketch measurement of iron loss using wattmeter method. **(06 Marks)**

b. Explain the construction and working principle of a power transformer. **(06 Marks)**

c. Write a note on turns compensation used in current transformer. **(04 Marks)**

OR

6 a. What are shunts and multipliers? Derive an expression for shunts and multipliers with reference to the meters used in electric circuit. **(06 Marks)**

b. Explain the measurement of leakage factor using search coil. **(06 Marks)**

c. What are the advantages of instrument transformer? **(04 Marks)**

Module-4

7 a. Explain the operation of true rms reading voltmeter. **(06 Marks)**

b. Explain with the help of block diagram the function of integrating type digital voltmeter. **(06 Marks)**

c. Write a note on performance parameters of digital voltmeter. **(04 Marks)**

OR

8 a. Explain the operation of successive approximation digital voltmeter. **(06 Marks)**

b. With a neat block diagram, explain the principle of working of electronic energy meter. **(06 Marks)**

c. Mention the advantages of electronic instruments over conventional meters. **(04 Marks)**

Module-5

9 a. Explain with suitable circuit diagram working of an cathode ray tube (CRT). **(06 Marks)**

b. Explain the principle of operation of galvanometer recorder and state its advantages. **(06 Marks)**

c. Write a note on display devices. **(04 Marks)**

OR

10 a. Explain the block diagram of an Electro Cardio Graph (ECG). **(06 Marks)**

b. Write a note on:

(i) Dot matrix display.

(ii) Bar matrix display. **(06 Marks)**

c. Distinguish between frequency modulation recording and direct recording. **(04 Marks)**

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15EI/ML/BM32

Third Semester B.E. Degree Examination, June/July 2017
Electronic Instrumentation and Measurements

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define the following terms :
i) Accuracy ii) Resolution iii) Sensitivity iv) Precision. **(06 Marks)**

b. Discuss the significance of measurement system. **(05 Marks)**

c. Explain Gross error and systematic error. **(05 Marks)**

OR

2 a. With the help of block diagram, explain elements of generalized measurement system. **(08 Marks)**

b. Explain the static characteristics of measurement systems. **(08 Marks)**

Module-2

3 a. With the help of circuit diagram, explain the principle of DC ammeter. **(05 Marks)**

b. Explain the working of multi-range voltmeter. **(05 Marks)**

c. With a neat block diagram, explain dual slope integrating type digital voltmeter. **(06 Marks)**

OR

4 a. With the help of diagram, describe the construction and working of true RMS voltmeter. **(08 Marks)**

b. With the aid of basic circuit, explain frequency measurement. **(08 Marks)**

Module-3

5 a. Draw the basic block diagram of an oscilloscope and explain the functions of each block. **(08 Marks)**

b. How is the vertical axis of an oscilloscope deflected? With the aid of block diagram, explain electron switch. **(08 Marks)**

OR

6 a. With a neat diagram, explain the basic elements of storage oscilloscope. **(08 Marks)**

b. Explain the functions of digital storage oscilloscope with diagram. **(08 Marks)**

Module-4

7 a. With a neat block diagram, explain AF sine and square wave generator. **(08 Marks)**

b. Explain Kelvin bridge and derive the expression for the measurement of low resistance. **(08 Marks)**

OR

8 a. Describe the working of Maxwell's bridge for the measurement of inductance. **(08 Marks)**

b. With a neat block diagram, explain modern laboratory signal generator. **(08 Marks)**

Module-5

9 a. Classify different display devices. Explain the principle of seven segment display. **(08 Marks)**

b. With a neat block diagram, explain the working of strip chart recorder. **(08 Marks)**

OR

10 a. Describe the construction and working of x-y recorder with diagram. **(08 Marks)**

b. With the help of diagram, discuss the basic components of a magnetic tape recorder. **(08 Marks)**

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15EI/ML/BM33

Third Semester B.E. Degree Examination, June/July 2017
Analog Electronic Circuits

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Obtain the expressions for voltage gain, Z_{in} and output impedance Z_0 of common-emitter configuration with voltage divider bias using AC equivalent with r_e model. **(10 Marks)**

b. For the circuit shown in Q1 (b), calculate (i) r_e (ii) Z_i and (iii) Z_0, take $r_0 = \infty\ \Omega$. **(06 Marks)**

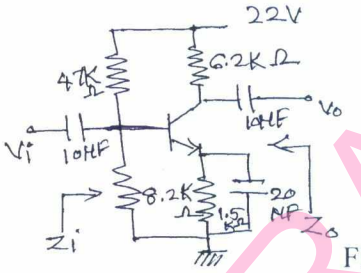

Fig. Q1 (b)

OR

2 a. Obtain the expressions for voltage gain (A_V), Z_{in} and Z_0 of common – emitter bias configuration with emitter follower using AC equivalent circuit with r_e-model. **(10 Marks)**

b. For the emitter follower shown in Fig. Q2 (b), determine r_e, Z_i and Z_0. Take $\beta = 100$ and $r_0 = \infty$. **(06 Marks)**

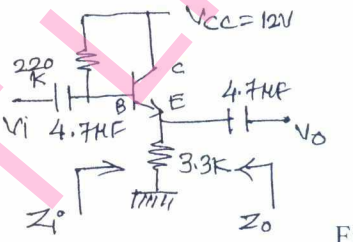

Fig. Q2 (b)

Module-2

3 a. With a neat diagram, explain construction and characteristics of n-type JFET. **(10 Marks)**

b. Explain how to find g_m using graphical method and derive mathematical expression of g_m. **(06 Marks)**

OR

4 a. With a neat circuit diagram, explain fixed bias configuration and hence determine V_D, V_G and V_{GS}. **(10 Marks)**

b. Determine the following for the network at Fig. Q4 (b): (i) V_{GSQ} (ii) I_{DQ} (iii) V_{DS} (iv) V_D (v) V_G (vi) V_S **(06 Marks)**

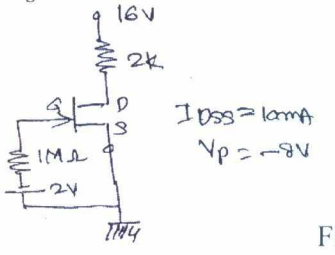

Fig. Q4 (b)

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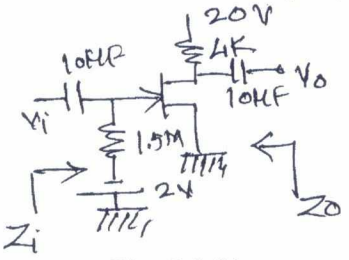
Module-3

5 a. Obtain the expressions for voltage gain input impedance and output impedance of JFET common source amplifier using self bias configuration. **(10 Marks)**

b. For the FET amplifier shown below calculate z_i, z_0 and A_V. **(06 Marks)**



I_{DSS} = 15 mA
Y_P = -6 V
Y_{OS} = 25 μsec

Fig. Q5 (b)

OR

6 a. With a neat circuit diagram, explain low frequency response BJT amplifier and hence determine f_{LS}, f_{LC} and f_{LE}. **(10 Marks)**

b. Determine the lower cut off frequency for the network using the following parameters : C_S= 10 μF, C_E = 20 μF, C_C = 1 μF, R_C = 4 KΩ, R_L = 2.2 KΩ, R_S = 1 KΩ, R_1 = 40 KΩ, R_2 = 10 KΩ, R_E = 2 KΩ, β = 100, V_{CC} = 20 V, $r_0 = \infty$ Ω **(06 Marks)**

Module-4

7 a. Explain the operation of a class B push-pull power amplifier with the help of a neat circuit diagram and draw its input and output waveforms. **(08 Marks)**

b. A class B push-pull amplifier with V_{CC} = 25 V provides a 22 V peak signal to an 8 Ω. Find peak load current, dc current, input power, output power and efficiency. **(08 Marks)**

OR

8 a. Explain the working and AC operation of a series Fed class A amplifier with necessary equations. **(10 Marks)**

b. Obtain maximum efficiency of series Fed Class A amplifier. **(06 Marks)**

Module-5

9 a. Explain the operation transistor RC-Phase shift oscillator using a neat circuit diagram. **(06 Marks)**

b. In an RC-phase shift oscillator R_C = 5 KΩ and R = 3.3 KΩ. Find the range of values of C if it is required to vary the frequency from 100 Hz to 20 KHz. **(06 Marks)**

c. Mention the effects of negative feed back on amplifiers output. **(04 Marks)**

OR

10 a. With a neat circuit diagram, explain FET Colpitts oscillator. **(08 Marks)**

b. With a neat circuit diagram, explain transistor crystal oscillator. **(08 Marks)**

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15EI/ML/BM34

Third Semester B.E. Degree Examination, June/July 2017
Digital Design and HDL

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Expand $f_1 = a + bc + a\bar{c}d$ in to min tem and $f_2 = a(b+c)(a+c+\bar{d})$ in to max term. **(06 Marks)**

b. Simplify f (a, b, c, d) = $\sum$m(1, 2, 4, 11, 13, 14, 15) + dc (0, 5, 7, 8, 10) using K Map. **(05 Marks)**

c. Discuss the shift and relational operators in verilog. **(05 Marks)**

OR

2 a. Simplify s = f(a, b, c, d) = $\sum$(1, 3, 13, 15) + $\sum$(8, 9, 10, 11) using QM technique. **(08 Marks)**

b. Write data flow description of Half adder with truth table and simulation result. **(08 Marks)**

Module-2

3 a. What is the disadvantage of ripple carry adder and how it can be overcome by carry look ahead adder? **(08 Marks)**

b. Design 2 bit comparator using gates. **(08 Marks)**

OR

4 a. Implement the following function using 4:1 MUX, treat a and b as select lines. F(a, b, c, d) = $\sum$M (0, 1, 5, 6, 7, 9, 10, 15). **(06 Marks)**

b. Explain the formats of while loop and for loop. **(04 Marks)**

c. Write verilog behavioral description of 2:1 multiplexer along with truth table. **(06 Marks)**

Module-3

5 a. Design BCD to excess 3 code converters using logic gates. **(10 Marks)**

b. What are the problems associated with 8:3 encoder? How it can overcome by priority encodes. **(06 Marks)**

OR

6 a. Design a combinational circuit to achieve a common cathode 7 segment display with BCD inputs. **(10 Marks)**

b. Write the logic diagram and truth table of 2 to 4 decoder for active low enable and active high outputs and its behavioral description. **(06 Marks)**

Module-4

7 a. Explain the working of pulse trigger JK master slave flip-flop with truth table. **(06 Marks)**

b. Explain switch debouncer using SR latch with waveforms. **(06 Marks)**

c. Write verilog behavioral description of D latch. **(04 Marks)**

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OR

8 a. Explain universal shift register with the use of logic diagram and mode control table. **(08 Marks)**

b. Write verilog behavioral description of positive edge triggered JK flip-flop along with excitation table. **(08 Marks)**

Module-5

9 a. Explain 4 bit binary ripple counter. **(10 Marks)**

b. With the logic symbol and truth table of 3 bit synchronous counter write verilog behavioral description of 3 bit binary counter. **(06 Marks)**

OR

10 a. Explain the design of a synchronous mod 6 counter to count the sequence 0 – 2 – 3 – 6 – 5 – 1 – 0 using the clocked JK flip flops. Clearly indicate the application table excitation table and minimal sum expression. **(10 Marks)**

b. Draw the gate level synthesis information, extracted from the following verilog code always @ (s, a, b)

```
begin
    if (s = 1' b1)
    y = x;
    else
    y = x1 ;
end
```

(06 Marks)

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15BM/ML35

Third Semester B.E. Degree Examination, June/July 2017
Human Anatomy and Physiology

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-1

1 a. Explain the negative feedback mechanism with example. **(06 Marks)**

b. Draw the neat diagram of a simple cell and name its organelles. **(04 Marks)**

c. Explain the following with example :
   i) isotonic solution
   ii) hypotonic solution
   iii) hypertonic solution. **(06 Marks)**

OR

2 a. List the main types of body tissues. **(04 Marks)**

b. Define Cartilage. Explain the Hyaline cartilage. **(06 Marks)**

c. List the cells of connective tissue. **(06 Marks)**

Module-2

3 a. With a neat diagram, explain the parts of neuron. **(08 Marks)**

b. Give the properties of neurons. **(04 Marks)**

c. List the functions of cerebral cortex. **(04 Marks)**

OR

4 a. List and explain the ventricles of Brain. **(08 Marks)**

b. Draw the neat diagram of cerebellum and its associated structures. **(04 Marks)**

c. Give the names of spinal nerves according to their number. **(04 Marks)**

Module-3

5 a. Explain the process of flow of blood through the heart. **(06 Marks)**

b. Describe the process of vasodilatation and vasoconstriction. **(04 Marks)**

c. List the factors affecting heart rate. **(06 Marks)**

OR

6 a. Define the term blood pressure. Describe the main control mechanisms for regulation of blood pressure with neat diagram. **(08 Marks)**

b. Explain the process of pulmonary circulation. **(06 Marks)**

c. Define the following:
   i) Pulse
   ii) Cardiac output. **(02 Marks)**

Module-4

7 a. List the organs of respiratory system. **(04 Marks)**

b. Give the functions of pharynx. **(06 Marks)**

c. Explain the physiological variables affecting breathing. **(06 Marks)**

OR

8	a.	List the functions of Saliva.	(05 Marks)
	b.	Describe the structure of a tooth.	(06 Marks)
	c.	Give the important functions of liver.	(05 Marks)

Module-5

9	a.	Describe the stages of development of a long bone with a neat sketch.	(08 Marks)
	b.	List the factors that delay healing of fractures.	(06 Marks)
	c.	What are Sinuses? Give the functions of it.	(02 Marks)

OR

10	a.	With a neat sketch, give the characteristics of fibrous and cartilaginous joints.	(06 Marks)
	b.	List the types of synovial joint with an example for each.	(08 Marks)
	c.	List the movements possible at knee joint.	(02 Marks)

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CBCS Scheme

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

15MATDIP31

Third Semester B.E. Degree Examination, June/July 2017
Additional Mathematics - I

Time: 3 hrs. Max. Marks: 80

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-1

1 a. Express $\frac{3+4i}{3-4i}$ in the form x + iy. **(06 Marks)**

b. Express $\sqrt{3}+i$ in the polar form and hence find their modulus and amplitudes. **(05 Marks)**

c. Find the sine of the angle between $\vec{a} = 2i - 2j + k$ and $\vec{b} = i - 2j + 2k$. **(05 Marks)**

OR

2 a. Simplify **(06 Marks)**

$$\frac{(\cos 3\theta + i\sin 3\theta)^4 (\cos 4\theta + i\sin 4\theta)^5}{(\cos 4\theta + i\sin 4\theta)^3 + (\cos 5\theta + i\sin 5\theta)^{-4}}$$

b. If $\vec{a} = i + 2j - 3k$ and $\vec{b} = 3i - j + 2k$, then show that $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$ are orthogonal. **(05 Marks)**

c. Find the value of λ, so that the vectors $\vec{a} = 2i - 3j + k$, $\vec{b} = i + 2j - 3k$ and $\vec{c} = j + \lambda k$ are co-planar. **(05 Marks)**

Module-2

3 a. If $y = \cos(m \log x)$ then prove that $x^2 y_{n+2} + (2n+1)x y_{n+1} + (m^2 + n^2) y_n = 0$. **(06 Marks)**

b. With usual notation prove that

$$\tan\phi = \frac{r d\theta}{dr}.$$ **(05 Marks)**

c. If $u = \log_e\left(\frac{x^4 + y^4}{x + y}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3$. **(05 Marks)**

OR

4 a. Find the Pedal equation of $r = a[1 - \cos\theta]$. **(06 Marks)**

b. Expand $\log_e(1+x)$ in ascending powers of x as far as the term containing x^4. **(05 Marks)**

c. Find the total derivative of $Z = xy^2 + x^2 y$, where $x = at^2$ $y = 2at$. **(05 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi/6} \sin^6 3x\, dx$ using Reduction formula. **(06 Marks)**

b. Evaluate $\int_0^1 x^6\sqrt{1-x^2}\, dx$ – using Reduction formula. **(05 Marks)**

c. Evaluate $\int_1^2 \int_0^{2-y} xy\, dx\, dy$. **(05 Marks)**

OR

6 a. Evaluate $\int_0^{\pi/2} \sin^3 x \cos^7 x \, dx$. **(06 Marks)**

b. Evaluate $\int_0^{\pi} x \cos^6 x \, dx$. **(05 Marks)**

c. Evaluate $\int_0^3 \int_0^2 \int_0^1 (x + y + z) \, dz \, dx \, dy$. **(05 Marks)**

Module-4

7 a. A particle moves along the curve $\vec{r} = (1-t^3)\hat{i} + (1+t^2)\hat{j} + (2t - 5)\hat{k}$. Determine the velocity and acceleration. **(06 Marks)**

b. Find the directional derivative of $\phi = xy^2 + yz^3$ at the point (2,-1, 1) in the direction of the vector $i + 2j + 2k$. **(05 Marks)**

c. Find the constant a, b, c. Such that the vector $\vec{F} = (x + y + az)\,\hat{i} + (x + cy + 2z)\,\hat{k} + (bx + 2y - z)\,\hat{j}$ is irrotational. **(05 Marks)**

OR

8 a. Find the angle between the tangents to the curve $\vec{r} = t^2\,\hat{i} + 2t\,\hat{j} - t^3\,\hat{k}$ at the points $t = \pm 1$. **(06 Marks)**

b. Find the divergence and curl of the vector $\vec{F} = (xyz + y^2z)\,\hat{i} + (3x^2 + y^2z)\,\hat{j} + (xz^2 - y^2z)\,\hat{k}$. **(05 Marks)**

c. If $\vec{F} = (ax + 3y + 4z)\,\hat{i} + (x - 2y + 3z)\,\hat{j} + (3x + 2y - z)\,\hat{k}$ is solenoidal, find a. **(05 Marks)**

Module-5

9 a. Solve $\frac{dy}{dx} = \frac{y}{x - \sqrt{xy}}$. **(06 Marks)**

b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. **(05 Marks)**

c. Solve $\frac{dy}{dx} = \frac{x + 2y - 1}{x + 2y + 1}$. **(05 Marks)**

OR

10 a. Solve $(x^2 - y^2)\,dx = 2xy\,dy$. **(06 Marks)**

b. Solve $x\frac{dy}{dx} + y = x^3 y^6$. **(05 Marks)**

c. $(1 + xy)\,ydx + (1 - xy)\,xdy = 0$. **(05 Marks)**

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