G 1873 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 406—COMPUTER PROGRAMMING (EE)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is the purpose of a type declaration ? What does a type declaration consist of ?
2. How is the execution of a while loop terminated ?
3. What is the purpose of the return statement ?
4. What is a structure ? How does a structure differ from an array ?
5. What is the primary advantages to using a data file ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Describe the *two* equality operators included in 'C'. How do they differ from the relational operators ?
7. Summarize the syntactic rules associated with the for statement.
8. Under what conditions can two pointer variables be compared ? Under what conditions are such comparisons useful ?
9. Summarize several types of commonly used linked data structures.
10. What is the purpose of the fclose function ? Must a call to this function appear with in a program that utilizes a data file ?

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Write a 'C' program to generate and print the first 10 members of the Fibonacci series.

(12 marks)

Or

12. (a) Write a program to find the area and perimeter of a rectangle having length l, and breath b.

(6 marks)

(b) What is conditional operator ? Give its syntax and explain with the help of an example.

(6 marks)

Turn over

13. (a) Write a 'C' program to find the sum of the first 50 even numbers. (6 marks)

(b) Write a 'C' program to compute all prime numbers between 2 and 50. (6 marks)

Or

14. Write a 'C' program to read a line of text and count the number of vowels consonants, Digits and blank spaces. (12 marks)

15. (a) Write a program to copy a string from one string to another. (6 marks)

(b) Write a program to find the number of characters in a string using pointers. (6 marks)

Or

16. Write a program to concatenate two string into a new string. (12 marks)

17. Briefly explain about dynamic memory allocation. (12 marks)

Or

18. (a) Write a short notes "user Defined Data types". (6 marks)

(b) For what kinds of applications are unions useful ?? (6 marks)

19. Briefly explain about the role of C preprocessor. (12 marks)

Or

20. (a) What is the purpose of the library function strset ? Why might strset be included in a program that creates an unformatted data file ? (6 marks)

(b) Summarize the different types that can be specified by the fopen function. (6 marks)

(5 × 12 = 60 marks)

G 1853 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 404—ELECTROMAGNETIC THEORY (EE)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. State Coulomb's law.
2. Write down Maxwell's curl equation.
3. What is meant by current density ?
4. Define Mutual inductance.
5. Distinguish between transformer EMF and motional EMF.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Give the relation between Cartesian and Cylindrical co-ordinate systems.
7. Determine the electric field intensity at P[–0.2, 0, –2.3] due to a point charge of 5 nC at [0.2, 0.1, –2.5] in air.
8. Derive Continuity equation.
9. Derive Ampere's circuital law.
10. Derive Maxwell's equation for $\nabla \times E$ and $\nabla \times H$.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. (a) Determine divergence and curl of the vector $A = X^2 a_x + Y^2 a_y + Y^2 a_z$. (6 marks)

(b) Determine the gradient of the scalar field at $P\left[\sqrt{2}, \pi/2, 5\right]$ defined in cylindrical co–ordinate system as $A = 25p \sin\phi$.

(6 marks)

Or

Turn over

12. (a) Give two points A (2, 3, –1) and B (4, 25°, 120°). Find the spherical and cylindrical co-ordinates of point A and Cartesian and cylindrical co-ordinates of point B.

(6 marks)

(b) Find the curl of H at $P\left(2, \frac{\pi}{6}, 0\right)$, where $H = 2_p \cos\phi\, a_p - 4_p \sin\phi\, a_\phi + 3a_z$. (6 marks)

13. Define the electrical potential, show that in an electric field, the potential difference between two points a and b along the path, $V_a - V_b = -\int_a^b E.dl$.

(12 marks)

Or

14. What is dipole element ? Obtain expression for the potential and field due to an electric dipole ? Two point charges $Q_1 = 4nC_1$ $Q = 2nC$ are kept at [2, 0, 0] and [6, 0, 0]. Express the electric field at (4, –1, 2).

(12 marks)

15. Explain in detail the behavior of a dielectric medium in electric field. (12 marks)

Or

16. Derive an expression for capacitance of a spherical capacitor with conducting skells of radius '*a*' and '*b*'.

(12 marks)

17. Calculate B due to a long solenoid and a thin teroid. (12 marks)

Or

18. Derive H due to a circular current loop and extend the same to compute H due to a long solenoid.

(12 marks)

19. State and explain Faraday's law of electromagnetic induction. Hence derive the expressions for statically and dynamically induced emfs.

(12 marks)

Or

20. (a) Explain when and how an electromagnetic wave is generated. (6 marks)

(b) Derive the electromagnetic wave equations in free space and mention the types of solutions.

(6 marks)

[5 × 12 = 60 marks]

G 1863 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

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

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is MULDEM ? Explain in brief.
2. Differentiate combination circuits from sequential circuits.
3. What are the potential applications of universal shift register ?
4. Explain the steps to design a logic unit.
5. List the advantages and applications of semiconductor RAM.

(5 × 3 = 15 marks)

Part B

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

6. Define and explain fan-in and fan-out of CMOS.
7. Draw a neat diagram of MS JKFF and explain it in detail.
8. Differentiate ring counter from twisted ring counter.
9. Draw a 2 bit half subtractor circuit and explain it in detail.
10. Explain flash memory in detail.

(5 × 5 = 25 marks)

Part C

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

Module 1

11. Using a *four* variable K map simplify :

$$F = \sum_d (1,4,7,9,11,12,14) + \sum_d (0,8,13)$$

Realize the function using only NAND gates.

Or

12. Draw CMOS NAND and NOR gates and explain them in detail.

Module 2

13. Explain all the filp-flops. With their truth tables and excitation tables.

Or

14. Enumerate and explain the design steps of an asynchronous up-down counter with an example.

Module 3

15. Design a NOD-4 counter (up-down) using JKFF. Explain the design steps.

Or

16. Explain the principle of universal shift Register with a neat schematic diagram.

Module 4

17. Draw a 3-bit subtractor. Explain its truth table. Realize the truth table using only NOR gates.

Or

18. Explain the following in detail :—

(a) Fast adder. (b) One stage ALU.

Module 5

19. Explain the organization and principles of static and dynamic RAM cells, with neat sketches.

Or

20. Write technical notes on :

(a) E2 PROM.

(b) UV PROM.

(c) I/O Interfacing.

(d) Virtual Memory Organization.

(5 × 12 = 60 marks)

G 1844 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 403—LINEAR SYSTEM ANALYSIS (EE)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. List out merits and demerits of Open loop Control system and Closed loop Control system.
2. State the reasons for choosing State variable analysis over Transfer function method.
3. Write short notes on steady-state error coefficient in time response systems.
4. What does characteristics equation mean ? What is its significance ?
5. Write the various open circuit impedance parameters.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Define : Transfer function. In detail discuss the role of transfer function in a system behavior.
7. Explain the various steps involved in developing state variable equation of RLC networks.
8. In detail explain various time domain specifications with diagram.
9. Sketch the root locus for a unity feedback system with open loop transfer function.

$$G(s) = KS/(S^2 + 4)(S + 2)$$

10. State the procedure of obtaining residues by pole zero plot.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Discuss about the mathematical modeling of electro-mechanical, translational and rotational systems.

Or

12. In detail explain the procedure of linearizing the non-linear models of electrical systems and linearize the following nonlinear equation.

$$Z = XY$$

In the region $5 \le X \le 7, 10 \le Y \le 12$. Find the error if the linearized equation is used to calculate the value of Z when X = 5, Y = 10.

Turn over

13. Explain the procedure of creating signal flow graph from equations and vice-versa.

Or

14. Obtain the state space representation of :
    (a) Armature controlled d.c. motor.
    (b) Field controlled d.c. motor.

15. The overall transfer function of a unity feedback system is given by $C(s)/R(s) = \left[10/\left(s^2 + 6s + 10\right)\right]$. Find the values of the static error constants. Also determine the steady state error for the input $r(t) = 1 + t + t^2$.

Or

16. A servo mechanism is used to control the angular position Φ_0 of a mass through a command signal Φ_i. The moment of inertia of load is 200 kg-m^2 and the motor torque at load is 6.88×10^4 N/m/rad of error. The damping torque coefficient is 5×10^3 N-m/rad/sec. Find the time response for a step input of 1 radian.

17. Using Routh-Hurwitz criterion for the unity feedback system with open loop transfer function :

$$G(s) = K/S(S+1)(S+2)(S+5)$$

    (a) Find the range of K for stability.
    (b) Find the value of K for marginally stable.
    (c) Find the actual location of the closed loop poles when the system is marginally stable.

Or

18. State Lyapunov's theorem. Compare Direct and Indirect Methods of Lyapunov's theorem. Explain stability analysis using Lyapunov's direct method.

19. Write notes on the following :
    (a) Transmission (ABCD) parameters.
    (b) Inverse transmission (A' B C' D') parameters.
    (c) Hybrid (g) parameters.
    (d) Inverse (g') parameters.

Or

20. Write notes on the following :
    (a) Ideal transformers.
    (b) Gyrator.
    (c) Impedance Converter.

(5 × 12 = 60 marks)

G 1838 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 402—DC MACHINES AND TRANSFORMERS (EE)

(Regular—2010 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Write short notes on Inter poles.
2. State the mechanism of torque generation in D.C. Generator. Write its expression.
3. What does speed regulation mean in D.C. motor ? Write its expression.
4. Classify transformers based on the type of cooling methods.
5. What are the advantages of Delta-Delta connection in three-phase transformer ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. What is the effect of armature reaction on the external characteristics of a d.c. generator ?
7. What does voltage regulation mean ? Write it's expression. The commutator of a 6-pole machine has 35 segments. Determine the commutator pitch. Can the coils be connected using bath retrogressive and progressive windings ?
8. What would the sequence of events if the load on the D.C. motor is increased ?
9. Derive the condition for maximum efficiency in a transformer.
10. What should be the kVA rating of each transformer in a V-V bank when the 3-phase balanced load is 40 kVA. If a third similar transformer is connected for operation, what is the rated capacity ? What percentage increase in rating is affected in this way ?

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

11. Define : Commutation and briefly discuss various methods of commutation. Explain about various methods to improve commutation.

Or

12. State the maximum efficiency criterion for different types of D.C. generators. A 50-kW, 120 V, long shunt compound generator is supplying a load at its maximum efficiency and the rated voltage. The armature resistance is 50 mΩ, series field resistance is 20 mΩ, shunt field resistance is 40 Ω, and rotational loss is 2 kW. What is the maximum efficiency of the generator ?

(12 marks)

13. A 24-slot, 2-pole d.c. machine has 18 turns per coil. The average flux density per pole is 1 T. The effective length of the machine is 20 cm, and the radius of the armature is 10 cm. The magnetic poles are designed to cover 80 % of the armature periphery. If the armature angular velocity is 183.2 rad/s, determine,

    (a) the induced e.m.f. in the armature winding,

    (b) the induced e.m.f. per coil,

    (c) the induced e.m.f. per turn, and

    (d) the induced e.m.f. per conductor.

Or

14. Discuss the operation of series and shunt D.C. generator with diagrams.

(12 marks)

15. In detail explain electrical, mechanical and other major characteristics of D.C. series motors. Draw performance curve of D.C. series motor.

Or

16. A 240-V shunt motor takes a current of 3.5 A on no load. The armature circuit resistance is 0.5 Ω and the shunt field winding resistance is 160 Ω. When the motor operates at full load at 2400 r.p.m. it takes 24 A. Determine (a) its efficiency at full load ; (b) torque developed and the useful torque ; (c) the no-load speed and (d) per cent speed regulation. Sketch the power-flow diagram for each operating condition.

(12 marks)

17. The maximum efficiency of a 500 kVA, 3300/500 V, 50 Hz, single phase transformer is 97 % and occurs at $\frac{3}{4}^{th}$ full-load u.p.f. If the impedance is 10 %, calculate the regulation at full load, 0.8 p.f. lag.

Or

18. In detail explain the parallel operation of a single phase transformer with diagrams for, (a) ideal cage ; (b) equal voltage ratios.

(12 marks)

19. In detail explain Scott connection in three phase transformer.

Or

20. Discuss the operation of autotransformer and Cu saving associated with it. List out it's advantages.

(5 × 12 = 60 marks)

G 1404 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING (E)

(Improvement/Supplementary—2004 Admission onwards)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever needed.
Also write comments wherever necessary in the program.

Part A

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

1. Write the syntax of conditional operator and explain with the help of an example.
2. What are the commonly used input-output functions in C ? How they are accessed ?
3. Explain pass by valve and pass by reference with suitable examples.
4. Differentiate between automatic and register variables.
5. Explain any two string functions with examples.
6. State the rules to be followed during array initialization.
7. Explain the following pointer declarations :
   (a) char * func (char *x* [ ]);
   (b) int * (*fptr [8]) (char arr);
8. Explain "fopen ( )". What are the parameters and functions used in it ?
9. Explain initialization of a structure with an example.
10. What are command line arguments ? What are its applications ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Write an interactive C program to read an integer and to calculate the sum of digits. Also check if it is divisible by 6.

Or

12. Explain, with the help of appropriate examples, all the operators used in C, giving their overall precedence.

Turn over

Module 2

13. (a) Differentiate between "while" and "Do-while" loops, with the help of syntax and examples.

(b) Write a program to count the number of digits in an integer using "while" loop.

Or

14. Write a C program to find the number of Thousands, five-hundreds, hundreds, fifties, twenties, tens, fives, twos and ones in an amount given.

Module 3

15. Write an interactive C program to merge two arrays and to print the merged array in descending order.

Or

16. Write a program to check whether the given string is palindrome or not.

Module 4

17. Write a C program to compare two strings and to find the biggest string, using pointers.

Or

18. Write a complete C program to count the number of words in a text file.

Module 5

19. (a) Explain three dynamic memory allocation functions. What is singly linked list and doubly linked list ? Give examples. (8 marks)

(b) Explain any two preprocessor directives and their functioning ? (4 marks)

Or

20. Define macro. What are its advantages ? Write a macro that converts a character to uppercase if it is a lowercase letter and leaves it unchanged otherwise.

[5 × 12 = 60 marks]

G 1385 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRONIC CIRCUITS (E)

(Improvement/Supplementary—2004 admission onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare and contrast between emitter bias circuit and voltage divider bias circuit.
2. What is pinch-off ? Draw the depletion region in the JFET during pinch-off.
3. Compare the voltage gains and current gains of CE and CC configurations, giving typical values.
4. Clearly explain why the voltage gain of an RC coupled amplifier decreases at low and high frequencies.
5. Compare the input and output resistances of a current series and voltage shunt feedback amplifiers.
6. Draw and explain the general block diagram of a negative feedback amplifier.
7. Clearly explain the need and functioning of commutating capacitor in a bistable multivibrator.
8. With a cicuit diagram and waveforms, explain the working of a positive clamping circuit.
9. Compare the efficiencies of class A, B, AB and C power amplifiers.
10. With necessary equations, show that all the even harmonic components are cancelled in a transformer coupled push pull power amplifier.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Draw source follower circuit. Obtain its small signal equivalent circuit at low frequencies. Derive expressions for its A_i, A_v, R_i and R_o.

Or

12. Draw the circuit of a CE RC coupled amplifier using voltage divider bias. Explain the function of each component. Design the circuit for a voltage gain of 150.

Turn over

Module II

13. Define all the *h*-parameter of CE transistor, giving typical values. With necessary diagrams show how these can be estimated from the transistor characteristics.

Or

14. (a) Compare the *h*-parameters of CE, CC and CB configurations, giving typical values and the relationships among them.

(6 marks)

(b) Draw a 2-stage RC coupled BJT amplifier and design it for a voltage gain of 1200.

(6 marks)

Module III

15. (a) Draw the expressions for the effect of negative feedback on the input impedance of current shunt and voltage series feedback amplifies.

(8 marks)

(b) Derive equations to show that the sensitivity in voltage gain of a negative feedback amplifier is reduced.

(4 marks)

Or

16. Draw the circuit of a crystal oscillator to generate 3 MHz sine waves. Comemnt on the frequency stability of the circuit.

Module IV

17. Give neat circuit diagrams of (i) collector coupled ; and (ii) emitter coupled astable multivibrators and describe the working of the circuits with necessary waveforms.

Or

18. Draw the circuit of UJT relaxation sweep oscillator and describe its working with its emitter and base waveforms. Design the circuit to generate sweep of 1.2 kHz, 10 % duty cycle, 6 V amplitude.

Module V

19. Draw and explain a class C power amplifier and give its practical applications.

Or

20. With a neat circuit diagram, explain the working of class AB complementary symmetry power amplifier. Give its applications.

(5 × 12 = 60 marks)

G 1372 (Pages : 3) Reg. No. EEE

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common to all Branches)

[Improvement/Supplementary/2004 Admissions onwards]

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 I

1. (a) Find the general solution of $p^2 + 2py \cot x = y^2$. (5 marks)

(b) Solve $xdx - xdy + \log xdx = 0$. (5 marks)

(c) Find the orthogonal trajectory of the cardioids

$r = a(1 - \cos\theta)$. (10 marks)

Or

(d) Solve $(D^2 + 2D + 1)\, y = 2 + x^2$. (5 marks)

(e) Solve $(D^2 - 2D + 1)\, y = e^x \log x$ by the method of variation of parameters. (5 marks)

(f) A bullet enters a board of 0.1 m thickness with a velocity of 200 m/s, pierces it and leaves the board with a velocity of 80 m/s. Assuming that the resistance offered by the board to the bullet is proportional to the square of its velocity, find the time taken by the bullet to pierce the board. (10 marks)

Module 2

2. (a) Solve $(pq - p - q)(z - px - qy) = pq$. (5 marks)

(b) Solve by Charpit's method : $q + xp = p^2$. (8 marks)

(c) Solve $\frac{\partial^2 z}{\partial x^2} - 7\frac{\partial^2 z}{\partial x \partial y} + 12\frac{\partial^2 z}{\partial y^2} = e^{x-y}$. (7 marks)

Or

(d) Find the complete solution of

$$\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = e^{(2x-3y)} + \sin(x-2y).$$

(10 marks)

(e) A bar with insulated sides is initially at temperature 0° C throughout. The end $x = 0$ is kept at 0° C and heat is suddenly applied at the end $x = l$ so that $\frac{\partial u}{\partial x} = A$ for $x = l$, where A is a constant. Find the temperature function $u(x, t)$.

(10 marks)

Module 3

3. (a) Using Fourier integrals, show that

$$\int_0^\infty \frac{\lambda \sin \lambda x}{k^2 + \lambda^2} d\lambda = \frac{\pi}{2} e^{-kx}, \; x > 0, k > 0$$

(8 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px dx = \begin{cases} 1-p & 0 \le p \le 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that $\int_0^\infty \frac{\sin t}{t^2} dt = \frac{\pi}{2}$.

Or

(12 marks)

(c) Using Parseval's identity, show that $\int_0^\infty \frac{dx}{(1+x^2)^2} = \frac{\pi}{4}$.

(10 marks)

(d) Find the Fourier cosine transform of $f(x) = \frac{1}{(1+x^2)}$ and hence derive Fourier sine transform of $\phi(x) = \frac{x}{1+x^2}$.

(10 marks)

Module 4

4. (a) In 800 families with 5 children each, how many families would be expected to have (i) 3 boys and 2 girls ; (ii) 2 boys and 3 girls ; (iii) no girl ; (iv) at the most two girls ? Assume probabilities for boys and girls to be equal.

(12 marks)

(b) Suppose a book of 585 pages contains 43 typographical errors. If these errors are randomly distributed throughout the book, what is the probability that 10 pages, selected at random, will be free from errors ?

Or

(8 marks)

(c) The probability that a man aged 40 years will die before reaching the age of 45 years is 0.018. Out of a group of 400 men, now aged 40 years, what is the probability that 2 men will die within the next 5 years ?

(10 marks)

(d) Fit a normal curve to the following distribution :

x :	2	4	6	8	10
f :	1	4	6	4	1

(10 marks)

Module 5

5. (a) In a simple sample of 600 men from a certain city, 400 are found smokers. In one of 900 men from another city, 450 are found to smoke. Do the data indicate that the cities are significantly different with respect to the prevalence of smoking among men ?

(10 marks)

(b) Tests for breaking strength were carried out on two lots of 5 and 9 steel wires respectively. The variance of first lot was 250 and that of the second was 482. Is there a significant difference in their variability ?

(10 marks)

Or

(c) Obtain the equation of the normal curve that may be fitted to the data and test the goodness of fit :

x :	4	6	8	10	12	14	16	18	20	22	24	Total
$f(x)$:	1	7	15	22	35	43	38	20	13	5	1	200

(10 marks)

(b) What is the probability that a correlation coefficient of 0.75 or less can arise in a sample of 30 from a normal population in which the true correlation coefficient is 0.9 ?

(10 marks)

[5 × 20 = 100 marks]

16. Find the Z and Y parameters for the network shown in Fig. 7.

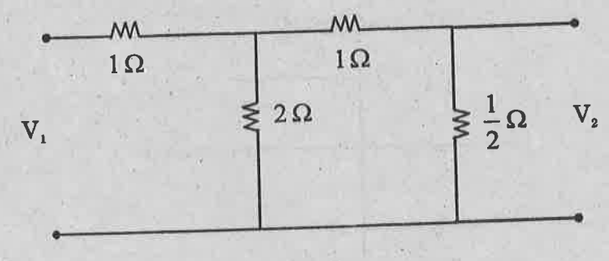

Fig. 7.

Module 4

17. (a) Design a T-section constant-K high pass filter having cut-off frequency of 8kHz and design impedance $R_0 = 600\,\Omega$. Find its characteristic impedance and phase constant at 20 kHz. Draw the complete circuit. (8 marks)

(b) Draw the characteristics of all the ideal and practical filters. (4 marks)

Or

18. Design and draw the m-derived T and π-networks of low pass filter with nominal characteristic impedance $R_0 = 600\,\Omega$, cut-off frequency $f_c = 0.8$ kHz and infinite attenuation frequency $f_\alpha = 2$ kHz.

Module 5

19. (a) An impedance function has the pole-zero pattern as shown in Fig. 8. If $Z(-2) = 3$, synthesize the impedance in Foster II form and draw the network.

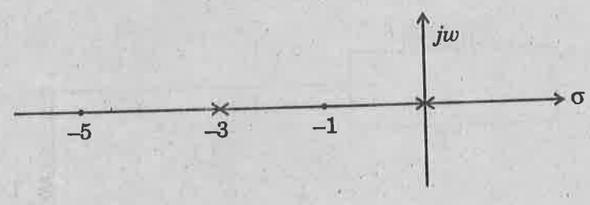

Fig. 8.

(b) Realise the RC driving point impedance function $Z(s) = \dfrac{s^2+6s+8}{s^2+4s+3}$ in first Cauer form.

Or

20. Check the positive realness of the following functions :

(a) $\dfrac{s^2+s+6}{s^2+s+1}$.

(b) $\dfrac{s^2+6s+5}{s^2+9s+14}$.

(5 × 12 = 60 marks)

G 1375

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

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

NETWORK ANALYSIS AND SYNTHESIS (E)

(Improvement/Supplementary—2004 Admissions onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Obtain the Laplace Transform of $e^{-at}\sin wt$.
2. Find the inverse Laplace transform of $\dfrac{1}{(s+1)(s+2)}$ by using convolution.
3. Find the Fourier Transform of an impulse function and also draw the spectrum.
4. Solve the integral $\int_{-\infty}^{\infty}(t^2+1)\,\delta(t)\,dt$.
5. Determine the Transmission parameters in terms of open circuit and short circuit impedances.
6. Define image impedances of the network and also calculate these impedances in terms of the open circuit and short circuit impedances.
7. Compare constant-K and m-derived filters.
8. Find Z_0 for a π-network terminated with Z_0 in terms of prototype impedances.
9. Check whether $s^4+s^3+5s^2+3s+4$ is Hurwitz or not.
10. Explain Sturm's test and its application ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Determine the steady-state mesh currents i_1 and i_2 in the Fig.1. Assume no initial energy stored in the circuit.

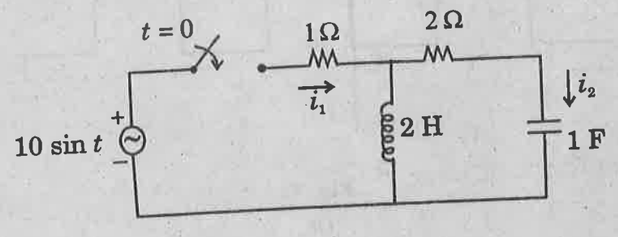

Fig. 1.

(b) Find the Laplace Transform of the waveform in Fig. 2.

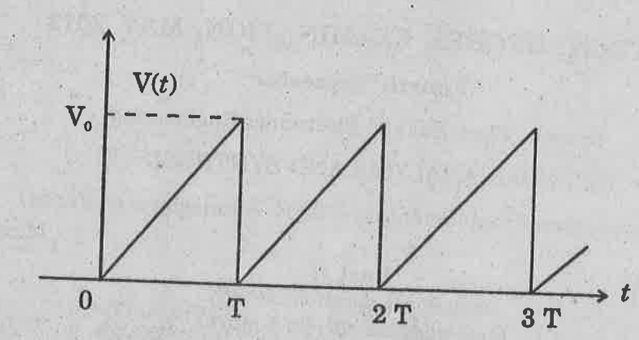

Fig.2.

Or

12. In the circuit shown in Fig. 3, obtain $v(t)$, for $t > 0$, when S is closed at $t = 0$. Also determine the current drawn from the source.

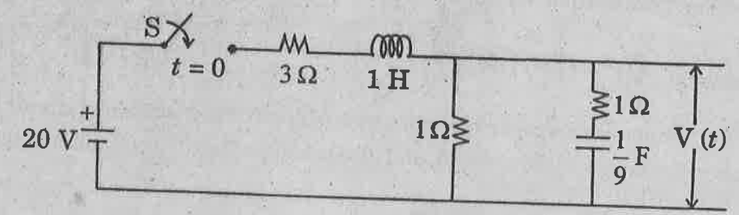

Fig. 3.

Module 2

13. Obtain the trigonometric Fourier series representation of the periodic signal shown in Fig. 4.

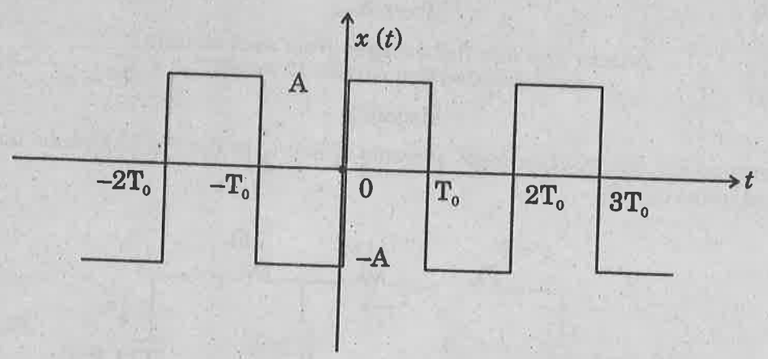

Fig. 4.

Or

14. (a) Find the Fourier Transform of Signum function shown in Fig. 5.

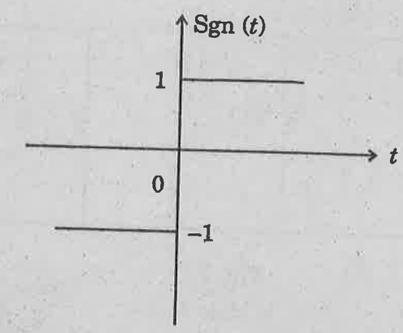

Fig. 5.

(b) Determine the Fourier Transform of $1 + \sin\left(6\pi t + \frac{\pi}{8}\right)$.

(7 marks)

Module 3

15. (a) Plot the pole-zero diagram of $\frac{s}{(s+1)(s+2)}$ and obtain its residues by graphical method.

(5 marks)

(b) Calculate the driving point impedance of the network shown in Fig. 6, and plot the pole-zero diagram.

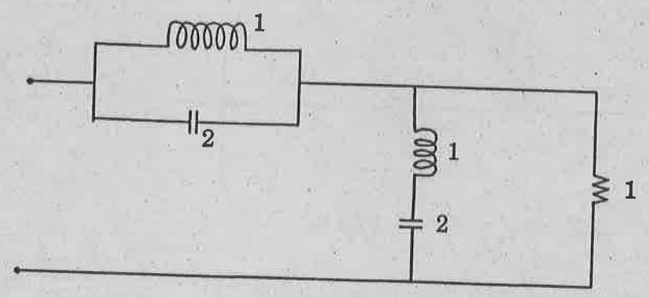

Fig. 6.

(7 marks)

Or

G 1395 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Electrical and Electronics Engineering

ELECTRICAL MACHINES—I (E)

(Improvement / Supplementary— 2004 Admissions onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain why all shunt field coils are designed to produce the required mmf using a large number of turns and low current.
2. Distinguish between 'Apparent flux density' and 'True flux density' in highly saturated armature teeth.
3. For dc compound generator operating in parallel, explain two additional conditions for maintaining proportionate load division with changes in load.
4. Give three reasons why the terminal voltage of a self-excited shunt generator will decrease with application of increased load.
5. Explain why a small change in motor speed and counter emf will produce correspondingly larger changes in armature current.
6. Explain any one method of speed control of dc series motor.
7. Is it possible for a 50 Hz transformer to operate on 400 Hz ? Under what conditions ?
8. Why is it customary to perform the open-circuit test on the lowest-voltage winding obtainable on the transformer.? What precautions are necessary ?
9. Explain how does the tertiary winding reduce secondary Y-connected load imbalances.
10. Show which transformation will supply a 6ϕ load using conventional single-winding transformers having no centre taps.

(10 × 4 = 40 marks)

Part B

Answer **either** *section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) A 350 kW, 500 V generator has 8 poles, an armature diameter of 130 cm and a core length of 35 cm. A 4-circuit, wave connected winding is accommodated in 114 slots with 6 coil sides per slot. Taking commutating poles with an axial length of 20 cm and gap of 1cm, and assuming a specific permeance = 6, find the necessary excitation of, number of turns for, each interpole.

(12 marks)

Or

Turn over

(b) A 4 pole generator supplies a current of 143A. It has 492 armature conductors (i) wave connected, (ii) lap-connected. When delivering full -load the brushes are given an actual lead of 10°. Calculate the demagnetizing armature ampere-turns per pole in each case. The field winding is shunt connected and takes 10A, find the number of extra shunt field turns necessary to neutralize this demagnetization.

(12 marks)

Module 2

12. (a) A shunt generator has an induced voltage on open-circuit of 125V, when the machine is on load, the terminal voltage is 120 V. Find the load current if the field circuit resistance is 15Ω armature resistance is 0.02Ω. Ignore armature reaction.

(12 marks)

Or

(b) A series generator, having an external characteristic which is a straight line through zero to 50 V at 200 A, is connected as a booster between a station bus-bar and a feeder of 0.3Ω resistance. Calculate the voltage between the far end of the feeder and the bus-bar at a current of (i) 150 A (ii) 40 A.

(12 marks)

Module 3

13. (a) A series motor with an unsaturated magnetic circuit and with negligible resistance, when running at a certain speed on a given load takes 50 A at 500 V. If the load torque varies as the cube of the speed, find the resistance necessary to reduce the speed by (i) 50% ; (ii) 30%.

(12 marks)

Or

(b) A test on two coupled similar tramway motors, with their fields connected in series, gave the following results when one machine acted as a motor and the other as a generator.

Motor :

Armature current	=	56A
Armature voltage	=	550V
Voltage drop across field winding	=	40V

Generator :

Armature current	=	44A
Armature voltage	=	400V
Field voltage drop	=	40 V
Resistance of each armature	=	0.3Ω

Calculate the efficiency of each machine.

(12 marks)

Module 4

14. (a) The equivalent circuit for a 220/440 V step up transformer has the following parameters referred to the low-voltage side

Equivalent resistance	=	0.15Ω
Equivalent reactance	=	0.36Ω
Core loss component resistance	=	600Ω
Magnetising reactance	=	300Ω.

When the transformer is supplying a load of 10A at a pf of 0.8 lag, calculate

(i) the primary current.

(ii) secondary terminal voltage.

(iii) draw the phasor diagram.

(12 marks)

Or

(b) A 250/500 V transformer gave the following test results :

SC test : 20 V, 12 A, 100 W with l.v. winding short circuited. OC test : 250 V, 1A, 80W on low voltage side.

Determine the circuit constants, insert these on the equivalent circuit diagram and calculate applied voltage and efficiency when the output is 10 A at 500 V and 0.8 pf lagging.

(12 marks)

Module 5

15. (a) (i) What are the steps to maximise all-day efficiency during the design ? (4 marks)

(ii) A transformer has its maximum efficiency of 0.98 at 15 kVA at upf. Compare its all-day efficiencies for the following load cycles :

(1) Full-load of 20kVA 12 hours/day and no-load, rest of the day.

(2) Full-load 4 hours/day and 0.4 full-load rest of the day.

(8 marks)

Or

(b) A 600 kVA, 1ϕ transformer with 0.012 pu resistance and 0.06 pu reactance is connected in parallel with a 300 kVA transformer with 0.014 pu resistance and 0.045 pu reactance to share a load of 800 kVA at 0.8 pf lagging. Find how they share the load (i) when both the secondary voltages are 440 V and (ii) when the open circuit secondary voltages are respectively 445 V and 455V.

(12 marks)

(5 × 12 = 60 marks)

G 1413 (Pages : 3) Reg. No.....

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B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONIC INSTRUMENTS (E)

(Improvement/Supplementary—2004 Admission onwards)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain with neat diagram, air friction damping adopted in indicating instruments.
2. Explain electromagnetic damping and its applications.
3. What is the principle of Electrostatic voltmeter (attracted disc type) ?
4. Give the differences between moving coil and moving iron instruments.
5. What are the errors in dynamometer type wattmeter ? What are their causes ?
6. What do you mean by creep in an energy meter ? How it can be compensated ?
7. With neat diagrams, explain the working of the time-base generator in a CRO ?
8. Explain the operation of the "level" control in CRO.
9. What different methods can be used for the measurement of frequency ?
10. In a synchroscope it is observed that the pointer is revolving once in every second. What is the frequency of the incoming machine ?

(10 × 4 = 40 marks)

Part B

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

MODULE 1

11. With neat diagrams and expressions, describe under damping, over damping and critical damping in indicating instruments. The best performance is obtained when the meter is either critically damped or slightly under damped. Why ?

Or

Turn over

12. (a) With neat diagrams, explain the controlling torque generated through gravity and spring control methods.

(6 marks)

(b) The torque of an ammeter varies as the square of the current through it. If a current of 6A produces a deflection of 90°, what deflection will accord for a current of 3A when the instrument is (i) gravity controlled ; (ii) spring controlled ?

(6 marks)

MODULE 2

13. (a) Explain with a neat diagram, the construction and principle of operation of moving iron attraction type of ammeter. What are its applications ?

(6 marks)

(b) A voltmeter having a sensitivity of 1000 Ω/V reads 100 V on its 150 V scale when connected across an unknown resistor in series with an ammeter. When the ammeter reads 5A, calculate :

(i) the apparent resistance of the unknown resistor ;

(ii) actual resistance of the unknown resistor and

(iii) error due to the loading effect of the voltmeter.

(6 marks)

Or

14. State the causes of change of accuracy in moving iron instruments with change of temperature. With neat diagrams, explain how compensation is made in ammeters for change of electrical resistance of the instrument with change of temperature.

MODULE 3

15. (a) With a neat sketch, explain the construction and principle of working of dynamometer type wattmeter.

(6 marks)

(b) Describe the errors and methods of corrections in an induction type wattmeter. (6 marks)

Or

16. Draw the constructional diagram of a 3-phase energy meter and its working. How do you correct it, if it is found to be moving fast ?

MODULE 4

17. (a) With the help of neat diagram, explain the working of a rectifier type voltmeter. (6 marks)

(b) Give the block schematic of RLC meter and describe how the component values can be measured.

(6 marks)

Or

18. (a) With a neat cross-sectional diagram, explain the various electrodes present in a general purpose CRO and their functioning ?

(7 marks)

(b) Calculate the velocity of the electron beam in an oscilloscope if the voltage applied to its vertical deflection plates in 2000 V. Also calculate the cut-off frequency if the maximum transit time is 1/4 of a cycle. The length of the horizontal plates is 50 mm. Assume charge of an electron = 1.6×10^{-19} and Mass of electron = 9.1×10^{-31} kg.

(5 marks)

MODULE 5

19. (a) With a neat sketch, explain the operation of electrical resonance type frequency meter.

(6 marks)

(b) Describe, with neat diagrams, the construction and working of a rotating type phase sequence indicator.

(6 marks)

Or

20. (a) Explain the construction and operation of a moving iron type power factor meter.

(7 marks)

(b) Explain the working principle of a synchroscope. (5 marks)

[5 × 12 = 60 marks]

MODULE 5

19. Two independent sample sizes of 7 and 6 has the following values :

Sample A	:	28	30	32	33	31	29	34
Sample B	:	29	30	30	24	27	28	—

Examine whether the samples have been drawn from normal populations having the same variance.

(12 marks)

Or

20. Records taken of the number of male and female births in 800 fa ilies having four children are as follows :

No. of male births	:	0	1	2	3	4
No. of female births	:	4	3	2	1	0
No. of families	:	32	178	290	236	94

Test whether the data are consistent with the hypothesis tl he binomial law holds and the chance of male birth is equal to that of the female birth, namely, $p = q = \frac{1}{2}$.

(12 marks)

[5 × 12 = 60 marks]

G 1833 (Pages : 4) Reg. No.....

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B.TECH. DEGREE EXAMINATION, MAY 2012

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular—2010 Admissions)

[Common to all Branches]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Expand $\pi x - x^2$ in a half range sine series in the interval $(0, \pi)$ upto the first three terms.

2. Find the Fourier Transform of $f(x) = \begin{cases} 1 \text{ for } |x| < 1 \\ 0 \text{ for } |x| > 1. \end{cases}$

3. Form the partial differential equation by eliminating the arbitrary functions from $f\left(x + y + z, x^2 + y^2 + z^2\right) = 0.$

4. During war, one ship out of nine was sunk on an average in a certain voyage. What was the probability that exactly 3 out of a convoy of 6 ships would arrive safely ?

5. A random sample of 900 members has a mean 3.4 cm. Check if it can be reasonably regarded as a sample from a large population of mean 3.2 cm. and SD = 2.3 cm.

(5 × 3 = 15 marks)

Part B

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

6. Obtain Fourier series for the function

$$f(x) = \pi x, \quad 0 \le x \le 1$$
$$= \pi(2 - x) \quad 1 \le x \le 2$$

7. Find the Fourier cosine transform of $f(x) = \frac{1}{1 + x^2}$ and hence derive Fourier sine Transform of $\phi(x) = \frac{x}{1 + x^2}$.

8. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, given that $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$, when y is an odd multiple of $\frac{\pi}{2}$.

9. Assume that the probability of an individual coal-miner being killed in a mine accident during an year is $\frac{1}{2400}$. Use Poisson's distribution to calculate the probability that in a mine employing 200 miners, there will be at least one fatal accident in a year.

10. A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

(5 × 5 = 25 marks)

Part C

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

Module 1

11. If $f(x) = x, \quad 0 < x < \pi/2$
$= \pi - x, \ \pi/2 < x < \pi$, show that

(a) $f(x) = \frac{4}{\pi}\left[\sin x - \frac{\sin 3x}{3^2} + \frac{\sin 5x}{5^2} - \ldots\ldots\right]$. (5 marks)

(b) $f(x) = \frac{\pi}{4} - \frac{2}{\pi}\left[\frac{\cos 2x}{1^2} + \frac{\cos 6x}{3^2} + \frac{\cos 10x}{5^2} + \ldots\ldots\right]$. (7 marks)

Or

12. Obtain the first three coefficients in the Fourier Cosine series for y from the following data :

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

(12 marks)

Module 2

13. (a) Using Fourier integral representation, show that $\int_0^\infty \frac{\cos \omega x}{1+\omega^2}\, d\omega = \frac{\pi}{2} e^{-x} \ (x \geq 0)$. (6 marks)

(b) Solve for F (x) the integral equation $\int_0^\infty F(x) \sin tx \ dx = \begin{cases} 1, & 0 \leq t < 1 \\ 2, & 1 \leq t < 2 \\ 0, & t \geq 2. \end{cases}$ (6 marks)

14. (a) Using Parseval's identity, prove that $\int_0^\infty \frac{dt}{(a^2+t^2)(b^2+t^2)} = \frac{\pi}{2ab(a+b)}$. (5 marks)

(b) Solve the integral equation $\int_0^\infty F(x) \cos px = dx \begin{cases} 1-p, & 0 \leq p \leq 1 \\ 0, & p > 1 \end{cases}$ and hence deduce that

$\int_0^\infty \frac{\sin^2 t}{t^2}\, dt = \frac{\pi}{2}$.

(7 marks)

Module 3

15. Solve $2zx - px^2 - 2\,pxy + pq = 0$. (12 marks)

Or

16. Solve :

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

(b) $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = 12\,xy$. (6 marks)

Module 4

17. A random variable X has the following probability distribution values of X :

x :	0	1	2	3	4	5	6	7	8	9
$p(x)$:	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$	$19a$

(a) Determine the value of a (3 marks)

(b) Find $P(X < 3), P(X \geq 3), P(2 \leq X < 5)$. (6 marks)

(c) What is the smallest value for which $P(X \leq x) > 0.5$? (3 marks)

Or

18. A sample of 100 button cells tested to find the length of life, produced the following results : $\bar{x} = 12$ hours, $\sigma = 3$ hours. Assuming the data to be normally distributed, what percentage of button cells are expected to have life

(a) more than 15 hours ; (4 marks)

(b) less than 6 hours ; and (4 marks)

(c) between 10 and 14 hours ? (4 marks)

Turn over