F 3473 (Pages : 3) Reg. No.....EEE.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

ENGINEERING MATHEMATICS—III

(Common for all branches)

[Prior to 2007 Admissions—Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer one full question from each module.
Statistical tables permitted.

Module 1

1. (a) Solve $y'' + 3y' + 2y = e^{-2x} + \sin 2x$. (7 marks)

(b) Solve $(D^2 + 6D + 9)y = (x^2 + 1)\sinh x$. (7 marks)

(c) Solve by the method of variation of parameters $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan x$. (6 marks)

Or

2. (a) Solve $(D^2 + 4)\, y = x^2e^{-x} + \sin 2x$. (7 marks)

(b) Solve $x^2 \frac{d^2y}{dx^2} + 2x \frac{dy}{dx} - 12y = x^3 (\log x)^2$. (6 marks)

(c) Solve the system of simultaneous equations :

$$\frac{dy}{dx} + 2y - 3z = x$$

$$\frac{dz}{dx} + 2z - 3y = e^{2x}.$$

(7 marks)

Module 2

3. (a) Solve $2zx - px^2 - 2pxy + pq = 0$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 3\frac{\partial^2 z}{\partial x \partial y} + 2\frac{\partial^2 z}{\partial y^2} = x + y$. (5 marks)

Turn over

(c) A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x\ (l - x)$, find the displacement of the string at any distance x from one end at any time t. (10 marks)

Or

4. (a) Form the partial differential equation from $z = f(x + it) + g(x - it)$. (5 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x\, \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cos x$. (5 marks)

(c) An insulated rod of length 'l' has its ends A and B maintained at 0°C and 100°C respectively until steady state conditions prevail. If B is suddenly reduced to 0°C and maintained at 0°C find the temperature at a distance x from A at time t. (10 marks)

Module 3

5. (a) Express $f(x) = \begin{cases} 1, \text{ for } |x| \le 1 \\ 0, \text{ for } |x| > 1 \end{cases}$ as a Fourier integral. (5 marks)

(b) Find the Fourier transform of $e^{-x^2/2}$. (7 marks)

(c) Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}\ (a > 0)$. (8 marks)

Or

6. (a) Using Fourier integral prove that $\int_0^\infty \frac{\cos \lambda x}{1 + \lambda^2}\, d\lambda = \frac{\pi}{2} e^{-x}\ (x \ge 0)$. (6 marks)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1, |x| < 1 \\ 0, |x| > 1 \end{cases}$. Hence evaluate $\int_0^\infty \frac{x \sin x}{x}\, dx$. (7 marks)

(c) Find the Fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2}\, dx$. (7 marks)

Module 4

7. (a) In a certain factory producing cycle tyres there is a small chance of one in 500 tyres to be defective. The tyres are supplied in lots of 20. Calculate the approximate number of lots containing no defective, one defective and two defective tyres in a consignment of 20000 tyres. (10 marks)

(b) In an intelligence test conducted on 1000 students the mean was 42 and S.D. 24. Assuming the normality of the distribution, find (i) how many students score between 30 and 54 ; (ii) how many score about 60.

(10 marks)

Or

8. (a) Fit a binomial distribution for the following data and calculate the theoretical frequencies :

x :	0	1	2	3	4	5	6
f :	13	25	52	58	32	16	4

(10 marks)

(b) Define Poisson distribution. Determine its mean and variance. (10 marks)

Module 5

9. (a) An I.Q. test was given to two different sets of college students and the results are given below :

	Mean	S.D.	Size
Set I ...	75	7	90
St II ...	73	5	120

Is the difference between the means significant ?

(10 marks)

(b) Out of a consignment of one lakh tennis balls, 400 were selected and out of them 20 were found to be defective. How many defective balls you can reasonably expect to have in the consignment at 5% level of significance ?

Or

(10 marks)

10. (a) S^2 is the variance of a sample of size 10 taken from a normal population with S.D. 5. Find the probability that S^2 will lie between 8.4 and 42.3.

(10 marks)

(b) If two independent sample of sizes $n = 26$ and $n_2 = 8$ are taken from a normal population, what is the probability that the variance of the second sample will be at least 2.4 times the variance of the first sample.

(10 marks)

[5 × 20 = 100 marks]

F 3476 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch—Electrical and Electronics Engineering

NETWORK ANALYSIS AND SYNTHESIS (E)

(Prior to 2007 Admissions/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find the initial and final values of $f(t)$ where $F(s) = \frac{2s+1}{s^2+5s+6}$ using initial and final value theorems.
2. Find the Laplace Transform of a single triangular pulse shown in Fig.1.

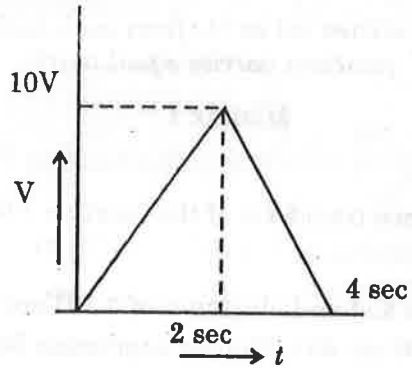

Fig. 1.

3. Find the Fourier transform of a unit impluse function.
4. Explain briefly on waveform symmetries as related to fourier coefficients.
5. Find the driving point admittance of the network shown in Fig. 2.

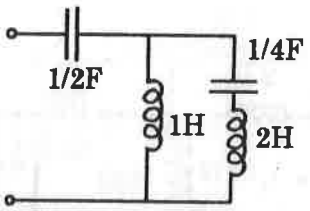

Fig. 2.

Turn over

6. Find the transmission parameters of the network shown in Fig. 3.

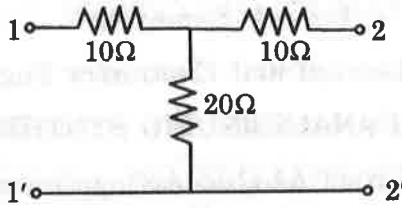

Fig. 3.

7. What is the characteristic impedance of a filter ?
8. What is a filter ? What is the difference between constant k and *m* derived filter ? How are filters classified ?
9. List the properties of a Hurwitz polynomial. How is a polynomial tested for Hurwitz nature ?
10. Discuss the properties of RC impedance and admittance functions. How can such functions be realized ?

(10 × 4 = 40 marks)

Part B

Answer **either** (*a*) **or** (*b*) *from each module.*
All questions carries equal marks.

MODULE I

11. (a) (i) Find the inverse Laplace transform of the function $F(s) = \frac{Se^{-2s}}{s^2 + 6s + 5}$.

(ii) A resistance of 4 ohms and an inductance of 0.1 H are connected in series and excited by a voltage source $v = 100 \sin 40t$. Find an expression for the current. The initial current is zero.

Or

(b) In the current shown in Fig. 4. the switch is initially open and is closed at $f = 0$. Find the current i_1 and i_2.

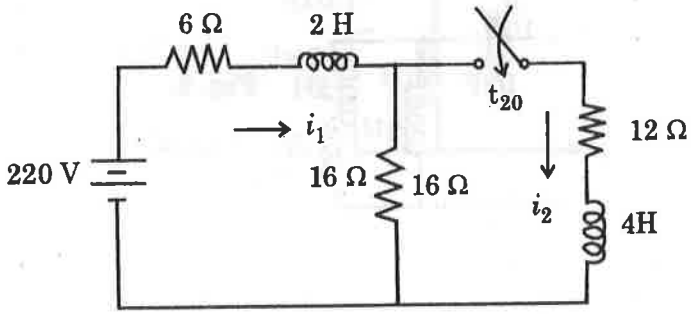

Fig.4.

MODULE II

12. (a) Determine the Fourier series of the waveform shown in Fig. 5.

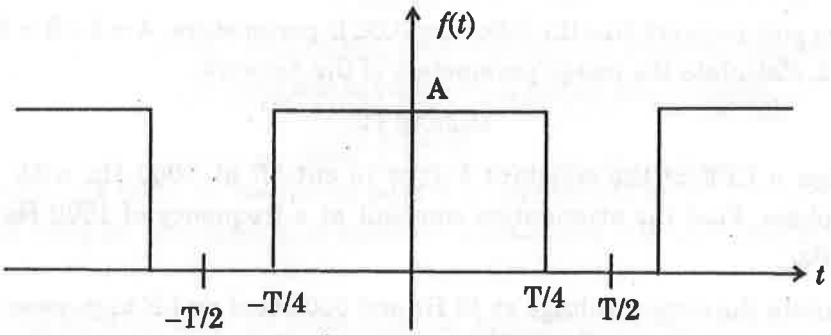

Fig. 5.

Or

(b) (i) Describe any *four* properties of Fourier transform.

(ii) Determine the current i in the inductor for the applied voltage $v(t) = 10e^{-2t}$ use Fourier transform.

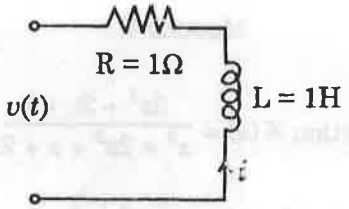

Fig. 6.

MODULE III

13. (a) (i) Determine the poles and zeores of the function $w(s) = \dfrac{(s^2+1)(s^2+2)}{s(s^2+4)}$.

(ii) Obtain the Network function E(s)/I(s) for the network shown in Fig. 7.

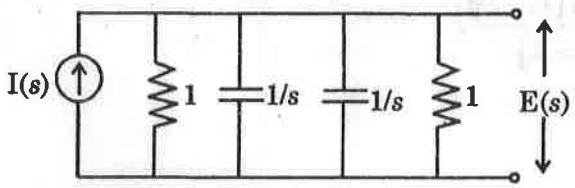

Fig.7.

Or

(b) (i) The following equation give the current I_1 and I_2 of a two port network. Find the ABCD parameters :

$I_1 = 0.05\ V_1 - 0.4\ V_2$

$I_2 = -0.4\ V_1 + 0.1\ V_2$.

(ii) A two port network has the following ABCD parameters. A = 5 ; B = 50 Ω ; C = 0.2 Ω and D = 2. Calculate the image parameters of the network.

MODULE IV

14. (a) (i) Design a LPF of the constant *k* type to cut-off at 1000 Hz with load impedance of 200 ohms. Find the attenuation constant at a frequency of 1500 Hz and phase shift at 500 Hz.

(ii) Calculate the output voltage at 10 Hz and 500 Hz of an LR high-pass filter having cut-off frequency 500 Hz and R = 2 KΩ, L = 159.15 mH. Assume input voltage is 10 Volt.

Or

(b) (i) Design an *m*-derived HPF write f_c = 2000 Hz and R_0 = 600 Ω with very high attention at 1700 Hz.

(ii) In a series LCR type BPF, L = 50 mH, C = 127 μ F and R = 63 ohms. Determine (i) resonant frequency; (ii) the bandwidth ; (iii) cut-off frequenies. Assume load resistance to be 600 ohms.

MODULE V

15. (a) (i) Check whether the function $Z(s) = \dfrac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}$ is a Positive Real function.

(ii) State whether the following function are driving point immittances of LC network or not ;

$$\frac{z(s) = 10\left(s^2 + 4\right)\left(s^2 + 6\right)}{\left(s^2 + 1\right)\left(s^2 + 9\right)} \text{ and } \frac{z(s) = 5s\left(s^2 + 4\right)}{\left(s^2 + 1\right)\left(s^2 + 3\right)}.$$

Or

(b) Find the first and second Foster form of the driving point impedance function :

$$z(s) = \frac{z\left(s^2 + 1\right)\left(s^2 + 9\right)}{s\left(s^2 + 4\right)}.$$

(5 × 12 = 60 marks)

F 3485 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRONIC CIRCUITS (E)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Compare CB and CE configurations.
2. Discuss the biasing techniques of FET.
3. What are the advantages of *h*-parameter representation of BJT Circuits ?
4. Discuss the frequency responses of single stage and multistage amplifiers.
5. Discuss the different methods of negative feedback.
6. What are the advantages of Crystal Oscillator ?
7. Discuss the applications of different types of multivibrators.
8. Explain with necessary diagrams the principle of operation of an RC integrator.
9. Compare Class A, Class B and Class C amplifiers.
10. What is a push pull amplifier ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each question carries 12 *marks.*

11. (a) Explain with necessary diagrams the stabilization techniques used in BJT.

Or

(b) Explain with diagrams the principle of operation and characteristics of UJT.

Turn over

12. (a) Explain how to determine the h-parameters of a transistor in CE mode from its characteristics curves. Derive expressions for voltage gain and current gain.

Or

(b) Explain with figures the different methods of cascading amplifiers.

13. (a) Explain with necessary diagrams the effects of negative feedback on the different distortions of amplifiers.

Or

(b) Draw and explain the circuit of an RC phase shift oscillator and derive an expression for its frequency of oscillation.

14. (a) Explain with circuit diagrams and waveforms the working of a bi-stable multivibrator.

Or

(b) Explain with diagrams the principle of operation of a relaxation oscillator. Derive an expression for its frequency of oscillation.

15. (a) Explain with figures the principle of operation of a Class B amplifier. Derive an expression for its efficiency.

Or

(b) Explain with diagrams the principle of operation of a complimentary symmetry amplifier.

(5 × 12 = 60 marks)

F 3510 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch—Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONICS INSTRUMENTS (E)

(Prior to 2007 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the different methods of damping used in indicating instruments ? List their relative advantages.
2. Explain the torque to weight ratio of moving parts of an instrument. Explain its significance.
3. Explain how the current range of a permanent magnet moving-coil instrument is extended.
4. List the advantages and disadvantages of moving-iron instruments.
5. Discuss the main sources of errors in electrodynamometer type instrument.
6. Explain how the following adjustments are made in single phase induction type energy meter :
   (i) friction compensation and
   (ii) overload compensation.
7. Draw the block diagram of an electronic multimeter.
8. Explain the features of multi-channel oscillosocpe.
9. Discuss the principle of operation of power factor meter.
10. Write a note on grading of instruments.

(10 × 4 = 40 marks)

Part B

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

MODULE 1

11. (a) Describe the various operating for (*e*) needed for proper operation of an analog indicating instrument.

(12 marks)

Or

Turn over

(b) Describe the different methods of producing controlling torque in an indicating instrument. Explain their advantages and disadvantages. (12 marks)

MODULE 2

12. (a) (i) How do you obtain different voltage ranges in a voltmeter ? (4 marks)

(ii) Discuss the construction and working of multimeter. (8 marks)

Or

(b) Explain the construction and working of attraction type moving-iron instrument. (12 marks)

MODULE 3

13. (a) Explain the construction and theory of electro dynamometer type wattmeter. (12 marks)

Or

(b) (i) Describe the working of trivector meter. (6 marks)

(ii) Explain the construction of 3 phase energy meter. (6 marks)

MODULE 4

14. (a) (i) Discuss the principle of operation of electrostatic instrument. (6 marks)

(ii) Describe an electronic multimeter. (6 marks)

Or

(b) Explain how can you use CRO for measuring current, phase and frequency. (12 marks)

MODULE 5

15. (a) Describe the construction and working of a phase sequence indicator. (12 marks)

Or

(b) Explain the construction and working of a frequency meter. (12 marks)

[5 × 12 = 60 marks]

1 copy

F 3494 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—I (E)

(Prior to 2007 admissions)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is the difference between lap and wave winding ?
2. Explain the reasons for the failure of a d.c. shunt machine to build up voltage. How is it rectified ?
3. Explain armature reaction in d.c. machines.
4. Derive the condition for maximum efficiency of a DC shunt motor.
5. Sketch the typical characteristics of a d.c. series motor. What are the applications for this motor ?
6. Explain how Swinburne's test is conducted to calculate the efficiency of DC shunt machine.
7. Explain with sketches the constructional features of Core type and shell type transformer.
8. Derive the e.m.f. equation of a 1-phase transformer.
9. Inrush current in transformer. Explain.
10. Explain the difference between power and distribution transformer.

(10 × 4 = 40 marks)

Part B

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

Module I

11. (a) With neat sketches explain the construction of DC Machines.

(12 marks)

Or

Turn over

(b) (i) Derive an expression for demagnetising and cross magnetising ampere turns/Pole of a DC Machine.

(6 marks)

(ii) A 250 kW 400V 6 pole d.c. generator has 720 lap wound conductors. It is given a brush lead of 2.5 angular degrees (mech) from the geometric nutral. Calculate the cross magnetising demagnetising turns/Pole . Neglect shunt field current.

(6 marks)

Module II

12. (a) (i) Explain the different methods of excitation of d.c. generators with sketches.

(6 marks)

(ii) Find the number of series turns required per pole on a 50 kW compound generator to give 220 V on no-load and 250 V on load, the corresponding mm/s per pole required being 4400 AT and 5800 AT respectively. Assume that the shunt winding alone can give 220V at no -load.

(6 marks)

Or

(b) (i) State the necessity and conditions for parallel operation of DC generators.

(6 marks)

(ii) Two d.c. shunt generators are operated in parallel to supply a load of 1500 A. The armature and field resistances of the machines are 0.01Ω and 0.2Ω and 25Ω and 20Ω respectively. If the terminal voltages are 250 V and 240 V respectively find (a) terminal voltage (b) the current output of each generator.

(6 marks)

Module III

13. (a) (i) Describe the different methods of speed control of d.c. motor. (6 marks)

(ii) The peak current of a d.c. shunt motor rated at 230 V should not exceed 2.5 times the rated value. The rated current of the motor is 12 A. Determine the value of starting resistance and the way in which it is divided into five sections.

(6 marks)

Or

(b) (i) Explain the procedure and calculation for the calculating the full-load efficiency by Hopkinson's test.

(6 marks)

(ii) A 200 V shunt motor has an armature resistance of 0.25Ω and field resistance of 200Ω . When running on no-load it takes 5 amps. Calculate the h.p. output and the efficiency of the motor when loaded to take a line current of 40 A.

(6 marks)

Module IV

14. (a) What are the losses in a transformer ? How they are minimized ? Derive the condition for maximum efficiency. How will you determine the losses experimentally ?

(12 marks)

Or

(b) A 10 kVA 250/500 V 50 Hz single-phase transformer has primary and secondary resistance of 0.8Ω and 0.34Ω respectively and the corresponding reactances 0.18Ω and 0.8Ω . Calculate the potential difference at the terminals of the secondary of the transformer on full-load at 0.707 p.f. leading the voltage applied to the primary being 250 V.

(12 marks)

Module V

15. (a) (i) What are the merits and demerits of Y Y 3-phase connection ? (6 marks)

(ii) Explain the principle of Scott connection in detail. (6 marks)

Or

(b) Write short notes on :

(i) Methods of Cooling of Transformers. (4 marks)

(ii) Role of Tertiary winding in three winding Transformer.

(4 marks)

(iii) All day efficiency. (4 marks)

[5 × 12 = 60 marks]

F 3502 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING (E)

(Prior to 2007 Admissions – Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. Explain with examples the tokens in C.
2. Describe the bitwise operators available with C. Explain their uses.
3. Compare while and do statements.
4. What is meant by scope of a variable?
5. What are the advantages of arrays?
6. Explain how string variables are declared and initialized.
7. What are the advantages in using pointers?
8. Distinguish between the functions (i) printf and fprintf ; (ii) feof and ferror.
9. What is a structure? What are its uses?
10. What is dynamic memory allocation?

(10 × 4 = 40 marks)

Part B

Each question carries 12 *marks.*

11. (a) Explain with examples the input-output functions used in C.

Or

(b) Write a program to read a triplet and to test whether it represents a triangle. If yes, test whether it represents an equilateral or isosceles triangle or not.

12. (a) Explain different categories of functions.

Or

(b) Write a program that uses a function to sort an array of integers.

Turn over

13. (a) Two one-dimensional arrays A and B are sorted in ascending order. Write a program to merge them into a single sorted array C that contains every element of A and B, in the ascending order.

Or

(b) Write a program which will read a text and count all occurrences of a particular word.

14. (a) Explain with examples how pointers help in handling data tables more efficiently.

Or

(b) Explain with examples how files are handled in C.

15. (a) Compare structure and union. What are their uses?

Or

(b) Explain the role of the C preprocessor.

(5 × 12 = 60 marks)