F 9323

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(2002 admissions onwards—Supplementary)

[Common to all branches]

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 $x^2 y dx = (x^3 - y^3)\, dy$; $y(1) = 1$. (5 marks)

(b) Solve $y' = \dfrac{2x + 2y - 1}{3x + y - 2}$. (5 marks)

(c) A tank contains 100 litres of fresh water. 2 litres of brine, each containing 1 gm of dissolved salt, run into the tank per minute, and the mixture kept uniform by stirring uniformly. Water runs out at the rate of 1 litre per minute. Find the amount of salt present when the tank contains 150 litres of brine. (10 marks)

Or

(d) Solve $y = x + 2\tan^{-1} p$. (5 marks)

(e) Solve $e^{4x}(p - 1) + e^{2y} p^2 = 0$. (5 marks)

(f) Calculate the amount of heat passing through 1 cm^2 of a refrigerator wall, if the thickness of the wall is 6 cm and the temperature inside the refrigerator is 0°C while outside it is 20°C. Assume k = 0.0002. (10 marks)

Module 2

2. (a) Solve $q(p - \cos x) = \cos y$. (5 marks)

(b) Solve by Charpit's method : $pxy + pq + qy = yz$. (8 marks)

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

Or

Turn over

(d) Find the complete solution of :

$$\frac{\partial^3 z}{\partial x^3} - 4\frac{\partial^3 z}{\partial x^2 \partial y} + 4\frac{\partial^3 z}{\partial x \partial y^2} = 4\sin(\quad, y).$$

(10 marks)

(e) A tightly stretched string with fixed ends points $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from rest from its position, find the displacement $y(x, t)$.

(10 marks)

Module 3

2. (a) Find the Fourier Integral representation of the function :

$$f(x) = \begin{cases} c, & x < 0 \\ 1/2, & x = 0 \\ e^{-x}, & x > 0 \end{cases}$$

(8 marks)

(b) Find the Fourier sine and cosine transforms of $2e^{-5x} + 5e^{-2x}$. (12 marks)

Or

(c) Using Parseval's identity show that $\int_0^\infty \frac{x^2 dx}{(1+x^2)^2} = \pi/4$. (10 marks)

(d) Solve the integral equation $\int_0^\infty f(\theta)\cos\alpha\theta\, d\theta = \begin{cases} 1-\alpha, 0 \le \alpha \le 1 \\ 0, \quad \alpha > 1 \end{cases}$ Hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$.

(10 marks)

Module 4

4. (a) The probability that a man aged 70 will live to be 75 is 0.65. What is the probability that out of ten men now 70, at least 7 would live to be 75 ?

(8 marks)

(b) An aptitude test for selecting design Engineers in an IT firm is conducted on 1000 candidates. The average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find :

(i) The number of candidates whose scores exceed 60.

(ii) The number of candidates whose scores lie between 30 and 60.

(12 marks)

(c) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and three defective blades respectively in a consignment of 10,000 packets.

(12 marks)

(d) Find the equation of the best fitting normal curve to the following distribution :

x:	0	1	2	3	4	5
y:	13	23	34	15	11	4

(8 marks)

Module 5

5. (a) In a group of 50 first cousines there were found to be 27 males and 23 females. Ascertain if the observed proportions are inconsistent with the hypothesis that the sexes should be in equal proportion ?

(10 marks)

(b) Fit a binomial distribution to the data :

x:	0	1	2	3	4	5
f:	36	144	340	282	163	25

and test for goodness of fit, at the level of significance 0.05.

(10 marks)

Or

(c) The correlation between height and weight in a sample of 200 ten year old boys is 0.7 and the correlation between height and weight in a sample of 250 ten year old girls is 0.62. Is the difference significant ?

(10 marks)

(d) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample will not differ from the true mean by more than 25% of the S.D. How large a sample should be taken ?

(10 marks)

[5 × 20 = 100 marks]

F 9336 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRONIC CIRCUITS (E)

(2002 Admissions onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Discuss the merits and demerits of Collector to Base bias amplifier.
2. Define Intrinsic stand-off ratio and indicate the same in the equivalent circuit.
3. Sketch the CE characteristics and show how h_{fe} estimated from it.
4. Explain the reasons for the drop of gain at low and high frequencies of RC coupled amplifier.
5. From fundamentals : derive $A_f = \frac{A}{1 + A\beta}$ for a feedback amplifier.
6. Describe how oscillations commence in a sine wave oscillator without feeding any signal to it.
7. Explain the concept of linearisation of the sweep voltage in a Miller Configuration.
8. Bring out the differences between RC differentiator and integrator.
9. What is cross-over distortion ? What are its causes and how it is overcome ?
10. For a transformer used with a power amplifier, the load connected to the secondary has an impedance of 8Ω. Its reflected impedance on primary is 800Ω. Calculate the turns ratio.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) What is thermal runaway ? What are the causes ? How it can be eliminated ?

    (b) Deduce the circuit of a voltage divider bias CE amplifier and derive expression for S_I.

Or

12. (a) Draw the low frequency small signal FET model and verify the relation between its parameters.

    (b) Draw the constructional diagram and emitter characteristics of UJT and account for its shape.

Turn over

Module 2

13. Draw a CC amplifier. Deduce its *h*-parameter equivalent circuit and derive expressions for its A_i, A_v and R_i.

Or

14. (a) Compare the parameters of CE, CB and CC configurations, giving their typical values.

(b) Draw a two stage RC coupled FET amplifier and explain its working.

Module 3

15. Draw the circuit of a voltage shunt feedback amplifier and analyse it to obtain its gains and impedances with feedback.

Or

16. Sketch and explain Hartley and RC phase shift oscillators using BJT. Compare these two.

Module 4

17. Draw the circuit of a transistorised bistable multivibrator and show how it can function as a memory element. Describe the read and write operations.

Or

18. With a generalised block diagram, describe the linearisation achieved in Boot strap sweep generator. With the transistorised circuit, show how it is realised ?

Module 5

19. With a neat circuit diagram, explain the working of a class A power amplifier. Obtain expressions for its efficiency and reflected impedance.

Or

20. With neat circuit diagram, describe the working of a class AB power amplifier. Compare its performance with that of class A and class B.

(5 × 12 = 60 marks)

F 9355 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING (E)

(2002 admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Write Neat and Efficient C programs whenever necessary.

Part A

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

1. Find errors, if any and rewrite the correct statements :

```
# include (st'dio.h) ;
int main (void) ;
print (" Hello Welcome") ;
return 0 ;
```

2. Write the code to add 8 to an integer variable, num, if a float variable, amount, is greater than 1.2.
3. Write a program that uses " for " loop to print a line of 50 asteriks..
4. What are the differences between parameter passing by value and passing by reference ?
5. Highlight the merits of using functions rather than a single program ?
6. Give the syntax and purpose of stramp ( ) function used in handling strings. Illustrate with an example.
7. List and briefly explain the high level I/O functions used in file manipulation.
8. What are pointers ? Why they are needed ?
9. What are the preprocessor commands ? Explain.
10. Can structure declarations appear inside functions ? Explain.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Describe all the format specifiers of scanf ( ) and printf ( ), with examples.

    (b) Explain the precedence and associativity of the operators in C ?

Or

Turn over

12. Write a C program to input a number ' n ' . If the number n is odd and positive, print its square root, otherwise print n^5.

Module 2

13. A man takes a job for 30 days. His pay for the first day is Rs. 25 His pay for the second day is Rs. 50 and for the third day is Rs. 100. Each day's pay is twice his pay of the previous day. Write a C program to find his total pay for 30 days.

Or

14. Write a function for matrix addition and another function for matrix multiplication. Hence write a main program to read two matrices A and B and find out A + BA + A + AB + B.

Module 3

15. Write a C program to read a line and find the following in the line :
    (a) Number of capital letters.
    (b) Number of small letters.
    (c) Number of punctuation marks.
    (d) Number of words.

Or

16. Write a program to reverse the numbers in a 500 elements array A.
    (a) Solve the problem first with if-statement.
    (b) Then solve with the for-loop.

Module 4

17. Write a C program using pointers to find the longest word in a given sentence.

Or

18. Write a C program to count the characters and words in a text file.

Module 5

19. Write a C program to create a single linked list to read a set of N numbers and print the list (N should be obtained from the user).

Or

20. Define a structure to represent time in hours (0 – 23) minutes (0 – 59) and seconds (0 – 59) and then write a function that accepts an argument at a time represented by this structure and updates it by 1 second.

(5 × 12 = 60 marks)

F 9364 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONIC INSTRUMENTS (E)

(2002 Admissions onwards–Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State and explain how electrical measuring instruments are classified.
2. What are the different methods of producing controlling torque in an analog instrument ?
3. Discuss the errors and their sources in a permanent magnet type moving coil instrument.
4. What are the differences between moving coil and moving iron instruments ?
5. What is creep ? How it is prevented ?
6. Compare and contrast electrodynamometer type and induction type instruments.
7. List the merits and demerits of electrostatic instruments.
8. Explain how Lissajous figures are formed.
9. What methods can be used for the measurement of frequency ?
10. Explain the working of a static type sequence indicator.

(10 × 4 = 40 marks)

Part B

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

Module 1

11 Explain the following damping methods :

(a) Air damping.

(b) Eddy current damping.

(c) Fluid friction damping.

Or

Turn over

12. The coil of a moving coil galvanometer is wound on a non-magnetic former whose height and width are both 20 mm. It moves in a constant field of 0.12 Wb/m^2. The moment of inertia of its moving parts is 0.25×10^{-6} kgm^2, and the control spring constant is 30×10^{-6} Nm/rad. Calculate : (i) the number of turns that must be wound on the coil to produce a deflection of 150° with a current of 10 mA, and (ii) the resistance of the coil to produce critical damping, all damping being assumed as electromagnetic.

Module 2

13. With the help of neat sketch, explain the construction of a PMMC. How are different forces produced ? Derive the torque equation.

Or

14. (a) Derive the expression for torque equation for a moving iron instrument and comment on the nature of scale.

(b) A PMMC meter is connected across appropriate points of bridge having resistance of each arm of 35 Ω and connected across a supply of voltage, $v = 5 \sin \theta + 0.2 \sin 3\theta$. Determine the reading of the ammeter if its resistance is 30 Ω.

Module 3

15. (a) Give the connection and vector diagrams for the 3-voltmeter method of power measurement.

(b) Discuss the errors introduced in the dynamometer type wattmeter due to the resistance of current and potential coils. How is the error due to resistance of pressure coil compensated for by using a compensating coil ?

Or

16. With neat diagrams, describe the construction and working of a single-phase induction type energy meter. Show that the total number of revolutions made by its disc during a particular time is proportional to the energy consumed.

Module 4

17. Explain with the help of neat diagram, the principle of operation of a rectifier ammeter. Discuss the factors which influence its performance. Specify suitable current and frequency range of a rectifier ammeter.

Or

18. (a) Clearly explain the basic controls in a CRO. (8 marks)

(b) Compare and contrast dual trace and dual beam oscilloscopes. (4 marks)

Module 5

19. With neat sketches, explain the construction and working of dynamometer type power factor meter for (i) single phase and (ii) three-phase.

Or

20. Draw the constructional diagram of synchroscope and explain its working and uses. In a synchroscope, it is observed that the pointer is revolving once in every second. Calculate the frequency of the incoming machine.

(5 × 12 = 60 marks)

F 9346 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—I (E)

(2002 Admissions onwards—Supplementary)

Time : Three Hours **Maximum : 100 Marks**

Part A

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

1. Explain why all field coils placed on field poles have the same number of turns/pole and are always connected in series.
2. "The dc machines with inter poles are economical and more compact in size than the non-inter-polar d.c. machines of the same rating". Comment on this statement.
3. Define (i) self excitation ; (ii) separate excitation.
4. For d.c. shut generators operating in parallel, explain why a condition of stable equilibrium exists between these generators for sudden increase or decrease in speed.
5. Explain why is armature current often employed as an indication of motor load and speed.
6. What is the effect of armature reaction on the speed regulation of d.c. motors.
7. Is the equivalent copper loss referred to the high voltage side the same as the equivalent copper loss referred to the low-voltage side ? Explain.
8. In determining efficiency only using open and short-circuit test data, why is it unnecessary to calculate equivalent impedance and reactance from short-circuit test data ? Explain.
9. Give three purposes for the use of tertiary in power transmission and distribution transformers ?
10. Which of the two powers is responsible for the increase in kVA using an autotransformer over a conventional isolation transformer ?

(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) (i) Explain the significance of time of commutation ? (4 marks)

Turn over

(ii) A compensated generator has 1200 armature ampere-turns per pole, the pole are to pole pitch ratio of 0.7, the length of interpole air gap of 1.25 cm and the flux density in the interpole air gap of 0.3 wb/m2. Calculate the ampere turns per pole for the compensating winding and for the interpole winding.

(8 marks)

Or

(b) A 1500kW, 550 V, 16-pole generator runs at 150 r.p.m. What must be the useful flux per pole if there are 2500 conductors lap-connected and full-load copper losses are 25 KW ? Calculate the area of the pole shoe if the gap density has a uniform value of 0.9 wb/m2 and find the no-load terminal voltage, neglecting armature reaction and change in speed.

(12 marks)

Module 2

12. (a) A separately excited generator, when running at 1200 r,p.m. supplies 200 A at 125 V to a circuit of constant resistance. What will be the current when the speed is dropped to 900 r.p.m. if the field current is unaltered ? Armature resistance : 0.04W, total drop at brushes : 2V. Ignore change in almature reaction.

Or

(b) A long-shut compound generator debivers a load current of 50A at 500V, and has armature, series field and shunt-field resistances of 0.05W, 0.003 W and 250 W respectively. Calculate the generated electromotive force and the armature current. Allow 10V per brush for copntact drop.

(12 marks)

Module 3

13. (a) A 50 hp, 500V shunt motor has a full load efficiency of 0.87 and runs at 750 r.p.m. A series winding is added to raises the speed to 800 r.p.m. Find the armature current and the efficiency under these conditions. Armature resistance = 0. 4W, series winding resistance = 0.1W, shunt winding resistance = 250 W. Assume that the load and the constant losses remain as constant.

Or

(b) In a Field's test on two 230V, 2hp mechanically coupled similar series motors, the following figures were obtained. Each had armature and compole resistance of 2.4W, series field resistance of 1.45 W and total brush drop of 2V. The p.d. across armature and field was 230 V with a motor current of 10.1A. The generaotr supplied a current of 8.9A at a terminal p.d. of 161 V. Calculate the efficiency and output of the of the motor for this load.

(12 marks)

Module 4

14. (a) A 10 KVA, 50 Hz, 4800 / 240 V transformer is tests by the open circuit and short-circuit tests. The test data are as follows :

Open circuit : 240V 1.5A, 160W on low voltage side.

Short circuit : 180V, 2.083 A, 180W on high voltage side calculate

(i) Equivalent resistance and reactance referred to LV and HV sides.

(ii) Voltage regulation of step-down transformer at unity pf, full load.

(12 marks)

Or

(b) (i) Explain various reasons which cause humming noise in a transformer ? (4 marks)

(ii) A 230/460 transformer has a primary resistance of 0.2 and reactance of 0.5W and the corresponding values for the secondary are 0.75 and 1.8 respectively. Find the secondary terminal voltage when supplying 10 A at 0.8 pf lagging

Module 5

15. (a) Two single phase furnaces A and B are supplied at 100 V by means of a Scott-connected transformer combination from a 3-phase 6600 system. The voltage of furnace A is leading. Calculate the line currents on the 3-phase side, when the furnace a taken 400 KW at 0.707 pf lagging and B takes 800 KW at upf.

(12 marks)

Or

(b) A 20 KVA, 2000/200V, two-winding transformer in to be used as an autotransformer, with a constant source voltage of 2000V. At full load of unity power factor, calculate the power output, power transformed and power conducted. If the efficiency of the two winding transformer at 0.7 pf is 97 % find the efficiency of the autotransformer.

(12 marks)

(5 × 12 = 60 marks)

MODULE 4

17. Design constant-K (both T and p networks) and draw the circuits of high-pass filter having cut-off frequency $f_c = 10$ kHz and nominal characteristic impedance $R_0 = 600\ \Omega$; (b) Find thecharacteristic impedance and phase constant of the above filter at 25 kHz ; (c) Calculate the attenuation of the filter at 5 kHz.

Or

18. (a) A filter section shown in Fig. 6. Determine :

(i) The type and class.

(ii) The element values of prototype.

(iii) The design impedance.

(iv) The cut-off frequency.

(v) The resonant frequency.

(8 marks)

(b) Show that for a constant -*k* band pass filter, the resonant frequency is the geometric mean between its lower and upper cut-off frequencies.

(4 marks)

MODULE 5

19. Test for positive real :

(a) $\dfrac{2s^2+2s+1}{s^3+2s^2+s+2}$.

(b) $\dfrac{2^3+s^2+3s+5}{s^3+6s+8}$.

Or

20. (a) Realise in Cauer I and Foster II forms the admittance $Y(s)=\dfrac{s^2+7s+6}{s+2}$.

(b) Show that the function $F(s)=\dfrac{s(3s+8)}{(s+1)(s+3)}$ represents and RL impedance. Realise it in Foster I form.

(5 × 12 = 60 marks)

F 9326 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Fourth Semester

Branch : Electrical and Electronics Engineering

NETWORK ANALYSIS AND SYNTHESIS (E)

(2002 Admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Obtain the Laplace Transform of $\delta(t-1)$.
2. Obtain the inverse Laplace Transform of $F(s)=\dfrac{1}{s(s+2)}$ by using the convolution integral.
3. Solve the integral $\int_{-1}^{2}\left[t^4+1\right]\delta(t-1)\,dt$.
4. Show that the spectra of a real valued periodic signal is conjugate symmetric.
5. Explain the principle of negative impedance converter.
6. Define input and output impedances and also calculate these impedances in terms of *h*-parameters.
7. What are constant - *k* filters ? Where do we use them ?
8. Define image and characteristic impedances. What are their importance ?
9. What are the necessary and sufficient conditions for a rational function to be positive real ?
10. Check whether $s^4+s^3+2s^2+4s+1$ is Hurwitz or not.

(10 × 4 = 40 marks)

Part B

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

MODULE 1

11. A rectangular pulse $x(t)$ as shown in Fig 1. Find the Laplace Transform X(*s*). Also find the inverse Laplace transform of $X^2(s)$ and plot the same.

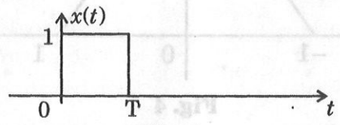

Fig. 1

Or

12. With switch S in position 1, the circuit attains equilibrium. At time $t = 0$, the switch is moved to position 2. Find the voltage across the 5MΩ resistor, using Laplace Transform.

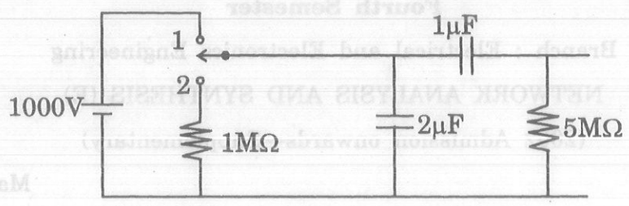

Fig. 2

MODULE 2

13. Find the Fourier series coefficients for the given saw-tooth wave shown in Fig. 3.

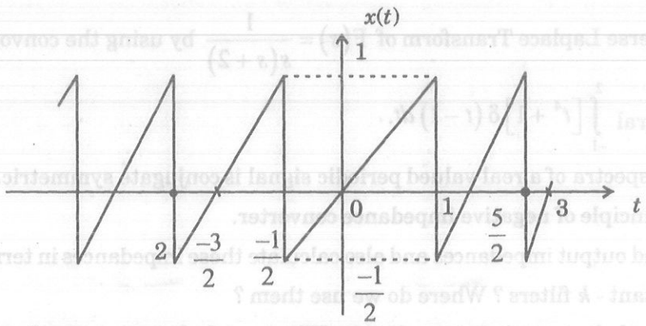

Fig. 3

Or

14. (a) Find the Fourier Transform of $x(t)$ as shown in Fig. 4.

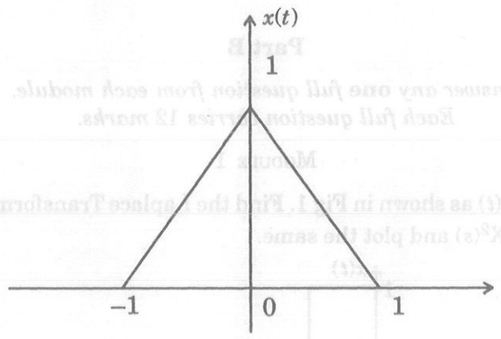

Fig. 4

(b) Find the Fourier Transform of rect $\left(\frac{t}{4}\right)$ shown in Fig. 5 and draw its magnitude spectrum.

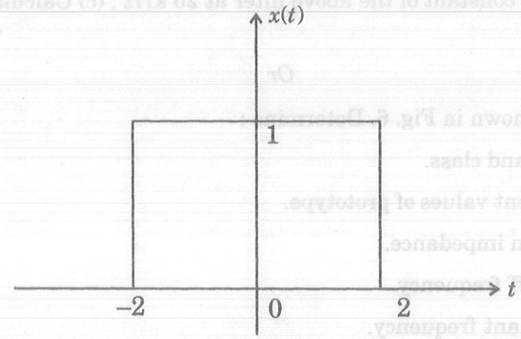

Fig. 5

MODULE 3

15. (a) What is natural frequency of a network ? What is the physical significance of it ? Comment on pole-zero plot of a positive real function.

(5 marks)

(b) A function F (*s*) has zeroes at 1 and –2 and poles at –3 and –1. F (0) = 10. Find $f(t)$.

(7 marks)

Or

16. Obtain the Y-parameters of the twin-T network shown in Fig. 6.

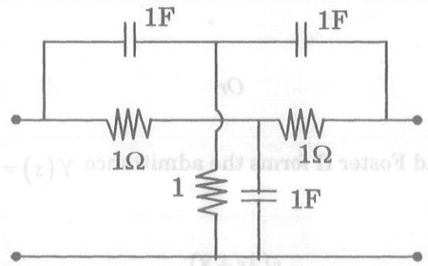

Fig. 6