G 520 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 404—ELECTROMAGNETIC THEORY (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Mention the features and applications of spherical coordinate system.
2. Define Dipole. Explain the dipole structure.
3. Define polarization. Explain the types of polarization.
4. State and explain Stoke's theorem.
5. Explain the concept of displacement current.

(5 × 3 = 15 marks)

Part B

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

6. State and explain Gauss law and its applications with examples.
7. Derive an expression for far electric field intensity of an electric dipole.
8. Derive an expression describing polarization ellipse. Explain its significance.
9. Define Vector Magnetic potential. Derive an expression for it.
10. Derive the potential functions for sinusoidal oscillations.

(5 × 5 = 25 marks)

Part C

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

11. (i) Compare and contrast cylindrical and spherical coordinate systems.

    (ii) Explain dot and cross products with examples.

Or

Turn over

12. (i) Derive general form of Maxwell's first equation.

(ii) Explain Del operator and its significance with an example.

13. (i) Derive the electric potential between two points.

(ii) What are magnetic dipoles ? Explain in detail.

Or

14. (i) Derive Laplace and Poisson equations.

(ii) Bring out Maxwell's curl equation for electrostatic fields.

15. (i) Derive the equation of continuity.

(ii) Derive the point form of Ohm's law.

Or

16. (i) Derive an expression for energy stored in capacitor and inductor.

(ii) Explain the Image theory and its applications in detail.

17. (i) State and prove Biot Savart's law.

(ii) Obtain an expression for Magnetic field intensity due to an infinite current sheet.

Or

18. (i) Differentiate self and mutual inductances. Explain the difference.

(ii) Derive the inductance of Solenoid and Toroid.

19. (i) Derive the standard wave equations from Maxwell's equations.

(ii) State and explain Poynting theorem. Derive the complex pointing vector.

Or

20. (i) Write a technical note on "Numerical methods for Electromagnetics".

(ii) Derive Maxwell's equations in point form and integral form.

(5 × 12 = 60 marks)

G 530 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

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

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State DeMorgan's theorem.
2. What is the difference between latch and flip-flop ? Explain.
3. Differentiate synchronous counter from asynchronous counter.
4. What is the principle of Fast Adder ? Explain.
5. Explain the principle of memory interleaving. Explain.

(5 × 3 = 15 marks)

Part B

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

6. Define and explain the parameters of logic families.
7. Explain the truth tables and excitation tables of JKFF and SRFF.
8. Draw a ring counter and explain it in detail.
9. Draw the block diagram of a processor and explain it in detail.
10. Differentiate ROM from RAM Explain the difference.

(5 × 5 = 25 marks)

Part C

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

11. (i) Explain a 4 : 1 MUX with a neat schematic diagram.

    (ii) Draw a BCD to decimal decoder and explain it.

Or

Turn over

12. (i) Draw CMOS NAND and NOR gates . Explain them in detail.

(ii) Differentiate CMOS and TTL logic families.

13. Realize a JKFF from SRFF using only NAND gates. Explain the procedure in detail.

Or

14. Draw an asynchronous UP- DOWN counter and explain its design procedure in detail.

15. Explain the types of shift registers in detail with neat diagrams.

Or

16. (i) Design a 2 bit up down synchronous counter and realize the same using JKFF.

(ii) Differentiate counters from shift registers.

17. Explain a full adder circuit with a neat block diagram. Design a full adder using the basic gates.

Or

18. (i) Explain the steps to design one stage of ALU with a neat diagram.

(ii) Explain the processor bus structure in detail, with a neat diagram.

19. Explain the Static and Dynamic RAM cells with diagrams. Explain the features of flash memory and cache memory.

Or

20. (i) Draw the block diagram of USB and explain it in detail.

(ii) Give an account on :

(a) EPROM ;

(b) Virtual memory ;

(c) Hit and Miss.

(5 × 12 = 60 marks)

G 540 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 406—COMPUTER PROGRAMMING (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List few applications of microprocessor-based system ?
2. How many machine cycles does 8085 have, mention them ?
3. Explain priority interrupts of 8085.
4. What are the basic modes of operation of 8255 ?
5. What are the different types of write operations used in 8253 ?

(5 × 3 = 15 marks)

Part B

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

6. Explain the functions of Flag register in 8085 processor ?
7. Write an assembly language program to add two 2-digit BCD numbers ?
8. Write a short note on HALT and HOLD states ?
9. Explain in detail with the modes of operation of 8255.
10. Explain the advantages of using the USART chips in microprocessor based systems.

(5 × 5 = 25 marks)

Part C

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

11. Explain the Logical and Arithmetic instructions available in 8085.

Or

12. Draw and explain the block diagram of a microprocessor 8085.

Turn over

13. With suitable examples explain how I/O devices are connected using memory mapped I/O and peripheral I/O ?

Or

14. Explain the timing diagram when 8085 fetches and executes instruction OUT FFH which is stored in memory staring form the address 8000H.

15. Explain the 8085 interrupt system in detail.

Or

16. Discuss the features of 8259 and explain the block diagram of 8259-programmable interrupts controllers.

17. Compare programmable peripheral interfaces 8255 and 8155.

Or

18. Draw the pin diagram of 8257 programmable DMA controller and explain the function of each pin in detail.

19. Explain the 7 segment LED interface with microprocessor.

Or

20. Describe the various modes of operation in 8253 programmable internal timer.

(5 × 12 = 60 marks)

G 544 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

ENGINEERING MATHEMATICS—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance—Prior to 2010 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*
Each full question carries 20 *marks.*
Use of Statistical tables is permitted.

1. (a) Solve $x^2\frac{dy}{dx} = 3x^2 - 2xy + 1$. (5 marks)

   (b) Solve $\left(D^3 + 1\right)y = \sin(2x + 3)$. (7 marks)

   (c) Solve $(3x+2)^2\frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1$. (8 marks)

Or

2. (a) Solve $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = \log x \sin(\log x)$. (8 marks)

   (b) By method of variation of parameters solve $y'' - 2y' + 2y = e^x \tan x$. (7 marks)

   (c) Solve $\frac{d^2y}{dx^2} + y = \operatorname{cosec} x$. (5 marks)

3. (a) From the p.d.e. by eliminating the arbitrary function from $z = f(x + it) + g(x - it)$. (5 marks)

   (b) Solve $px - qz = z^2 + (x + y)^2$. (7 marks)

   (c) A string is stretched and fastened to two points l apart motion is started by displacing the string in the form $y = a\sin\frac{\pi x}{l}$ from which it is released at time t = 0. Show that the displacement of any point at a distance x from one end at time t is given by $y(x,t) = a\sin\frac{\pi x}{l}\cos\frac{\pi ct}{l}$. (8 marks)

Or

Turn over

4. (a) A rod of length l with insulated sides is initially at a uniform temperature u_0 its ends are suddenly cooled to 0°C and are kept at that temperature. Find the temperature function $u(x,t)$.

(8 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial x \partial y} - \frac{6\partial^2 z}{\partial y^2} = 0$. (5 marks)

(c) Solve $\left(p^2 + q^2\right) y = qz$. (7 marks)

5. (a) Using Fourier sine integral show that :

$$\int_0^\infty \frac{1-\cos \pi\lambda}{\lambda} \sin x\lambda \, d\lambda = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & x > \pi \end{cases}.$$ (8 marks)

(b) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, & \text{of } |x|<1 \\ 0 \quad , & |x|>1 \end{cases}$ and use it to evaluate

$$\int_0^\infty \frac{x\cos x - \sin u}{x^3} \cos\left(\frac{x}{2}\right) dx \, .$$

(12 marks)

Or

6. (a) Find the Fourier cosine transform of e^{-x^2}. (8 marks)

(b) Using Parseval's identity show that $\int_0^\infty \frac{x^2 dx}{\left(1+x^2\right)^2} = \frac{\pi}{4}$. (12 marks)

7. (a) Out of 800 families with *four* children each how many families would you expect to have

(i) 2 boys and 2 girls. (ii) Atleast one boy.

(iii) No girl. (iv) Atleast 2 girls.

Assume equal probabilities for boys and girls.

(10 marks)

(b) Derive the mean and variance of Poisson distribution. (10 marks)

Or

8. (a) Fit a binomial distribution to the following data :

x :	0	1	2	3	4	5
	2	14	20	34	22	8

(12 marks)

(b) In a normal distribution 31% of the items are under 45 and 8% and over 64. Find the mean and standard deviation of the distribution.

(8 marks)

9. (a) The following figures refer to observations in live independent samples :

Sample I :	25	30	28	34	27	20	13	32	22	38
Sample II :	40	34	22	20	31	40	30	23	36	17

Analyse whether the samples have been drawn from the populations of equal mean.

(12 marks)

(b) A coin was tossed 400 times and returned heads 216 times. Test the hypothesis that the coin is ubiased.

(8 marks)

Or

10. (a) Two independent samples of sizes 7 and 6 had 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)

(b) A sample of 20 items has been 42 units and S.D. 5 units. Test the hypothesis that it is a random sample from a normal population with mean 45 units.

(8 marks)

[5 × 20 = 100 marks]

G 557 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRONIC CIRCUITS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is thermal runaway ? Explain any *two* methods to eliminate the same.
2. Draw the equivalent circuit of UJT and define intrinsic stand-off ratio.
3. Compare the four properties of CB and CE configurations.
4. Sketch the characteristics and indicate how h_{ib} and h_{fb} are estimated from them.
5. Distinguish between positive and negative feedback and give their applications.
6. Draw the electrical equivalent circuit of a crystal and identify the parameters.
7. Draw the circuit of a positive clipper using diodes and show how the level of clipping can be changed.
8. With a circuit, explain RC integrator and show how it works as a low-pass filter.
9. Prove that all the even harmonics are cancelled in a transformer coupled push-pull amplifier circuit.
10. Indicate the positions of Q-point on the load line for class A, B, AB and C. Compare their efficiencies.

(10 × 4 = 40 marks)

Part B

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

11. Derive the expressions for the stability factor S_I for (i) Collector feedback bias ; (ii) Emitter feedback bias ; and (iii) Voltage divider bias.

Or

12. With neat circuit diagram, explain the working of self biased JFET amplifier. Show how it can amplify a weak voltage.

Turn over

13. Starting from fundamentals, derive the low frequency small signal h-parameters of a CB configuration and the equivalent circuit. Define the h-parameters of the above, giving typical values.

Or

14. Draw the two-stage RC coupled CE amplifier and derive the expression for its (i) overall input resistance ; and (ii) overall current gain.

15. With block diagram representation, derive the expression for R_{if}, R_{of} and A_f of a current shunt feedback amplifier. Draw a circuit example.

Or

16. With a neat circuit diagram, explain how sustained oscillations are produced in a crystal oscillator. How the Barkhausen criteria are satisfied ?

17. Draw the circuit of an astable multivibrator using BJT to produce square wave of 600 Hz, 60 % duty cycle 0-6 V amplitude. Design the circuit and explain the working with the help of waveforms.

Or

18. Draw the circuit of UJT relaxation oscillator and explain the working with the help of waveforms. Design the circuit for generating sweep at 6V amplitude, 18.72 mS sweep trace and 1.28 mS retrace.

19. With a neat circuit diagram, describe the working of a complementary symmetry class AB power amplifier. Derive the expression for its power conversion efficiency.

Or

20. Describe the working of a class C power amplifier. How the distortion of its output is taken care of ? Explain with a circuit example.

(5 × 12 = 60 marks)

G 585 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL AND ELECTRONIC INSTRUMENTS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain electromagnetic damping used in an indicating instrument.
2. Why does an instrument need deflecting, controlling and damping torque for proper operation ?
3. Why does the moving iron instrument has a non-linear scale ?
4. What are the causes of change of accuracy in moving coil instruments with change of temperature ?
5. How is the error due to resistance of pressure coil compensated for by using a compensating coil in a dynamometer type wattmeter ?
6. What is the function of the copper shading band in an induction wattmeter ?
7. A 200 kV, 50 Hz a.c. supply is fed to a rectifier instrument through a capacitor. The PMMC meter reading is 30 mA. Calculate the value of the capacitor.
8. Explain blanking and unblanking in an oscilloscope and discuss the need for blanking.
9. Explain the grading and classification of electrical instruments as per IS specifications.
10. Describe any one method of phase measurement.

(10 × 4 = 40 marks)

Part B

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

11. With necessary diagrams and expressions, explain :
    (i) air friction damping.
    (ii) spring control.
    (iii) torque to weight ratio.

(3 × 4 = 12 marks)

Or

Turn over

12. Explain how controlling and damping torques are produced in measuring instruments ?

(12 marks)

13. A moving coil voltmeter with a resistance of 20 Ω gives a full scale deflection of 120° when a potential difference of 100 V is applied across it. The moving coil has dimensions of 30 mm × 25 mm and is wound with 100 turns. The control spring constant is 0.378×10^{-6} Nm/degree. Find the flux density in the gap. Also find the diameter of copper wire of the coil winding if 30 % of the instrument resistance is due to coil winding. The specific resistance of copper is 1.7×10^{-8} Ωm.

(12 marks)

Or

14. With the help of neat diagram, explain the working principle of a repulsion type moving iron voltmeter. Describe the different types of errors and how they are compensated ?

(12 marks)

15. (a) Sketch and explain three-phase electrodynamometer power factor meter. (8 marks)

(b) Describe in detail the working of a Trivector meter. (4 marks)

16. Explain in detail, with neat sketches, the operation of 3-phase energy meters. (12 marks)

17. Describe the construction of a quadrant type of electrostatic voltmeter. Derive the expression for deflection when idiostatic type of connections are used. The meter is spring controlled.

(12 marks)

Or

18. With the help of neat diagram, explain the main parts of a CRT ? What are the different types of sweeps used in a CRO ?

(12 marks)

19. With neat sketches, describe the working principle of Weston frequency meter. Explain clearly whether the instrument performance will be affected or not by normal changes in the supply voltage.

(12 marks)

Or

20. Clearly explain the construction and working of a synchroscope. (12 marks)

[5 × 12 = 60 marks]

G 576

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

COMPUTER PROGRAMMING (E)

(Old Scheme—Prior to 2010 admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Write neat and efficient C programs wherever needed.

Part A

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

1. Name any *four* functions available in stdio.h and give their uses.
2. Illustrate how the minimum field width for a data item can be specified using the printf ( ) function.
3. Write an example for a "for" loop used in C.
4. What is the output of the following program ?

```
main( )
{int x = 8 ;
while(x = = 1)
x = x – 1 ;
printf ("%d \ n", x) ;}
```

5. Name any *four* functions in string.h and give their uses.
6. How does C handle the values in an array internally ? Explain with an example.
7. Name any *four* I/O file functions and give their uses.
8. What are the differences between $*p++$ and $p++$?
9. Write a function for insertion and deletion in linked list.
10. What are the differences between macro and function ?

(10 × 4 = 40 marks)

Turn over

Part B

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. A company pays salary to an employee at the normal hourly rate, if the number of hours worked does not exceed 40. If the number of hours worked exceeds 40, the salary for the excess number of hours is calculated as 1.5 times the normal hourly rate. Write a C program to implement this and calculate the salary.

Or

12. Write a C program that will read the value of x and evaluate the function :

$y(x) = x^2 + 3x - 10$, if $x < 10$

$= | x |$, if $x > 10$ using "if" statement. (12 marks)

13. Write a recursive function to compute the value of x^n. Also write the main program.

Or

14. Write a function which receives N × N matrix as an argument and returns the square of it to the calling program. (12 marks)

15. Given are two linear arrays of integers, one containing 20 elements and the other containing 15 elements. After reading data to obtain values for all items in each array, print the values of only those integers that appear in both the arrays. Write a C program to implement this.

Or

16. Write a C program to find the longest word in a given string. (12 marks)

17. Write a C program using pointers to copy a string to another string variable.

Or

18. Give a text file, write a C program to create another file deleting all the vowels. (12 marks)

19. (a) What is meant by dynamic memory allocation ? Explain how C supports dynamic memory allocation.

(b) Explain singly linked list and doubly linked list, giving their applications. (6 + 6 = 12 marks)

Or

20. Write a C program that reads several different names and addresses into the computer, rearranges the names into alphabetical order, and then writes out the alphabetized list. Make use of structure variables within the program. (12 marks)

[5 × 12 = 60 marks]

G 505 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 402—DC MACHINES AND TRANSFORMERS (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What is commutation ? Explain with neat diagram.
2. What is separate excitation and self excitation ? What do you do if a self exited DC Machine fails to buildup EMF ?
3. Derive the expression for back EMF of DC motor.
4. 33kVA, 2200/220V 1-phase Transformer has $r_1 = 2.4\Omega$, $x_1 = 6.00\ \Omega$, and $r_2 = 0.03\ \Omega$, $x_2 = 0.07\ \Omega$, Find equivalent resistance and reactance with respective secondary.
5. A three-phase transformer has 500 primary turns and 50 secondary turns. If the supply voltage is 2.4kV find the secondary line voltage on no-load when the windings are connected to (a) star-delta, (b) delta-star.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each full question carries 5 *marks.*

6. Explain principle of operation of dc generator. Explain about mechanical inverter.
7. A 6 pole d.c. machine has 300 conductors and each conductor is capable of carrying 80A without excessive temperature rise. The flux per pole is 0.015 Wb and the machine is driven a 1800 r.p.m. Compute the total current, EMF, power developed in the armature, for (a) wave connected ; (b) lap connected.
8. What happens if we start the machine without starter ? Derive the torque equation in DC motor.
9. What are the necessary and sufficient conditions for the parallel operation of transformer, and explain ?
10. Write some major differences between two winding transformer and auto-transformer. Explain how efficiency will be in auto-transformer ?

(5 × 5 = 25 marks)

Turn over

Part C

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

11. State the maximum efficiency criterion for different types of DC Generator. 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 50mΩ, series field resistance is 20mΩ, shunt field resistance is 40Ω, and rotational loss is 2kW. What is the maximum efficiency of the generator ?

Or

12. Explain what is armature reaction? In each case explain how the resultant flux reacts.

13. (A) Explain the construction and working principle of the DC generator.

    (b) The shaft torque of a diesel motor driving a 100V d.c. shunt-wound generator is 25Nm. The armature current of the generator is 16 A at this value of torque. If the shunt field regulator is adjusted so that the flux is reduced by 15%, the torque increases to 35Nm. determine the armature current at this new value of torque.

Or

14. List out various tests on dc machines. Explain Hopkinson's test.

15. A 230V dc shunt motor, takes an armature current of 3.33A at rated voltage and at a no-load speed of 1000 rpm. The resistance of armature circuit and field circuit are respectively 0.3Ω, and 160 Ω. The line current at full load and rated voltage is 40A. Calculate, at full load the speed and the developed torque in case the armature reaction weakens the no load flux by 4%.

Or

16. The following data pertain to the magnetization curve of a dc shunt generator at 1500rpm :—

I_f A	...	0	0.4	0.8	1.20	1.60	2.0	2.40	2.80	3.0
Ea, volts	...	6	60	120	172.5	202.5	221	231	237	240

For this generator, obtain

(a) The voltage on open circuit to which the machine will build-up for a total shunt field resistance of 1000 Ω.

(b) The critical value of field resistance at 1500rpm.

(c) The magnetization curve at 1200 rpm. And therefore the open circuit voltage for field resistance of 100 Ω.

17. (a) Derive the expression for maximum efficiency and explain when it occurs.

    (b) The EMF per turn for a single phase, 2310/220 V, 50 Hz transformer is approximately 13 volts. Calculate (a) The number of primary and secondary turns. (b) The net cross-sectional area of the core, for a maximum flux density of 1.4T.

Or

18. Explain which tests have to carries out to know the characteristics of transformer. And explain each test in details.

19. (a) Explain in details what is tertiary winding write its application. Also derive the equivalent circuit of transformer with respective primary and draw it ?

    (b) Briefly explain different cooling arrangement of transformer.

Or

20. (a) Explain the methods to increase co-efficient of coupling in three phase transformer.

    (b) The self and mutual inductances of a two- winding transformer are L_2 = 4mH, L_2 = 6mH, M_{12} = M_{21} = 1.8mH. Calculate the current which would flow in the primary winding when this winding is connected to a 130 V, (500/π) Hz supply and the load of 0.2mH inductance is connected across the secondary winding. Assume power losses in the windings and magnetic circuit to be neglected.

(5 × 12 = 60 marks)

20. (a) Given :

Day	:	Mon	Tue	Wed	Thu	Fri	Sat	Sun
f	:	16	8	12	11	6	14	14

(No. of accidents)

Is there any reason to doubt that the accident is equally likely to occur on any day of the weak ?

(6 marks)

(b) A machine produced 20 defective units in a sample of 400. After overhauling the machine, it produced 10 defective units in a hatch of 300. Has the machine improved due to overhauling ?

(6 marks)

[5 × 12 = 60 marks]

G 500 **(Pages : 4)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

(Common to all Branches)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. If $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$

find a_0.

2. Show that the Fourier Cosine transform of Fourier Cosine transform of a given function is itself.

3. Solve : $a(p+q) = z$.

4. Find the distribution function from $f(x) = \begin{cases} c(3+2x), & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$

5. What are type-I and type-II errors ?

(5 × 3 = 15 marks)

Part B

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

6. Write the Fourier Series for $f(x) = \begin{cases} 1-x, & -\pi < x < 0 \\ 1+x, & 0 < x < \pi \end{cases}$.

7. Find the finite Fourier Cosine transform of $f(x) = \frac{\pi}{3} - x + \frac{x^2}{2\pi}$.

Turn over

8. Solve : $\left(\frac{y^2 z}{x}\right) p + xzq = y^2$.

9. Fit a binomial distribution for :

x	:	0	1	2	3	4
f	:	5	29	36	25	5

10. Write the application of ψ^2-test.

(5 × 5 = 25 marks)

Part C

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

11. Obtain the Fourier Series for $f(x) = \begin{cases} l - x, & 0 < x \le l \\ 0, & l \le x < 2l \end{cases}$

Hence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots = \frac{\pi}{4}$ and $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$.

(12 marks)

Or

12. If $f(x) = lx - x^2$ in $(0, l)$, show that the half range, sine series for $f(x)$ is

$\frac{8l^2}{\pi^3} \sum_{n=0}^{\infty} \frac{1}{(2n+1)^3} \sin \frac{(2n+1)\pi x}{l} \ldots$ and deduce that $\frac{\pi^3}{3^2} = 1 - \frac{1}{3^3} + \frac{1}{5^3} - \ldots$

(12 marks)

13. Show that the Fourier transform of $f(x) = \begin{cases} a^2 - x^2 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a > 0 \end{cases}$

is $2\sqrt{\frac{2}{\pi}} \left(\frac{\sin as - as \cos as}{s^3}\right)$. Hence deduce that $\int_0^{\infty} \frac{\sin t - t \cos t}{t^3} dt = \pi/4$. (12 marks)

Or

14. (i) Find the finite sine transform of $f(x) = x^3$. (6 marks)

(ii) Find the cosine transform of $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$ (6 marks)

15. (a) Solve : $r - 2s + t = \sin(2x + 3y)$. (6 marks)

(b) Solve : $\left(D^2 + D^{1^2}\right) z = \cos mx \cos ny$. (6 marks)

Or

16. (a) Solve : $D(D + D' - 1)(D + 3D' - 2)\ z = x^2 - 4xy + 2y^2$. (9 marks)

(b) Solve : $r - s + p = 1$. (3 marks)

17. (a) If 15% of a normal population lies below the value 30 and 10% of the population lies above the value 42, calculate its Mean and Standard Deviation.

(6 marks)

(b) Fit a Poisson Distribution to :

x	:	0	1	2	3	4
f	:	43	38	22	9	1

(6 marks)

Or

18. (a) Six coins are tossed once. Find the probability of obtaining heads.
(i) exactly 3 times.
(ii) atmost 3 times.
(iii) atleast 3 times.
(iv) atleast once.

(8 marks)

(b) Given : X is a Poisson variate with $P(X = 2) = \frac{2}{3} P(X = 1)$. Find $P(X = 0)$ and $P(X \ge 2)$.

(4 marks)

19. (a) Test for the difference of variances for :

Method 1	:	20	16	27	26	22	23
Method 2	:	27	33	42	32	35	34	38

(6 marks)

(b) The 9 items of a sample have 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these values differ significantly from the assumed mean 47.5 ?

(6 marks)

Or

Turn over

20. A 3300/400/100 star/star/delta transformer taking a magnetising currents of 6A, has respective primary, secondary and tertiary per unit resistances of 0.005, 0.006 and 0.008 and per unit reactances of 0.03, 0.025 and 0.035 with 1000 kVA as base KVA. If the secondary and tertiary windings supply balanced loads of 700 kVA at 0.8 p.f. lagging and 250 KVA at 0.6 p.f. leading, respectively, determine the primary current, power factor, primary load and various regulations at the given loads.

(5 × 12 = 60 marks)

G 567 **(Pages : 4)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES—I (E)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Derive the e.m.f. equation of a D.C. machine.
2. What is back e.m.f. ? Explain its significance ?
3. A d.c. generator fails to build up voltage, when it is run at rated speed. What may be the possible reasons ?
4. What are the conditions for self excitation in a D.C. shunt generator ?
5. Why D.C. series motors are suitable for electric traction, and cranes ?
6. Neatly sketch the speed-load, torque-load and speed-torque characteristics of a d.c. compound motor.
7. Draw the phaser diagram of transformer on no-load.
8. What are the various losses present in a transformer ?
9. Define an autotransformer ? Indicate how does the current flow in different parts of its windings ?
10. Explain the advantages of using a tertiary winding in a bank of star-star transformers.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (a) Define and explain (i) front pitch, (ii) resistant pitch ; and (iii) commutator pitch.

(3 × 2 = 6 marks)

Turn over

(b) A d.c. shunt machine, connected to 250 V mains, has an armature resistance (including brush) of 0.12 Ω, and the resistance of the field circuit is 125 Ω. Find the ratio of the speed as generator to the speed as a motor, the line current in each case being 75 A.

(6 marks)

Or

12. (a) Explain the effect of brush shift. (4 marks)

(b) Find the flux per pole of a 50 kW d.c. generator having 4 poles, and a lap-wound armature with 380 conductors. The machine is run at a speed of 800 r.p.m., and generates 460 V. Resistance of the armature, and shunt field are 0.5 Ω, and 300 Ω respectively. Also find the current flowing in the armature at full-load, and the terminal voltage.

(8 marks)

13. (a) With neat sketches, explain the constructional details, and working principle of a d.c. generator ? List the parts, and materials used in practice. (7 marks)

(b) A 400 V shunt generator has full-load current of 200 A. Its armature resistance is 0.06 Ω, and field resistance losses together are 2 kW. Find its efficiency.

(5 marks)

Or

14. (a) What is the critical field resistance of a d.c. shunt generator ? What is its significance ?

(4 marks)

(b) The field winding of a 4-pole generator consists of 4 coils connected in series, each coil being wound with 1200 turns. If a current of 2A produces a magnetic flux of 400 μWb, calculate : (i) inductance of the field circuit, (ii) the average value of e.m.f. induced, if the field switch is opened at such a speed that the flux falls to the residual value of 20 μWb in 0.01 second.

(8 marks)

15. The Hopkinson test on two shunt machines gave the following results for full-load : Line voltage : 250 V ; line current excluding field currents : 50 A ; motor armature current : 380 A ; field currents : 5 A and 4.2A ; calculate the efficiency of each machine. Armature resistance of each machine is 0.02 Ω.

Or

16. (a) Draw the power flow diagrams of a d.c. generator and a d.c. motor. (6 marks)

(b) When running on no-load, a 400 V shunt motor takes 5A. Armature resistance is 0.5 Ω and field resistance is 200 Ω. Find the output of the motor and efficiency when running on full- load and taking a current of 50 A. Also, find the percentage change is speed from no-load to full-load.

(6 marks)

17. (a) Derive the expressions for the r.m.s. values of the induced voltages in the two-windings of a single-phase transformer connected to a sinusoidal supply.

(4 marks)

(b) A 40 KVA single-phase transformer has iron losses of 800 W and copper loss of 1140 W when supplying its full-load at unity power factor. Calculate the efficiency of the transformer at upf at full-load and half load.

(8 marks)

Or

18. A commercial 400 Hz, 220V/20V transformer has 50 turns on its low-voltage side. Calculate :

(a) the number of turns on its high voltage side.

(b) ratio of transformation, when used as step down transformer.

(c) ratio of transformation, when used as a step-up transformer.

(d) volts/turns ratio of high voltage side.

(e) volts/turns ratio of low voltage side.

19. (a) Explain why it is essential to have one three-phase winding in delta for the transformers used in 3-phase systems. (4 marks)

(b) A 2-phase 240 V supply is to be obtained from a 3-phase, 3-wire 440 V supply by means of a pair of scott-connected single-phase transformers. Determine the turns ratio of the main and teaser transformers. Find the input current in each of the three-phase lines when each of the 2-phase currents is 10 A lagging behind the respective phase voltage by 36.9°.

(8 marks)

Or

17. The state-variable model of open-loop system is described by :

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -3 & 2 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

(a) Check the stability of the system.

(b) The system's loop is now closed by a state feedback $u(t) = -K\,x(t)$.

Where $K = [K_1, K_2, K_3]$ is the feedback matrix of constant gains. Determine the constraints on the elements of K for the system to be 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) Inverse (g') parameters.

(b) Gyrator.

(c) Transmission (ABCD) parameters.

Or

20. Write notes on the following :—

(a) Ideal transformer.

(b) Impedance converter.

(c) Hybrid (g) parameters.

(5 × 12 = 60 marks)

G 511 **(Pages : 4)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

EE 010 403—LINEAR SYSTEM ANALYSIS (EE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Classify between distributed and lumped parameter systems.
2. Define Mason's gain formula. What do you mean by Non-Touching loops ?
3. Compare between open loop and closed loop control systems.
4. Describe briefly the "Sylvester's Theorem".
5. What do you mean by driving point functions ?

(5 × 3 = 15 marks)

Part B

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

6. Derive the transfer function of armature controlled D.C. motor.
7. Draw the signal flow graph of the Mechanical system shown below (Fig. 1)

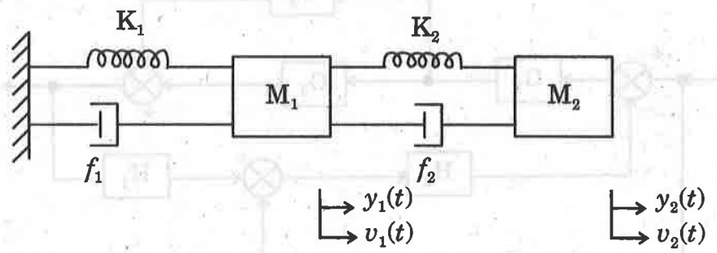


Fig. 1

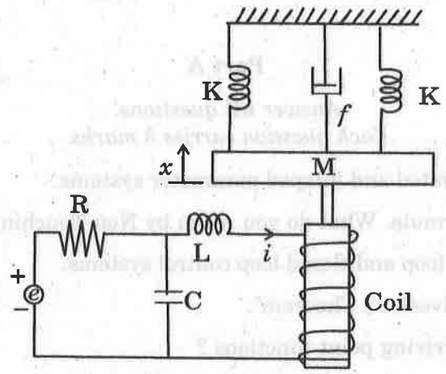
8. Discuss the response of first order system to unit step, unit ramp and unit impulse signals.
9. Describe Routh-Hurwitz criterion.
10. What is the difference between driving point functions and transfer functions.

(5 × 5 = 25 marks)

Part C

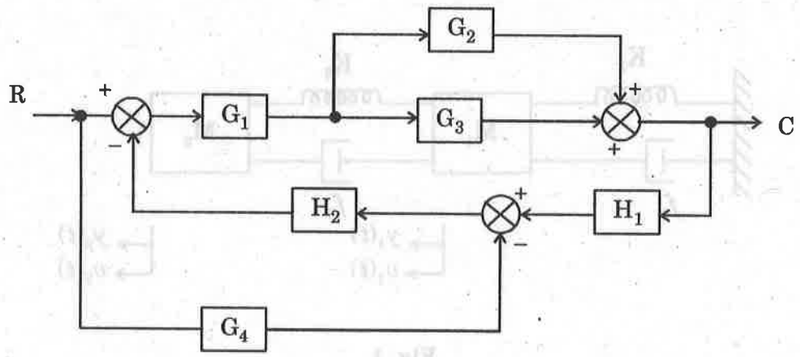
Answer **all** *questions.*
Each question carries 12 *marks.*

11. Find the transfer function $X(s)/E(s)$ for the electro-mechanical system shown below (Fig. 2)



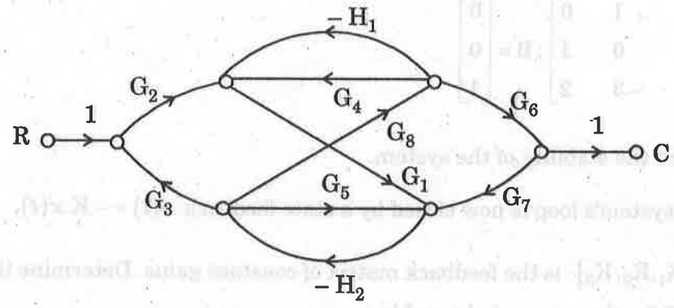
Or

12. Discuss about the mathematical modeling of electro-mechanical, translational and rotational systems.
13. Draw a signal flow graph and evaluate the closed loop transfer function of a system whose blockdiagram is given below :

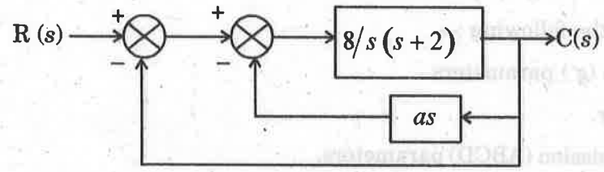


Or

14. Obtain the overall transfer function C/R from the signal flow graph shown in figure below :



15. Consider the control system shown below :



(a) In the absence of derivative feedback (a = 0), determine the damping factor and natural frequency. Also determine the steady state error resulting from a unit ramp input.

(b) Determine the derivative feedback constant of which will increase the damping factor of the system to 0.7. What is the steady-state error to unit ramp input with this setting of the derivative feedback constant ?

Or

16. 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 $r(t) = 1 + t + t^2$.

16. (a) The z-parameters of a two-port network are $Z_{11} = 20\ \Omega$, $Z_{22} = 30\ \Omega$, $Z_{12} = Z_{21} = 10\ \Omega$. Find the transmission parameters for the network. (6 marks)

(b) For the transfer function $Z(s) = \dfrac{4s(s+30)}{(s+2)(s^2+9)}$ obtain the pole-zero plot. (6 marks)

17. 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, one 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 the numerical values.

Or

18. Derive the design equations of constant k low-pass and high-pass filters : Also design the following filters.

(a) Low-pass $f_c = 5$ kHz, $R_0 = 800\ \Omega$.

(b) High-pass $f_c = 10$ kHz, $R_0 = 1600\ \Omega$.

19. Find the Foster network which will respond as follows : Zeros at $w_1 = 5000$, $w_3 = 7000$, $w_5 = 9000$, poles at $w_2 = 6000$, $w_4 = 8000$, and at infinity. Also the input impedance at $w = 1000$ is $-j\ 1000$.

Or

20. (a) Test whether the following are Hurwitz :

(i) $p_1(s) = s^3 + 2s^2 + 4s + 1$. (4 marks)

(ii) $p_2(s) = s^4 + 3s^3 + 2s^2 + s + 5$. (4 marks)

(b) Check if $N(s) = \dfrac{2s^2 + 2s + 3}{(s+1)(s+2)}$ is positive real or not. (4 marks)

[5 × 12 = 60 marks]

G 547

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

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Fourth Semester

Branch : Electrical and Electronics Engineering

NETWORK ANALYSIS AND SYNTHESIS (E)

(Old Scheme—Supplementary/Mercy Chance)

[Prior to 2010 Admissions]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries **4** *marks.*

1. Find the Laplace Transform of a parabolic function.
2. Find an expression for $i(t)$ in a series RL circuit, energised from a voltage source V, when $t = 0$.
3. Illustrate time shifting property of Fourier Transform.
4. Discuss the symmetry in Fourier Series.
5. With necessary diagrams, explain the principle of a negative impedance converter.
6. Derive the condition of reciprocity and symmetry in ABCD parameters.
7. State and explain the conditions for a network to be of a constant-k type.
8. Design a low-pass filter in π -section with cut-off frequency at 1.25 kHz and load resistance = 600 Ω.
9. Test whether the impedance function $Z(s) = \dfrac{(s+1)(s+2)}{(s^2+8s+15)}$ represents RL or RC network ? Why ?
10. Compare and contrast the properties of Foster and Cauer forms :

(10 × 4 = 40 marks)

Turn over

Part B

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

11. Using Laplace Transformation technique, find $i_2(t)$ following the switching at $t = 0$ in the circuit shown in Fig. 1. Assume zero initial conditions :

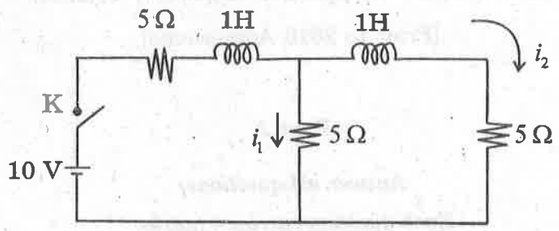


Fig. 1.

Or

12. Find the Laplace Transform of the periodic waveform shown in Fig. 2.

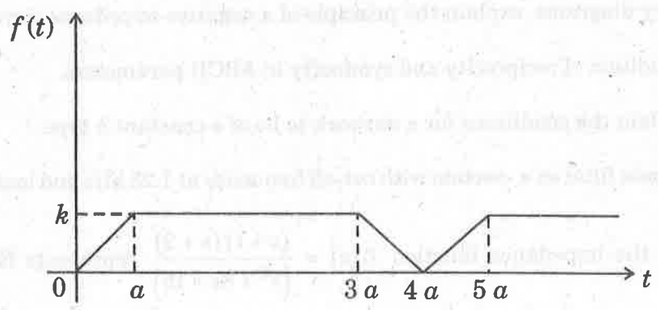


Fig. 2.

13. Find the Fourier Series of the function shown in Fig. 3.

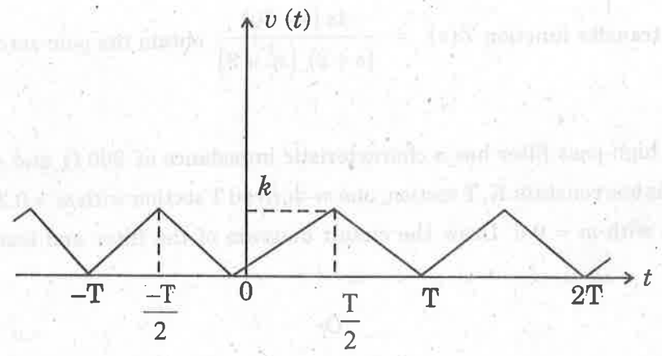


Fig. 3.

Or

14. Find the trigonometric Fourier series for the wave shown in Fig. 4.

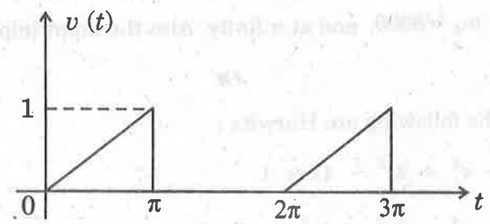


Fig. 4.

15. Find the y and z parameters for the network shown in Fig. 5.

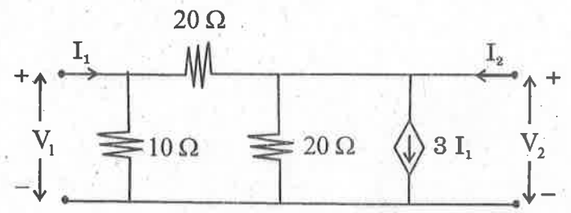


Fig. 5.

Or

Turn over