G 4936 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Engineering Mathematics—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Each full question carries 20 *marks.*
Use of statistical tables is permitted.

MODULE 1

1. (a) Solve $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 0$, given that when $t = 0$, $y = 0$ and $\frac{dy}{dt} = 0$. (5 marks)

(b) $2(y + z)\,dx - (x + z)\,dy + (2y - x + z)\,dz = 0$. (5 marks)

(c) A particle of mass 4 gram vibrates through one centimeter on each side of the middle point of its making 330 complete vibrations per minute. Assuming its motion to be SHM, show that the maximum force upon the particle is $484\pi^2$ dyne. (10 marks)

Or

2. (a) Solve $(D^3 - 6D^2 + 11D - 6)\,y = e^{-2x} + e^{-3x}$. (6 marks)

(b) Solve $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$; given that $x = y = 0$ when $t = 0$. (8 marks)

(c) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$. (6 marks)

MODULE 2

3. (a) Form partial differential equation by eliminating the arbitrary functions

$$z = f(x + ay) + g(x - ay).$$

(5 marks)

(b) Solve $pz - qz = z^2 + (x + y)^2$. (5 marks)

(c) A bar 10 cm. long, with insulated sides, having its ends A and B maintained at temperatures 50° C. and 100° C. respectively, until steady-state conditions prevail. The temperature at A is suddenly raised to 90° C. and at the same time that at B is lowered to 60° C. FInd the temperature distribution in the bar at time t. (10 marks)

Or

Turn over

4. (a) Solve by Charpit's method $(p^2 + q^2)\, y = qz$. (10 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x\, \partial y} + \frac{\partial^2 z}{\partial y^2} = x^2 + xy + y^2$. (10 marks)

MODULE 3

5. (a) Find the Fourier sine and cosine transforms of $f(x) = \begin{cases} 1, & 0 \le x < a \\ 0, & x \ge a \end{cases}$. (12 marks)

(b) Solve the integral equation $\int_0^\infty f(x)\cos \lambda x\, dx = e^{-\lambda}$. (8 marks)

Or

6. (a) Express $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ 0, & x \ge \pi \end{cases}$ as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \pi\lambda}{\lambda} \sin \lambda x\, d\lambda .$$

(10 marks)

(b) Find the Fourier Sine Transform of e^{-ax} and hence find the Fourier Sine Transform of $\frac{x}{x^2 + a^2}$.

(10 marks)

MODULE 4

7. (a) The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a binomial distribution to this data :

x :	0	1	2	3	4	5	6	7	8	9	10	Total
f :	5	18	22	10	8	8	7	2	0	0	0	80

(10 marks)

(b) The incidence of occupational disease in an industry is such that the workmen have a 10% chance of suffering from it. What is the probability that in a group of 8, six or more will suffer from it ?

(10 marks)

Or

8. (a) It is known from the past experience that the number of telephone calls made daily in a certain community between 4 p.m. and 5 p.m. have a mean of 350 and a standard deviation of 30. What percentage of the time will there be more than 400 telephone calls made in this community between 4 p.m. and 5 p.m.?

(10 marks)

(b) The probability that a man aged 45 years will die before reaching the age of 50 years may be taken as 0.019. Out of a group of 500 men, now aged 45 years, what is the probability that 2 men will die within the next 5 years?

(10 marks)

MODULE 5

9. (a) Two random samples are drawn from two normal populations, gave the following results :

Sample 1	:	20	17	25	29	24	20	18	19
Sample 2	:	19	21	18	17	27	26	25	19

Test whether the two samples have the same variance at 5% of level of significance.

(10 marks)

(b) A set of 5 similar coins is tossed 320 times and the result is :

No. of heads	:	0	1	2	3	4	5
Frequency	:	5	28	75	115	68	31

Test the hypothesis that the data follow a Binomial distribution for V = 5, $\chi^2_{0.05} = 11.07$.

(10 marks)

Or

10. (a) If the mean of an infinite population is 550 with standard deviation 8.1, how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 547?

(10 marks)

(b) The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. May the samples be regrated as drawn from normal populations with the same standard deviation?

(10 marks)

[5 × 20 = 100 marks]

16. (a) Obtain ABCD parameters of a π circuit. (6 marks)

(b) Find Z and Y parameters for the network shown in Fig 8.

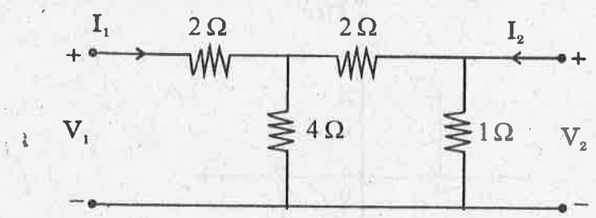


Fig.8 (6 marks)

MODULE 4

17. Design a π section low pass filter and its m-derived section, with the specifications given below :

Characteristic impedance — 1000 ohms

Cut-off frequency — 2 kHz

Infinite cut-off at 2.2 kHz.

Draw the networks.

Or

18. A composite high pass filter has a characteristic impedance of 900 Ω and a cut-off frequency of 2.5 kHz. It has one constant K, T section, on m-derived T section with $m' = 0.3$ and two terminating half sections with $m = 0.6$. Draw the circuit diagram of the filter and insert all numerical values.

Module 5

19. For the function $Z(s) = \dfrac{(s+1)(s+3)(s+5)}{s(s+2)(s+4)(s+6)}$, determine the first and second Foster forms and draw the networks.

Or

20. (a) Test for the positive real function property of $\dfrac{s^3 + 10s^2 + 27s + 18}{s^2 + 7s + 11.25}$. (6 marks)

(b) An impedance function has two simple poles at S = –1 and –4 and simple zeroes at S = –2 and –5. F(0) = 10 ohms. Identify the function and find any one canonical form with element values. (6 marks)

[5 × 12 = 60 marks]

G 4939 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

NETWORK ANALYSIS AND SYNTHESIS (E)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Obtain Laplace Transform of the pulse shown below (Fig. 1).

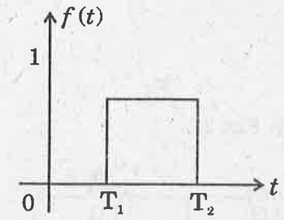


Fig. 1

2. Using definite integrals, find : (a) $L\{t\}$. (b) $L\{1\}$.
3. Find the inverse Fourier Transform of $F(jw) = \beta\delta(w - w_0) + \beta\delta(w - w_0)$.
4. Explain the time-shifting and frequency shifting properties of Fourier Transform.
5. Define z-parameter and explain the procedure to find the same for a simple π network.
6. Find the image parameters of the T-network with $\frac{Z_1}{2}$ each in series branch and Z_2 in shunt branch.
7. In a constant K band pass filter, the ratio of capacitance in the shunt and series arms is 50 : 1 and the resonant frequency of both the arms is 1kHz. Find the bandwidth of the filter.
8. Define characteristic impedance. What are its practical significance ?
9. List the properties of RC impedance functions.
10. Find the limits of k so that the polynomial $s^3 + 14\,s^2 + 56\,s + k$ may be Hurwitz.

(10 × 4 = 40 marks)

Turn over

Part B

Answer any one *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) The switch in the following circuit (fig. 2) has been in position b for a long time. It is moved to a position a at $t = 0$. Determine $V_c(t)$ for $t > 0$.

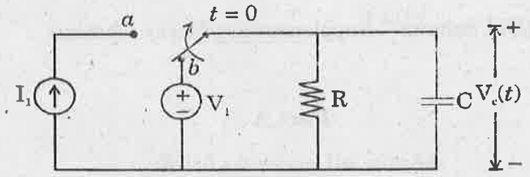


Fig.2

(6 marks)

(b) Use Laplace Transform to solve the differential equation $\frac{d^2v(t)}{dt^2} + 6\frac{dv(t)}{dt} + 8v(t) = 2u(t)$ subject to $v(0) = 1, v'(0) = -2$. (6 marks)

Or

12. Find $i_0(t)$ for $t > 0$ in the circuit in Fig. 3.

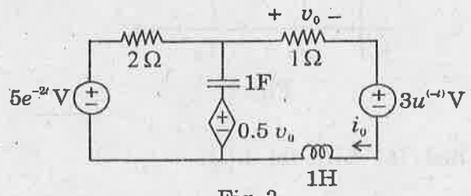


Fig. 3

Module 2

13. Obtain the Fourier series expansion of the periodic function shown in Fig. 4.

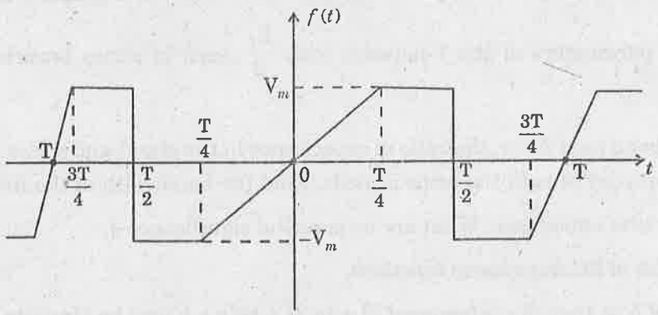


Fig. 4

Or

14. Find the magnitude and phase spectrum of the Fourier transform of the pulse shown in Fig. 5.

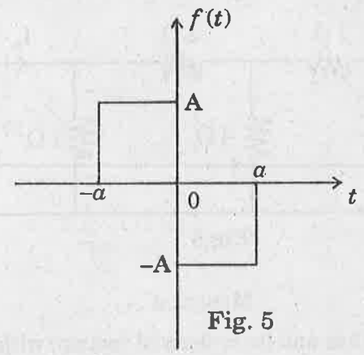


Fig. 5

Module 3

15. (a) Find the h-parameter of the circuit shown in Fig. 6.

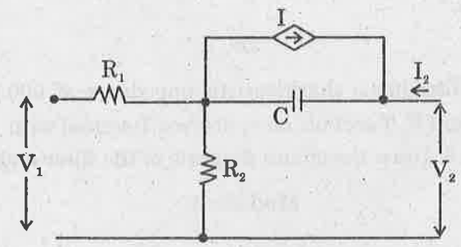


Fig.6

(6 marks)

(b) Find the pole-zero location of the current transfer ratio $\frac{I_2}{I_1}$ in S-domain for the circuit in Fig. 7.

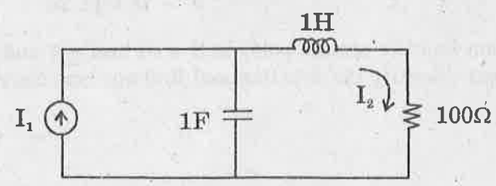


Fig. 7

(6 marks)

Or

G 4949

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRONIC CIRCUITS (E)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Derive an expression for the stability factor of a fixed bias circuit.
2. Explain the pinch-off in the JFET.
3. With the help of CB characteristics, describe how h_{ib} is estimated ?
4. A given amplifier arrangement has $A_{V_1} = 10$, $A_{V_2} = 20$ and $A_{V_3} = 40$. What is the overall voltage gain ? Also express each gain in dB and determine the total dB voltage gain.
5. An amplifier has a voltage gain of 1000. With the application of negative feedback, the gain reduces to 100. Calculate (a) the fraction of the output that is fed back to the input ; (b) the percentage of negative feedback.
6. Why do we need three RC networks for a phase-shift oscillator ? Can it be two or four networks ? Why ?
7. What is a multivibrator ? Explain the differences between the three types of multivibrators.
8. Define the following terms associated with a sweep : (a) slope error ; (b) displacement error ; (c) transmission error ; and (d) sweep speed error.
9. The maximum collector dissipation of a transistor used in a class A power amplifier is 10 W. When a signal is applied, the collector efficiency of the circuit is 32%. Calculate the a.c. power output.
10. Clearly explain the reason why most of the power amplifiers used in practice are designed to operate in class AB.

(10 × 4 = 40 marks)

Turn over

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. A transistor with $\beta = 100$, $V_{BE} = 0.7$ volt, $V_{CC} = 20$ volt, $R_c = 5.6\ k\Omega$ is used in a potential divider bias circuit. It is designed to establish the quiescent point (12 volt, 1.5 mA) and current stability factor $S \leq 5$. Find the values of R_1, R_2, R_E for the circuit. Derive the expression for the stability factor.

Or

12. Draw neatly the circuit diagram of a common source self biased JFET amplifier and explain. Derive expression for the voltage gain and the output resistance.

Module 2

13. Design an emitter follower circuit having $Z_i = 500\ k\Omega$, $R_o = 20\ \Omega$, using a transistor having $h_{ie} = 1k\Omega$, $h_{fe} = 50$, $h_{re} = 10^{-4}$, h_{oe} 25 μA/V. Draw your circuit and find the values of A_i and A_v.

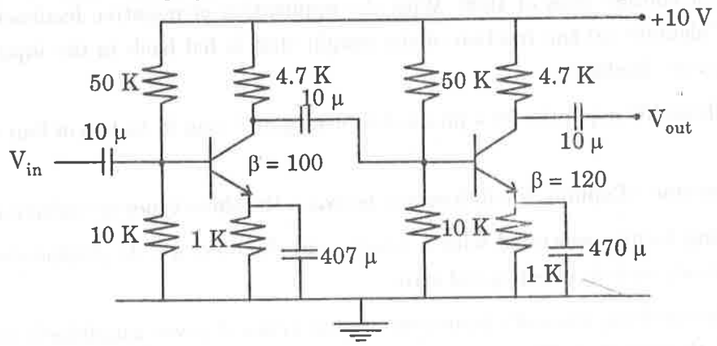
Or

14. For the two-stage amplifier, determine :

(a) Individual stage voltage gains ;

(b) Input resistance ; and

(c) Overall voltage gain in dB.



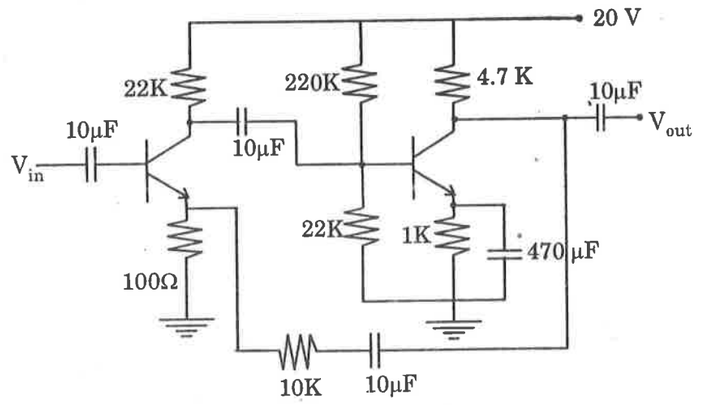
(5 + 5 + 2 = 12 marks)

Module 3

15. With neat circuit diagram, explain how sustained oscillations are obtained from Hartley oscillator. If the resonant circuit oscillates at 2 MHz and then the capacitance value is increased by 30%, what will be the new resonant frequency ?

Or

16. Find the voltage gain, input resistance and output resistance of the feedback amplifier shown below : $h_{fe} = 99$, $h_{ie} = 1.8\ k\Omega$.

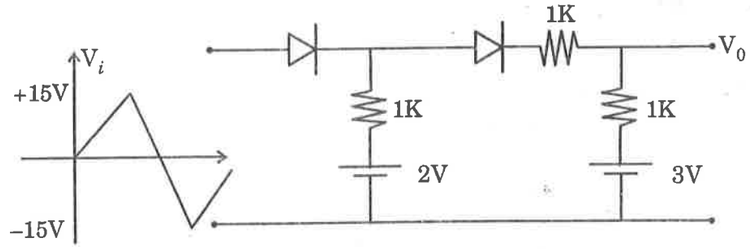


Module 4

17. Explain the circuit of a UJT relaxation oscillator with necessary waveforms. Indicate the operating region on the UJT characteristics and explain.

Or

18. Plot V_0 waveform for the following circuit and explain the operation of the circuit which uses silicon diodes.



Module 5

19. Draw the RC-coupled as well as transformer coupled class A power amplifier circuits and explain their operator with respective Q points. For the RC-coupled circuit, derive the expression for the conversion efficiency, starting from fundamentals. Comment on the efficiency when the coupling is changed to transformer.

Or

20. Derive an expression for the collector circuit efficiency of class AB power amplifier explaining its circuit diagram. Hence obtain its maximum efficiency.

(5 × 12 = 60 mar

G 4959 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—I (E)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Distinguish between lap winding and wave winding.
2. What are the functions of commutator and carbon brush in a d.c. machine ?
3. Define critical speed of a d.c. generator. How it is determined ?
4. A d.c. generator generates an e.m.f. of 500 V at 1200 r.p.m. The armature has 2000 conductors and four parallel paths. Find the number of poles if flux per pole is 0.012 Wb.
5. Derive the condition for maximum power developed by a d.c. motor.
6. Explain any one method for speed control of d.c. motor.
7. Write a note on harmonics in a transformer.
8. Explain under what conditions the voltage drop across secondary of a transformer will be zero when a load is connected to it ?
9. What are the disadvantages of Y – Y connected 3-phase transformers ?
10. What do you mean by conducted power and transformed power in an autotransformer ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) Explain the methods of improving commutation in a d.c. machine. (6 marks)

(b) The brushes of a certain lap connected 400 kW, 6-pole generator are given a lead of 18° electrical. Calculate (i) demagnetizing ampere-turns ; (ii) cross magnetizing ampere-turns. The full-load current is 750 A, total number of conductors are 900.

(6 marks)

Or

Turn over

12. (a) Derive an expression for finding out distribution factor in relation with armature winding. (5 marks)

(b) Determine the number of turns on each commutating pole of a 6-pole machine if the flux density in the air gap of the commutating pole is 0.5 Wb/m^2. at full-load and effective length of the air gap is 4 mm. The full-load current is 500 Amp and armature is lap wound with 540 conductors. Assume number of ampere turns required for the remainder of the magnetic circuit to be one-tenth of that of the air gap. (7 marks)

MODULE 2

13. (a) Explain the excitation methods of a d.c. generator. (6 marks)

(b) A series generator of total resistance 0.5 Ω is running at 1000 r.p.m. and is delivering 5 kW at a terminal voltage of 100 V. If the speed is raised to 1500 r.p.m. and the load is adjusted to 8 kW, find the new current and terminal voltage. Assume that the magnetization curve is a straight line. (6 marks)

Or

14. (a) Explain the procedure to maintain the constant voltage across shunt generator. (5 marks)

(b) A shunt generator gave the following results in the OCC test at a speed of 800 r.p.m.

I_f (Amp)	:	1	2	3	4	6	8	10
e.m.f. (volt)	:	90	183	252	290	324	348	360

The field resistance is adjusted to 50 Ω and the terminal voltage is 300 V. Armature resistance is 0.1 Ω. Assuming that the flux is reduced by 5 % due to armature reaction, find the load supplied by the generator. (7 marks)

MODULE 3

15. (a) Explain the performance characteristics of d.c. series motor. (5 marks)

(b) A 200 volts d.c. series motor runs at 700 r.p.m. when operating at its full-load current of 20 A. The motor resistance is 0.5 ohm and the magnetic circuit can be assumed unsaturated. What will be the speed if :

(i) Load torque is increased by 40 %.

(ii) The motor current is 10 A. (7 marks)

Or

16. (a) Draw and explain power flow diagram of a d.c. motor. (4 marks)

(b) Two identical machines when tested by Hopkinson's method gave the following test results. Field currents are 2.5 A and 2 A. Line voltage is 220 volts. Line current including both the field currents is 10 amperes. Motor armature current is 73 amp. The armature resistance of each machine is 0.05 ohm. Calculate the efficiency of both the machines. (8 marks)

MODULE 4

17. A 250/500 V transformer gave the following results :

S.C. test : 20 V, 12A, 100 W on HV side.

O.C. test : 250 V, 1A, 80 W on LV side.

Draw the equivalent circuit refused to LV side. Also calculate applied voltage and efficiency when the output is 10 A at 500 V 0.8 p.f. lagging.

Or

18. (a) With a neat diagram, explain the Sumpner's test in transformer. (6 marks)

(b) The full-load voltage drops in a transformer are 2 % and 4 % due to resistance and leakage reactances respectively. The full-load copper loss is equal to iron loss. Calculate the efficiency on half load unity power factor. (6 marks)

MODULE 5

19. Find the all-day efficiency of a transformer which has daily variations as below :

Transformer is of 100 kVa.

6.00 p.m. to 1.00 a.m. → 30 kW, 30 kVar

1.00 a.m. to 8.00 a.m. → No-load

8.00 a.m. to 1.00 p.m. → 65 kW, 35 kVar

1.00 p.m. to 6.00 p.m. → 70 kW, 45 kVar

No-load core losses = 270 Watt and full-load Copper losses = 1200 Watt.

Or

20. (a) Explain load tap-changing transformer. (6 marks)

(b) It is desired to transform 2400 V, 5000 kVa three-phase power to 2-phase power at 600 V by scott connected transformers. Determine the voltage and current ratings of both primary and secondary of each transformer neglecting no-load currents. (6 marks)

[5 × 12 = 60 marks]

G 4968 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING (E)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever necessary.

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Examine errors in the following and correct them :—

```
# include (stdio);
  int main;
  print {\n Press any key to continue);
  getch;
```

2. What are the differences between break and exit statements?

3. What is the output of the following programs?

```
main ( )
{int x=3;
   while (x < 1)
      x = x – 1;
   printf ("%d\n,"x);}
```

4. Write a function in C to calculate factorial of n.

5. List four string handling functions in C.

6. Find the number of elements of the following arrays :—

```
float sum [4] [5] [3];
char sym [ ] = "ibm";
int count [100], a [5] [4];
```

7. What is indirection operator and what is its role?

8. What are general formats for file opening and file closing commands? Give examples.

9. What are command line arguments? Explain with an example.

10. What is a queue? What are its applications?

(10 × 4 = 40 marks)

Turn over

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) Explain bitwise operators with appropriate examples. Discuss the order of evaluation.

(b) Write a C program to swap (interchange) the various of two variables a and b.

Or

12. Write an interactive C program using "switch" to find the value of y when

$$y(x,n)=\begin{cases}1+x & \text{when } x=1\\ 1+\dfrac{x}{n} & \text{when } x=2\\ 1+x^n & \text{when } x=3\\ 1+nx & \text{when } n>3 \text{ or } n<1.\end{cases}$$

MODULE 2

13. Write a C program that reads three integers and prints them in the order read and reversed. Use three functions — the first one to read the data, the second one to print them in the order read and the third one to print them reversed.

Or

14. Discuss the four storage class specifications and list out the comparative details of the four storage classes with respect to their scope, initialization, lifetime and their usage with examples.

MODULE 3

15. Write a C program to merge two one-dimensional sorted arrays A and B into a single array named C in the same order.

Or

16. Write a function that, given a string, a width, and an empty string for output, centers the string in the output area. The function is to return 1 if the formatting is successful, and 0 if any errors, such as string length greater than width, are found.

MODULE 4

17. Write a complete C program to merge two strings together using pointers.

Or

18. Write a program in C to read a sentence from one file and write the reversed sentence to another output file.

MODULE 5

19. Write a C program to implement merge sort using the concept of dynamic memory allocation, malloc and calloc.

Or

20. Define a structure to store the book details :

(i) title;

(ii) author;

(iii) edition;

(iv) publisher;

(v) no. of pages ; and

(vi) price.

Show how to access values and display them.

(5 × 12 = 60 marks)

20 (i) Fit a normal curve and test the goodness of fit for :

x :	0	1	2	3	4	5	6	7	8
f :	2	4	10	15	19	12	8	7	1

(6 marks)

(ii) Test if the means are significantly different :

	Size	*Mean*	S.D.
Sample 1 :	5	11.4	2.65
Sample 2 :	7	14.4	4.37

(6 marks)

[5 × 12 = 60 marks]

G 4984 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular/Improvement/Supplementary—New Scheme)

[Common for all Branches]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Find a_0 from $f(x) = \begin{cases} -\pi, & if\ -\pi < x < 0 \\ x, & if\ 0 < x < \pi. \end{cases}$

2. Find the Fourier cosine transform of $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1. \end{cases}$

3. Solve $zp = -x$.

4. Find E (x) from

x :	0	1	2	3
$p(x)$:	·1	·2	·4	·3

5. What do you mean by Hypothesis ? Write its types.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Obtain Fourier expansion for sin ax in the interval $-l < x < l$.

7. Find the Fourier cosine transform of $x e^{-ax}$.

8. Form a partial differential equation by eliminating the arbitrary function ϕ from $\phi\left(x + y + z, x^2 + y^2 - z^2\right) = 0$.

9. Derive the mean of binomial distribution.

10. Write the working rule for testing the hypothesis ?

(5 × 5 = 25 marks)

Part C

Each full question carries 12 marks.

11. (i) If $f(x) = \sqrt{1-\cos x}$, $0 \le x \le 2\pi$. Obtain the Fourier expansion and hence deduce that

$$\sum_{n=1}^{\infty} \frac{1}{4n^2-1} = \frac{1}{2}.$$

(8 marks)

(ii) Prove that for values of x in the range $(-\pi, \pi)$

$$\frac{1}{2}x = \sin x - \frac{\sin 2x}{2} + \frac{\sin 3x}{3} - \ldots\ldots$$

(4 marks)

Or

12. (i) Obtain the Fourier series expansion for $f(x) = \begin{cases} x + \pi/2, & -\pi < x \le 0 \\ \pi/2 - x, & 0 \le x < \pi. \end{cases}$ (6 marks)

(ii) Prove that in the interval $-\pi < x < \pi$, $x \cos x = -\frac{1}{2}\sin x + 2\sum_{n=2}^{\infty} \frac{n(-1)^n}{n^2-1} \sin nx$. (6 marks)

13. Find the Fourier transform of $f(x) = \begin{cases} a - |x|, & |x| \le a \\ 0, & |x| > a > 0. \end{cases}$ (12 marks)

Or

14. (i) Evaluate $\int_0^{\infty} \frac{dx}{\left(x^2 + a^2\right)^2}$ using Parseval's identity. (6 marks)

(ii) Find the Fourier Cosine transform of $f(x) = e^{-ax}$, $a > 0$. (6 marks)

15. (i) Solve : $\left(D^2 - 2DD' + D'^2\right) z = \tan(y + x)$. (6 marks)

(ii) Solve : $\left(D^2 - 2aDD' + a^2 D'^2\right) z = f(y + ax)$. (6 marks)

Or

16. (i) Solve : $\left(D^2 - D'\right) z = xe^{ax} + a^2 y$. (6 marks)

(ii) Solve : $(D - 3D' - 2)^2 z = 2e^{2x} \tan(y + 3x)$. (6 marks)

17. Find the variance of : $f(x) = \begin{cases} \frac{1}{16}(x+3)^2, & -3 \le x < -1 \\ \frac{1}{16}\left(6 - 2x^2\right), & -1 \le x < 1 \\ \frac{(3-x)^2}{16}, & 1 \le x \le 3. \end{cases}$ (12 marks)

Or

18. (i) Fit a normal distribution for :

x :	1	3	5	7	9
f :	1	2	3	2	1

(6 marks)

(ii) There are 2 urns containing 4 white 6 Red and 15 black balls and 10 white 8 red and 12 black balls respectively. One ball is taken out from each urn. What is the probability that both are red ? (6 marks)

19. (i) Test if the means are significantly different for

	n	*mean*	*S.D*
gp 1 :	50	181.5	3.0
gp 2 :	75	179	3.6

(6 marks)

(ii) Comment on the following :

Mathematical ability		*General ability*		
		Good	*Fair*	*Poor*
GOOD	: 44	22	5	
Fair	:	265	257	178
Poor	:	41	91	98

(6 marks)

Or

G 4995 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 403—LINEAR SYSTEM ANALYSIS (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Differentiate : Controlled variable and manipulated variable.
2. List out advantages and disadvantages of Phase Variable Method in State Space representation.
3. Write short notes on dynamic state error co-efficient in time response systems.
4. What is the effect of feedback on poles and zeros ?
5. Define Voltage transfer ratio. Differentiate transfer impedance and transfer admittance.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

1. How does a linear system differ with non-linear system ? Discuss about characteristics curves for various types of non-linearities.
2. Discuss the procedure for drawing block diagram and write the rules of block diagram algebra.
3. Discuss the effect of parameter variation in open-loop and closed-loop systems.
4. For the system with characteristic equation test the stability :

   $(S^3 + 5S^2 + 6S + 30) = 0$.

5. List out necessary conditions for transfer function.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

1. In detail explain the mathematical modeling of an electrical systems.

Or

Turn over

2. Discuss about the following systems in detail :—
   (a) Linear and Non-linear.
   (b) Static and dynamic.
   (c) Time dependent and Time independent.
   (d) Distributed and Lumped parameter.

3. Explain the procedure of creating signal flow graph from block diagram and vice-versa. (12 marks)

Or

4. Obtain the state space representation of the system for the following transfer function using canonical form. The given transfer function is $[2/S^3 (2S^2 + 4S + 8)]$.

5. In detail discuss the response of first order system for the following inputs :—
   (a) Unit Step.
   (b) Unit Ramp.
   (c) Unit Impulse. (8 marks)
   (d) Explain the response of second-order system for step input. (4 marks)

Or

6. An unit feedback system is given as $G(s) = 1/s\ (s + 1)$. The input to the system is described by $r(t) = 4 + 6t + 2t^3$. Find the generalized error coefficients and the steady state error.

7. Sketch the root locus for a unit feedback system with open loop transfer function :

   $G(s) = K/s\ (S^2 + 8S + 32)$.

Or

8. State the concept of Lyapunov's stability. Explain the stability analysis using Lyapunov's Direct method.

9. The Z parameters of a two-port network are $Z_{11} = 10\ \Omega$; $Z_{22} = 15\ \Omega$; $Z_{12} = Z_{21} = 5\Omega$. Find the equivalent T network and ABCD parameters.

Or

10. Derive general circuit parameters or ABCD parameters in terms of Z parameters and Y parameters.

[5 × 12 = 60 marks]

G 4989 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 402—D.C. MACHINES AND TRANSFORMERS (EE)

(New Scheme — Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is the difference between Lap winding and Wave winding?
2. What does Pigtail mean? What is its significance?
3. A D.C. motor should never be started at its rated voltage. Why?
4. What does transformer mean? List out its major functions.
5. Write short notes on parallel operation of a 3-phase transformer.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Discuss about the external characteristics of compound D.C. generator.
7. Discuss about various types of losses in D.C. generator and draw its power flow diagram.
8. Draw torque developed, power developed and speed characteristics of a series motor as a function of armature current. Also draw developed power and developed torque of a series motor as a function of speed for a series motor.
9. Derive E.M.F. equation orf a transformer.
10. Explain the process of three-phase to two-phase conversion in three-phase transformer.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain the construction of a d.c. machine with neat diagrams.

Or

12. Explain armature reaction. Cite methods that are commonly used to compensate the demagnetization effect of armature reaction.

Turn over

13. In detail explain about the magnetization characteristics of a d.c. machine.

Or

14. Draw and explain the external characteristics of separately excited D.C. generator and shunt generator. Draw equivalents also.

15. Discuss about D.C. motor speed control method with diagrams.

Or

16. A D.C. shunt machine while running as generator develops a voltage of 250 V. at 1,000 r.p.m. on no-load. It has armature resistance of 0.5 Ω and field resistance of 250 Ω. When the machine runs as motor, input to it at no-load is 4 A at 250 V. Calculate the speed and efficiency of the machine when it runs as a motor taking 40 A at 250 V. armature reaction weaks the field by 4%.

17. In detail explain transformer's open circuit test and short circuit test with diagrams.

Or

18. A 5-kVA, 2,300/230-V, 50-Hz transformer was tested for the iron losses with normal excitation and Cu losses at full-load and these were found to be 40 W. and 112 W. respectively. Calculate the efficiencies of the transformer at 0.8 power factor for the following kVA outputs : 1.25, 2.5, 3.75, 5.0, 6.25 and 7.5. Plot efficiency *vs.* kVA output curve.

19. Discuss about various types of three-phase transformer connection with diagrams.

Or

20. A 2-phase, 4 wire, 250 V system is supplied to a plant which has a 3-phase motor load of 30 kVA. Two Scott-connected transformer supply the 250 V. motors. Calculate, (a) Voltage, (b) kVA rating of each transformer. Draw the wiring connection diagram.

(5 × 12 = 60 marks)

G 4977 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch—Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONIC INSTRUMENTS (E)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Briefly explain the different types of damping provided in an indicating instrument.
2. Compare and contrast electromagnetic and air friction damping.
3. Why a permanent magnet moving coil instrument can be used for d.c. only where as moving iron instruments are suitable for both a.c. and d.c. ?
4. List the errors and the methods of compensation in a moving iron instrument.
5. What are the causes of change of accuracy with change of temperature and frequency in an electrodynamic type ammeter ?
6. Explain the meaning of "compensation winding" in a wattmeter and show how it helps to reduce the error.
7. What is time base generator ? Why it is an essential component of a CRO ?
8. Explain clearly the action of the "level" control knob in an oscilloscope.
9. List any four IS specification of Grading of Instruments.
10. With neat diagram, explain the principle and working of resonance frequency meter.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full questions from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) With neat diagrams, describe how gravity control torque is produced ? Derive the expression for the torque.

(8 marks)

Turn over

(b) Explain the three types of forces required for the satisfactory operation of an indicating instruments. (4 marks)

Or

12. (a) With neat diagram, describe the spring control torque used in indicating instrument ?

(b) A spring controlled moving iron voltmeter reads correctly on 250 V d.c. Calculate the scale reading when 250 V a.c. is applied at 50 Hz. The instrument coil has a resistance of 500 Ω and an inductance of 1H and the series non-reactive resistance is 2000 Ω.

MODULE 2

13. A basic D'Arsonval meter movement with an internal resistance of R_{in} = 100 Ω and a full scale current of I_m = 1 mA is to be converted into a multirange d.c. voltmeter with ranges of 0 – 10 V, 0 – 50 V, 0 – 250 V and 0 – 500 V. Calculate the values of the resistance using a potential divider arrangement.

Or

14. With neat diagrams, describe the working principle of a moving iron voltmeter. Show that this type of instrument can be used both for a.c. and d.c. measurements. Discuss the errors involved.

MODULE 3

15. Describe the constructional details and operation of a single-phase induction type energy meter and also explain any two compensation methods for the same.

Or

16. (a) Draw the possible methods of connecting the pressure coil of a wattmeter and compare the errors. (6 marks)

(b) Describe in detail the working principle of maximum demand meters. (6 marks)

MODULE 4

17. Draw the circuit diagram and explain the principle of operation of a rectifier type voltmeter employing a bridge rectifier.

Or

18. (a) With neat diagrams, explain how the measurement of a voltage, current, frequency and phase can be done using CRO ?

(8 marks)

(b) Distinguish between dual trace and dual beam oscilloscope. (4 marks)

MODULE 5

19. Describe the construction and working of rotating and static type phase sequence indicators.

Or

20. How power factor of a single-phase circuit is measured ? Describe one type of meter for this purpose.

[5 × 12 = 60 marks]

G 5004 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 404—ELECTROMAGNETIC THEORY (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. State Divergence theorem and mention the significance of the theorem.
2. Define electric potential and potential difference.
3. State Ohm's Law.
4. State Biot-Savart's law.
5. Write the Maxwell's equation from Faraday's law both in integral and point forms.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. State and prove Gauss's Law.
7. Derive Poisson's and Laplace's equation and explain their significance in field theory.
8. Write the properties of conductor.
9. Derive the expression for Co-efficient of coupling in terms of mutual inductances.
10. Summarize Maxwell's equation for time varying fields in integral form.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Find the value of the constant a, b, c. So that the vector

$E = [X + 2Y + aZ]a_x + [bX - 3Y - 2]a_y + [4X + cY + 2Z]a_z$ is irrotational.

(12 marks)

Or

12. Explain the spherical co-ordinate system.

(12 marks)

Turn over

13. (a) Define the potential difference and absolute potential. Give the relation between potential and field intensity.

(6 marks)

(b) Two point charges of +1c each are situated at (1, 0, 0)m and (–1, 0, 0)m. At what point along *y* axis should a charge of –0.5c be placed in order that the electric field E = 0 at (0, 1, 0)m.

(6 marks)

Or

14. (a) Write a note on dipole element. (6 marks)

(b) Find the electric field intensity at the point (0, 0, 5)m due to $Q_1 = 0.35\ \mu c$ at (0, 4, 0) and $Q_2 = -0.55\ \mu c$ at [3, 0, 0]m.

(6 marks)

15. Derive the dielectric boundary conditions. (12 marks)

Or

16. Define and derive skin depth. Calculate skin depth for a medium with conductivity 100 mho/m, $\mu_r = 2$, $\varepsilon_r = 3$ at 50 Hz, 1 MHz, and 1 GHz.

(12 marks)

17. Write short notes on magnetic vector potential, Ampere's circuital law of force and magnetic energy density.

(12 marks)

Or

18. Derive an expression for the capacitance/unit length of a two wire transmission time [with parallel wires] in free space.

(12 marks)

19. What is poynting vector ? Explain. Derive pointing theorem. (12 marks)

Or

20. (a) Derive the electromagnetic wave equation in frequency domain and the propagation constant and intrinsic impedance.

(6 marks)

(b) Explain the propagation of EM waves inside the conductor.

(6 marks)

[5 × 12 = 60 marks]

G 5014 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 405—DIGITAL SYSTEM AND COMPUTER ORGANISATION (EE)

(New Scheme — Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. State De Morgan's theorem.
2. What is a latch? Give an example.
3. What is the principle of Decode counter?
4. What is a 2 bit adder? Draw its schematic diagram.
5. What is Cache memory? Explain in brief.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain the characteristics of CMOS.
7. Draw the schematic of JKFF. Explain its excitation table.
8. Explain the demerits of Ripple counter.
9. Explain the advantages and applications of fast adders.
10. Draw the block diagram of USB and explain it briefly.

(5 × 5 = 25 marks)

Part C

Answer **all** *the questions.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) State and prove all the laws of Boolean algebra.

    (b) Explain the principle of encoder with an example.

Or

12. Compare and contrast the parameters of TTL and CMOS families.

Turn over

MODULE 2

13. Explain the principles of all the 4 flip-flops with neat sketches.

Or

14. Design a Mou-4 Up Down counter using JKFF. Realize the counter using JKFF and NAND gates.

MODULE 3

15. Draw a neat sketch of decade counter and explain its principle of working.

Or

16. Explain the working of twisted ring counter with a neat shematic diagram.

MODULE 4

17. Draw a neat block diagram of a processor and explain its working in detail.

Or

18. Draw a neat schematic of a 3 bit adder. Realize the truthtable using only NAND Gates. Explain the steps.

MODULE 5

19. (a) Explain the advantages of semiconductor RAM.

    (b) Explain in detail :

        (i) EEPROM.

        (ii) UVPROM.

Or

20. Write technical notes on :

    (a) Memory interleaving.

    (b) SCSI.

    (c) Address translation.

(5 × 12 = 60 marks)

G 5024 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 406—COMPUTER PROGRAMMING (EE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is an escape sequence ? What is its purpose ?
2. What is the purpose of the index in a for statement ?
3. State three advantages to the use of functions.
4. What is a structure member ? What is the relationship between a structure member and a structure ?
5. Describe the different ways in which data files can be categorized in C ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Are the library functions actually a part of the 'C' language ? Explain.
7. Summarize the syntactic rules associated with the while statement.
8. Suppose a function receives a pointer as an argument. Explain how the pointer argument is declared within the function definition.
9. What is a self-referential structure ? For what kinds of applications are self-referential structures useful ?
10. What is the purpose of the library function feof ? How might the feof function be utilized within a program that updates an unformatted data file ?

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 *marks.*

11. (a) Write a program to accept temperature in Fahrenheit and convert it to degree celsius and vice versa. [Hint : C = 5/9* (F – 32)].

(6 marks)

(b) Write a program to interchange the values of two variables with and without using Temporary variable.

(6 marks)

Or

12. (a) Write a program to determine if a number is even *or* odd. (6 marks)

(b) Write a program to determine if a year is a leap year *or* not ? (6 marks)

13. Write a program to find whether the matrix is symmetrical *or* not ? (12 marks)

Or

14. Write a program to find the largest element in an array and position of its occurance.

(12 marks)

15. Write a 'C' program, "Function to multiply a 3 × 5 array by a scalar". (12 marks)

Or

16. Explain about storage classes in C with appropriate example. (12 marks)

17. Summarize the rules that apply to processing unions. Compare with the rules that apply to processing structures. (12 marks)

Or

18. (a) Describe the syntax for defining the composition of a structure an individual members be initialized within a structure type declaration. (8 marks)

(b) How is an array of structures initialized ? (4 marks)

19. (a) Contrast the use the fread and furite function with the use of the *fscanf* and *fprintf* functions. How do the grammatical rules differ ? For what kinds of applications in each group of functions well suited ? (12 marks)

Or

20. Write notes on :

(a) Unformatted Data files. (6 marks)

(b) What is a stream pointer ? What is the relationship between a steam pointer and a buffer area ? (6 marks)

[5 × 12 = 60 marks]