

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-139**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**AC Machines**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
  - ii) Attempt from each section any two questions from remaining questions.
  - iii) Assume suitable data where ever necessary.

## Section A

- Q.1 Solve any five questions of the following 10
1. Differentiate between squirrel cage rotor and wound rotor
  2. What are advantages of skewed slots in the rotor of squirrel cage induction motor
  3. Write applications of AC servo motor.
  4. The rotor resistance and stand still reactance per phase of a 3 phase induction motor are  $0.02\Omega$  and  $0.1\Omega$  respectively. What should be the value of the external resistance per phase to be inserted in rotor circuit to give maximum torque at starting?
  5. What is necessity of starter?
  6. Define term crawling and cogging.
  7. A 3 phase 6 pole induction motor is connected to 60 Hz supply voltage induced in rotor bars is 4 volt when rotor is at standstill calculate the voltage and frequency induced in rotor bars at 300 rpm
  8. State why single phase I.M do not have starting torque.
- Q.2
- a) Explain in detail the power flow diagram of an Induction motor 07
  - b) A 6 pole, 3 phase, 50 Hz Induction motor gives full load output of 20 HP at 945 rpm. Stator losses amount to 1 kw allowing 13.65 NM for mechanical torque lost in friction find 08
    - 1) Rotor copper loss
    - 2) I/P to motor
    - 3) Efficiency
- Q.3
- a) Explain in detail the principle of operation of single phase capacitor start, capacitor run motor 07
  - b) Explain the construction and working of double cage I. M. 08
- Q.4
- a) Derive the torque equation of a 3 phase induction motor 08
  - b) A 50 Hz, 8 pole, Induction motor has a full load slip of 4%.The rotor resistance and standstill reactance are  $0.01\Omega$  and  $0.1\Omega$  per phase respectively. find (1) The speed at which maximum torque occurs. (2)The ratio of maximum torque to full load torque 07

- Q.5 Write short notes on 15
- 1) Rotor resistance starter
  - 2) Repulsion motor
  - 3) AC servo motor.

## Section B

- Q.6 Solve any five from following 10

- 1) What are advantages of short pitched winding in an alternator
- 2) Write function of damper winding in alternator
- 3) Calculate the value of pitch factor for a alternator which has 9 slots per pole and each coil spans 8 slot pitches
- 4) What is mean by pull out torque
- 5) Write advantages of synchronous motor
- 6) What do you mean by synchronous impedance of alternator
- 7) What is pitch factor
- 8) What is mean by phase spread

- Q.7 a) Explain construction and working of 3 phase synchronous generator with neat sketch 07

- b) A 4 pole, 3 ph, 50 Hz, star connected alternator has 60 slots, with 4 conductors per slot; coils are short pitched by 3 slots. If the phase spread is  $60^\circ$  find the line voltage induced for a flux per pole of 0.943 wb distributed sinusoidally. All the turns per phase are in series 08

- Q.8 a) Explain mmf method for obtaining voltage regulation in alternator 07

- b) Explain in detail the different torques in synchronous motor 08

- Q.9 a) Derive the EMF equation of an alternator 07

- b) What are advantages of parallel operation of alternator and write the conditions to be followed while paralleling the alternator with infinite bus bar. 08

- Q.10 Write short note on:- 15

- 1) V curves and its experimental set up
- 2) Hunting and damping in synchronous motor
- 3) Power angle equation

Total No. of Printed Pages:04

**SUBJECT CODE NO:- H-111**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics - IV**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

1. Q. No. 1 and 6 are compulsory
2. Solve any two questions from the remaining questions of each section
3. Figures to the right indicate full marks
4. Assume suitable data, if necessary

**Section: A**

Q.1 Attempt any five

10

1. If  $L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}$  then find  $L\{J_0(3t)\}$
2. Find Laplace transform of  $\cos t \log t \delta(t - \pi)$
3. Find inverse Laplace transform of  $\frac{e^{-3s}}{s^2-1}$
4. Find inverse Laplace transform of  $\frac{1}{s^2-2s+17}$
5. Find inverse z-transform of  $\frac{z}{(z-1)(z-2)}$  by residue method

**OR**Solve by direct integration method  $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ 

6. Find z-transform of  $\sinh \frac{\pi}{2} k, k \geq 0$

**OR**

Form a partial differential equation by eliminating a and b from the equation

$$z = (x + a)(y + b)$$

7. Find z-transform of  $f(k) = 3^k k, k \geq 0$

**OR**Solve  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = u, u(0, y) = 3e^{-3y}$ 

8. Find z-transform of  $f(k) = \cos 2k, k \geq 0$

OR

Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial y}$ , where  $u(x, 0) = 6e^{-3x}$

- Q.2 a. Find Z- transform of  $3^k \sin(2k + 5)$  05

OR

Solve  $y^2 zp + x^2 zq = y^2 x$  by Lagrange's method of linear partial differential equations

- b. Find Laplace transform of  $e^{-3t} \int_0^t t \sin 3t \, dt$  05  
 c. Find inverse Laplace transform of  $\log \left( \frac{s+a}{s+b} \right)$  05

- Q.3 a. Find z-transform of  $k^2 f(k)$  if  $f(k) = 3^k, k \geq 1$  05

OR

Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ , where  $u(x, 0) = 6 e^{-3x}$

- b. Find Laplace transform of  $f(t) \begin{cases} t, & 0 < t < 1 \\ 2 - t, & 1 < t < 2 \end{cases}$  and  $f(t) = f(t + 2)$  05  
 c. Find inverse Laplace transform of  $\frac{1}{(s^2+1)(s^2+4)}$  by using convolution theorem 05

- Q.4 a. Find inverse z- transform of  $\frac{z}{(z-2)(z-3)}$  by partial fraction 05

OR

Solve the equation  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$  with boundary conditions

$u(x, 0) = 3 \sin n\pi x, u(0, t) = 0$   
 and  $u(1, t) = 0$ , where  $0 < x < 1, t > 0$

- b. Evaluate  $\int_0^\infty e^{-2t} \sin^3 t \, dt$  05  
 c. Solve  $y'' - 4y' + 3y = 6t - 8, y(0) = 0$   
 $y'(0) = 0$  by Laplace transform 05

- Q.5 a. Solve the difference equation by z-transform  
 $y(k + 2) - 4y(k) = 0$ , given  
 That  $y(0) = 0, y(1) = 2$

05

OR

Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  subject to conditions  
 $u(0, y) = 0, \quad u(\pi, y) = 0,$   
 $u(x, 0) = 100 \quad \text{and} \quad u(x, \infty) = 0$

- b. Express the given function into Heaviside unit step function and hence find its Laplace transform

05

$$f(t) = t^2, \quad 0 < t < 1$$

$$= 4t, \quad t > 1$$

- c. Find inverse Laplace transform of  $\frac{s e^{-3s}}{s^2 + 8s + 25}$

05

**Section: B**

- Q.6 Attempt any five

10

- a. Find  $f(2)$  for the data

|      |   |   |    |
|------|---|---|----|
| x:   | 0 | 1 | 4  |
| f(x) | 4 | 3 | 24 |

- b. Find the first approximate value of the root (i.e.  $x_1$ ) by Newton raphson method for  $\log x = \cos x$

- c. Find the values of x, y, z in the first iteration by Gauss seidal method

$$10x + 2y + z = 69$$

$$x + 8y + 2z = -3$$

$$2x - y + 20z = 76$$

- d. Find the values of  $k_1$  and  $k_2$  while solving the D.E.

$$\frac{\partial y}{\partial x} = 3e^x + 2y, \quad y(0) = 0, \quad \text{Take } h = 0.1 \text{ by runge-kutta fourth order method}$$

- e. Verify whether  $f(z) = \sin z$  is analytic

- f. Find the image of  $|z| = 2$  under  $w = \frac{1}{z}$

- g. Evaluate  $\int_c (x + y)dx + (2y - x)dy$  where c is the straight line  $y=x$  joining the points  $(0,0)$  to  $(3,3)$

h. Find the residues of  $\frac{z}{(z+3)(z-2)}$  at each of its poles

Q.7 a. Fit a second degree parabola to the following data 05

|   |   |     |     |     |     |
|---|---|-----|-----|-----|-----|
| x | 0 | 1   | 2   | 3   | 4   |
| y | 1 | 1.8 | 1.3 | 2.5 | 6.3 |

b. Apply the Runge-Kutta fourth order method to find  $y(1.1)$  given that, 05

$$\frac{dy}{dx} = 3x + y^2, \quad Y(1) = 1.2, \quad h = 0.1$$

c. If  $f(z) = u + iv$  is analytic then find  $f(z)$  if  $u + v = e^x(\cos y + \sin y)$  05

Q.8 a. Using Lagrange's formula find  $f(2)$  from the data 05

|      |   |   |    |    |
|------|---|---|----|----|
| x    | 0 | 1 | 4  | 5  |
| f(x) | 4 | 3 | 24 | 39 |

b. Evaluate  $\int_c \frac{e^{-z}}{(z+2)^3} dz$ , where  $c$  is the circle  $|z| = 3$ , by Cauchy's integral formula 05

c. Show that  $u = \log \sqrt{x^2 + y^2}$  is harmonic hence find harmonic conjugate 05

Q.9 a. Find the root of the equation  $2(x - 3) = \log_{10} x$  by Newton Raphson method 05

b. Evaluate  $\int_c \frac{dz}{\sinh z}$ , where  $c$  is  $|z| = 4$  by Cauchy's residue theorem 05

c. Find the bilinear transformation which maps the points  $z=1, i, -1$  into the points  $w=i, 0, -i$  05

Q.10 a. Expand  $f(z) = \frac{1}{z^2 - 4z + 3}$  by Laurent series for  $1 < |z| < 3$  05

b. Solve by using Gauss-Seidel method 05

$$\begin{aligned} 10x + 2y + z &= 9 \\ 2x + 20y - 2z &= -44 \\ -2x + 3y + 10z &= 22 \end{aligned}$$

c. Evaluate  $\int_{(0,0)}^{(1,1)} (3x^2 + 4xy + ix^2) dz$  along  $y=x$  05

Total No. of Printed Pages:04

**SUBJECT CODE NO:- H-112**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics –IV**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i. Q.No.1 and 6 are compulsory.
- ii. Solve any two questions from remaining of each section.
- iii. Figures to the right indicate full marks.
- iv. Assume suitable data, if necessary.

**SECTION-A**

Q.1 Solve any five from the following 10

- a) Determine the analytic function whose real part is  $2x(1 - y)$ .
- b) Show that  $u = r^n \cos n\theta$  is harmonic.
- c) Show that the image of the line  $x = 0$  under the transformation  $w = e^z$  is a circle.
- d) Evaluate  $\int_0^{1+i} z^2 dz$  along the line  $y = x$ .
- e) Evaluate  $\int_c \frac{e^z}{(z-1)^2} dz$  where  $c : |z| = 2$ .
- f) State Cauchy's residue theorem.
- g) Solve  $\frac{\partial z}{\partial x} + 4z = \frac{\partial z}{\partial t}$ , where  $z(x, 0) = 4e^{-3x}$

OR

Find Z-transform of  $f(k) = a^k$ .

- h) Solve  $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$

OR

Find Z-transform of  $f(k) = \cos 2k$ .

Q.2 a) Determine analytic function  $f(z) = u + iv$  whose imaginary part is  $e^{-x}(x \sin y - y \cos y)$ . 05

- b) Show that  $w = \frac{i-z}{i+z}$  maps the real axis of  $z$ -plane into the circle  $|w| = 1$  and the half plane  $y > 0$  into the interior of the unit circle  $|w| = 1$  in the  $w$ -plane. 05

- c) Solve  $\frac{\partial u}{\partial t} = \beta^2 \frac{\partial^2 u}{\partial x^2}$  subject to the conditions 05
  - i.  $u(0, t) = u(l, t) = 0$  for all  $t$
  - ii.  $u(x, 0) = x$  in  $0 < x < l$
  - iii.  $u(x, \infty)$  is finite.

**OR**

Find Z-transform of  $3^k \sin(3k - 2)$ .

- Q.3
- Show that  $v = r^2 \sin 2\theta + r \sin \theta$  is harmonic. Find its harmonic conjugate and hence find corresponding analytic function. 05
  - Evaluate  $\int_{1-i}^{2+i} (2x + iy + 1) dz$  along  $x = t + 1; y = 2t^2 - 1$  05
  - Solve  $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$  subject to the conditions
    - $u(0, t) = u(l, t) = 0$  for all  $t$ .
    - $\frac{\partial u}{\partial t} = 0$  when  $t = 0$
    - $u(x, 0) = a \sin \frac{\pi x}{l}$

**OR**

Find inverse z-transform of  $\frac{z}{(z^2+7z+10)}$

- Q.4
- Expand  $f(z) = \frac{1}{(z^2-3z+2)}$  for  $1 < |z| < 2$  05
  - Evaluate  $\oint_c \frac{\cos z}{(z-\pi)^3} dz$  where  $c$  is  $|z - 1| = 3$  05
  - Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  Subject to the conditions
    - $u = 0$  when  $y \rightarrow \infty$  for all  $x$
    - $u = 0$  when  $x = 0$  for all  $y$
    - $u = 0$  when  $x = 1$  for all  $y$
    - $u = x(1 - x)$  when  $y = 0$  for  $0 < x < 1$

**OR**

Solve the difference equation by z-transform

$$u_{k+2} + 4u_{k+1} + 3u_k = 3^k \text{ with } u_0 = 0, u_1 = 1$$

- Q.5
- Find the bilinear transformation which maps the point  $z = 1, i, -1$  into the points  $w = i, 0, -i$ . 05
  - Evaluate  $\oint_c \frac{z \sec z}{(1-z)^2} dz$  where  $c$  is the circle  $|z| = 2$  by residue theorem 05
  - Evaluate  $\int_0^{2\pi} \frac{d\theta}{1-2a \sin \theta + a^2}, 0 < a < 1$ . 05



SECTION B

- Q.6 Solve any five from the following. 10
- a) Define Laplace Transform and find  $L\{e^t\}$ .
  - b) Find Laplace Transform of  $\sin^2 2t$ .
  - c) Find Laplace Transform of  $f(t) = e^{t-2}, t > 2$   
 $= 0, t < 2$
  - d) Find inverse Laplace transform of  $\frac{2s+1}{s(s+1)}$
  - e) Find inverse Laplace transform of  $\frac{e^{-\pi s}}{s^2+4}$
  - f) Find inverse Laplace transform of  $\frac{s}{(s-3)^5}$
  - g) Find the Fourier sine transform of  $\frac{1}{x}$
  - h) Find the Fourier sine transform of  $f(x) = 1, |x| < a$   
 $= 0, |x| > a$
- Q.7
- a) Find Laplace Transform of  $e^{3t} \int_0^t t \cosh 3t dt$  05
  - b) Find inverse Laplace transform of  $\log \left[ \frac{s+3}{s+2} \right]$  05
  - c) Solve  $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}, -\infty < x < \infty$  05  
 Subject to the conditions
    - i.  $u$  and  $\frac{\partial u}{\partial x} \rightarrow 0$  as  $x \rightarrow \pm\infty$
    - ii.  $u(x, 0) = \begin{cases} u_0 & |x| \leq a \\ 0 & |x| \geq a \end{cases}$
- Q.8
- a) Evaluate  $\int_0^\infty e^{-3t} \sin^3 t dt$  05
  - b) Find inverse Laplace transform of  $\frac{s}{(s^2+a^2)^2}$  by convolution theorem. 05
  - c) Solve the integral equation  $\int_0^\infty f(x) \cos px dx = \begin{cases} 1-p; & 0 < p < 1 \\ 0; & p > 1 \end{cases}$  05

- Q.9
- a) Find the Laplace Transform of  $f(t) = \begin{cases} 1 & ; 0 \leq t \leq 2 \\ -1 & ; 2 \leq t \leq 4 \end{cases}$  where  $f(t+4) = f(t)$  05
- b) Solve  $\frac{dy}{dt} + 3y + 2 \int_0^t y dt = t, y(0) = 0$  by Laplace Transform. 05
- c) Find Fourier sine transform of  $f(x) = e^{-x}$  and evaluate  $\int_0^{\infty} \frac{x \sin kx}{1+x^2} dx$  05
- Q.10
- a) Express the following function in term of Heaviside unit step function and hence find Laplace Transform  $f(t) = \begin{cases} t^2 & ; 0 < t < 1 \\ 4t & ; t > 1 \end{cases}$  05
- b) Solve by Laplace Transform  $\frac{dx}{dt} - y = e^t; \frac{dy}{dt} + x = \sin t$ , subject to  $x(0) = 1; y(0) = 0$ . 05
- c) Find Fourier sine Transform of  $f(x) = \frac{e^{-ax}}{x}$  05

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-209**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Electrical Power Trans. and Distri.**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- N.B
- 1) Solve any 2 questions from section A.
  - 2) Solve any 2 questions from section B.
  - 3) Q.No.1 and Q.No.6 are compulsory.

## Section A

- Q.1 Attempt any five questions: 10
- a) What is proximity effect?
  - b) Define transmission efficiency.
  - c) State advantages of HVAC transmission.
  - d) Define the following terms:
    - i) Feeder
    - ii) Distributor
  - e) What is ring main distribution system?
  - f) What is interconnected system of distributing?
  - g) What are the causes of voltage drop & line loss in a transmission line?
  - h) Define a substation. Why are substations required?
- Q.2 05
- a) What is skin effect? Why is it absent in the D.C. system? Explain. 05
  - b) Define and explain unsymmetrical spacing. 05
  - c) Write a short note on power factor tariff and three part tariff. 05
- Q.3 05
- a) Write a note on Instrument transformers. 05
  - b) Derive the expression of inductance of three phase line with unsymmetrical spacing. 05
  - c) Each line of a 3-phase system is suspended by a string of 3 similar insulators. If the voltage across the line unit is 17.5 KV, calculate the line to neutral voltage. Assume shunt capacitance between each insulator and earth to be  $1/8^{\text{th}}$  of the capacitance of the insulator itself. Also find the string efficiency. 05
- Q.4 05
- a) Define the terms load curve, load factor, demand factor, diversity factor and load duration curve. 05
  - b) State the three parameters of a transmission line. What is the effect of line parameters on the performance of the transmission line? 05
  - c) A single phase transmission line has two parallel conductors 3 meters apart. The radius of each conductor is 1 cm. calculate the capacitance of the line per km. given that  $\epsilon_0 = 8.854 \times 10^{-12} \text{ F/m}$ . 05
- Q.5 Write short notes. Attempt any three. 15
- a) Factors affecting corona
  - b) Methods of improving string efficiency

- c) Penalty tariff and incentives
- d) Load forecasting

Section B

- Q.6 Attempt any five: 10
- a) What are the types of underground cables?
  - b) What is the main purpose of armoring?
  - c) State two assumptions made while drawing the equivalent circuit of nominal T network of a medium transmission line.
  - d) Define sag. Illustrate with a figure.
  - e) What is the effect of capacitance in a transmission line?
  - f) What are ABCD constants?
  - g) State two methods of locating cable fault.
  - h) What is meant by short, medium and long transmission line?
- Q.7 05
- a) Derive the expression of capacitance of three phase line with unsymmetrical spacing. 05
  - b) Discuss the various types of line supports. 05
  - c) A three phase line delivers 3600KW at a p.f. of 0.8 lagging to a load. If the sending end voltage is 33 KV , determine: 05
    - a) Receiving end voltage
    - b) Line current
    - c) Line losses
    - d) Transmission efficiency
- Q.8 05
- a) Draw the equivalent circuit and vector diagram for a medium transmission line. State the assumptions made. 05
  - b) An overhead  $3\phi$ , 50 Hz, 132 KV transmission line has conductors placed in a horizontal plane 4.56m apart. The conductor diameter is 22.4mm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition. 05
  - c) Find ABCD constant values for nominal  $\pi$  method. 05
- Q.9 05
- a) Explain with neat sketches, the methods of laying underground cables in special locations. 05
  - b) Explain any four factors affecting corona. 05
  - c) Discuss the suitability of various types of overhead lines. 05
- Q.10 Write short notes. Attempt any three. 15
- a) Circuit breakers and insulators
  - b) Grading of cables
  - c) XLPE cables
  - d) Calculation of sag at equal and unequal levels

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-210**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**A.C. Machines**  
**(OLD)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Question No.1 & 6 are compulsory.
  2. Attempt from each section any two questions from remaining questions
  3. Assume suitable data if required

## Section A

- Q.1 Solve any five 10
- 1) Draw equivalent circuit of single phase induction motor considering core losses.
  - 2) Define term crawling
  - 3) Why does slip vary with load
  - 4) Mention the types of starters
  - 5) Write application of servo motor.
  - 6) Compare between single phase and 3 phase induction motor.
  - 7) How would you reverse the direction of rotation of capacitor start induction run motor?
- Q.2 a) A 3 phase 6 pole 50HZ induction motor has a slip of 1% at no load and 3% at full load, 08  
determine  
a) Synchronous speed b) no load speed c) full load speed d) frequency of rotor current at stand still & at full load.
- b) Explain in detail torque slip and torque speed characteristic of 3 phase Induction motor. 07
- Q.3 a) Explain the double – revolving field theory of single phase induction motor. 07
- b) With neat diagram explain the working of auto transformer for 3 phase induction motor 08
- Q.4 a) Explain in detail the principle of operation of single phase capacitor start & run Induction 07  
motor.
- b) In case of Induction motor, obtain an expression of rotor copper loss in terms of rotor 08  
input
- Q.5 Write short notes on 15
- 1) Speed control of induction motor by pole changing method
  - 2) Double cage induction motor
  - 3) FHP synchronous motor

Section B

- Q.6 Solve any five 10
- a) State two advantages of short pitching or chording in an alternator.
  - b) State the necessity for parallel operation of alternator
  - c) Draw equivalent circuit of a synchronous motor
  - d) Will the motor start with the field excited justify
  - e) Define hunting of synchronous motor
  - f) Draw vector diagram of loaded alternator for leading p.f
  - g) What is meant by armature reaction of synchronous machine
  - h) Why a 3 phase synchronous motor will always run at synchronous speed.
- Q.7 07
- a) Derive expression for power developed by synchronous motor.
  - b) 3 phase , 6pole, ster connected alternator revolves at 1000rpm, the stator has 90 slots , & 8 conductor per slot . The flue per pole is 0.05 wb ( sinusoidally distributed) calculate voltage generated by machine if winding factor is 0.94. 08
- Q.8 07
- a) Explain voltage regulation by synchronous impedance method in synchronous generator.
  - b) Explain working principle of synchronous motor & write its applications 08
- Q.9 07
- a) Explain effect of excitation on power factor of synchronous motor
  - b) Explain in detail different torques of synchronous motor 08
- Q.10 Write short note on any 3 15
- 1) Power angle equation
  - 2) Hunting & damping of synchronous motor
  - 3) Method of synchronizing alternator
  - 4) Damper winding

Total No. of Printed Pages:04

**SUBJECT CODE NO: H-301**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics - III**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i) Questions number 1 and 6 are compulsory.
- ii) Attempt any two questions from the remaining each section.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data if necessary.

**SECTION – A**

Q.1 Solve any five from the following:

10

- a) Solve  $(D^2 - 6D + 25)y = 0$
- b) Solve  $(D^2 - 4D + 5)y = 0$
- c) Find the particular integral of  $(D^2 - 4)y = x^2$
- d) Solve  $(x^2D^2 + xD - 1)y = 0$
- e) If 2lb weight is pulled 6 inches below its equilibrium position and then released. Assuming a spring constant  $k = 16lb/ft$ , damping force  $2 \frac{dx}{dt}$  Set- up the equation of motion.
- f) A circuit consists of an inductance of 0.05 henry, a resistance of 5 ohms and a Condenser of capacitance  $4 \times 10^{-4}$  farad, with constant EMF of 110 volts. Set-up the differential equation.
- g) In a certain manufacturing process 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools, at most 2 will be defective.
- h) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Find the number of students whose marks will be less than 68.

- Q.2 a) Solve  $(D^2 - 6D + 13)y = 8e^{3x} \sin 4x$  05
- b) If a weight 6lb hangs from a spring with constant  $k = 12$  and no damping force exists. Find the motion of weight when an external force  $3\cos 18t$  acts. Initially  $x = 0, \frac{dx}{dt} = 0$  at  $t = 0$ . Determine whether the resonance occurs. 05
- c) Calculate the mean deviation from mean of the following data: 05

|   |     |      |       |       |       |
|---|-----|------|-------|-------|-------|
| x | 0-6 | 6-12 | 12-18 | 18-24 | 24-30 |
| f | 8   | 10   | 12    | 9     | 5     |

- Q.3 a) Solve  $(D^3 - 2D + 4)y = 3x^2 - 5x + 2$  05
- b) A one henry inductance, a 4 microfarad capacitor and EMF of  $180 \cos 40t$  are connected in series. Find the charge  $Q$  and the current  $i$ , if  $i = Q = 0$  at  $t = 0$ . 05
- c) Suppose that life of a gas cylinder is normally distributed with mean of 40 days and a standard deviation of 5 days. If at a time 10,000 cylinders are issued to customer's, how many will need replacement after 35 days? 05

- Q.4 a) Solve  $(D^2 + 5D + 6)y = e^{e^x}$  by using general method. 05
- b) A long column of length  $l$  fixed at one end is completely free at other. If the load  $P$  is axially applied at the free end. Its deflection is given by 05

$$EI \frac{d^2y}{dx^2} = P(a - y)$$

Where the origin is taken at the fixed end and 'a' is the lateral displacement of the free end. Show that the deflection curve is given by

$$y = a \left[ 1 - \cos \left( \sqrt{\frac{P}{EI}} x \right) \right]$$

- c) Compute mean, variance,  $\beta_1$  and  $\beta_2$  if the first four moments about a value 5 of a variable are given as 2, 20, 38 and 52. 05
- Q.5 a) Solve  $(D^2 + 4)y = \frac{1}{1 + \cos 2x}$  by using method of variation of parameter. 05
- b) Solve  $(x - 1)^3 \frac{d^3y}{dx^3} + 2(x - 1)^2 \frac{d^2y}{dx^2} - 4(x - 1) \frac{dy}{dx} + y = 4 \log(x - 1)$  05



- c) Fit a straight line to the following data:

05

|   |   |   |    |    |
|---|---|---|----|----|
| x | 1 | 2 | 3  | 4  |
| y | 3 | 7 | 13 | 21 |

SECTION – B

Q.6 Solve any five from the following:

10

- a) If  $\vec{F} = x \cos z i + y \log x j - z^2 k$  find  $\text{curl } \vec{F}$
- b) Find the unit vector normal to the surface  $xy^3z^2 = 4$  at the point  $(-1, -1, 2)$
- c) Find the constant 'a' if  $\vec{F} = (x + 3y^2)i + (2y + 2z^2)j + (x^2 + az)k$  is solenoidal.
- d) Evaluate  $\int_C \vec{F} \cdot d\vec{r}$ , where  $\vec{F} = \cos y i - x \sin y j$  and C is the curve  $y = \sqrt{1 - x^2}$  in xy-plane from  $(1,0)$  to  $(0,1)$
- e) State Stoke's theorem.
- f) Find the first approximate root of the equation  $xe^x - \cos x = 0$  using Newton Raphson method.
- g) Find the first approximate solution of the equation
 
$$\begin{aligned} 8x - 3y + 2z &= 20, \\ 4x + 11y - z &= 33, \\ 2x + y + 4z &= 12 \end{aligned}$$
 by Gauss Seidal method.
- h) Find the missing term in the following:

|      |   |   |    |     |
|------|---|---|----|-----|
| x    | 0 | 1 | 3  | 4   |
| f(x) | 5 | 6 | -- | 105 |

Q.7

- a) Find the directional derivative of  $\frac{1}{r}$  in the direction of  $\vec{r}$ , where  $\vec{r} = xi + yj + zk$  05
- b) Find the work done in moving a particle in the force field  $\vec{F} = 3x^2i + (2xz - y)j + zk$  along the straight line joining the points  $(0,0,0)$  and  $(2,1,3)$  05
- c) Find the real root of the equation  $x + \log x = 2$  by Newton – Raphson method correct to three decimal places. 05

- Q.8
- Prove that  $\nabla^4 e^r = \left(1 + \frac{4}{r}\right) e^r$  05
  - Evaluate Green's theorem for  $\int_C (3x + 4y)dx + (2x - 3y)dy$  with  $C: x^2 + y^2 = 4$  05
  - Given  $\frac{dy}{dx} = x^2 - y, y(0) = 1$ , find  $y(0.1)$  and  $y(0.2)$  using Runge – Kutta fourth order method. 05
- Q.9
- Prove that the vector field  $\vec{F} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$  is irrotational. Find the scalar potential  $\phi$  such that  $\vec{F} = \nabla\phi$ . 05
  - Evaluate  $\iint_S \vec{F} \cdot \vec{ds}$  using Gauss divergence theorem, where  $\vec{F} = 2xyi + yz^2j + zxk$  and  $S$  is surface of the region bounded by  $x = 0, y = 0, z = 0, y = 3, x + 2z = 6$ . 05
  - Solve the equations  $83x + 11y - 4z = 95, 7x + 52y + 13z = 104, 3x + 8y + 29z = 71$  by Gauss Seidal method. 05
- Q.10
- Verify Stoke's theorem for  $\vec{F} = 4xzi - y^2j + yzk$  over the area in the plane  $z = 0$ , bounded by  $x = 0, y = 0, x^2 + y^2 = 1$  05

- From the following table, Obtain the first and second derivative at the point  $x = 0.96$  05

|   |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|
| x | 0.96   | 0.98   | 1.00   | 1.02   | 1.04   |
| y | 0.7825 | 0.7739 | 0.7651 | 0.7563 | 0.7473 |

- Taking  $h = 0.05$ , determine the value of  $y$  at  $x = 0.1$  by Euler's modified method, given that  $\frac{dy}{dx} = x^2 + y, y(0) = 1$  05

Total No. of Printed Pages:2

**SUBJECT CODE NO: H-365**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Electrical Measuring Techniques**  
**(OLD)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 and Q. No.6 are compulsory
  - ii) Attempt any two questions from the remaining questions of each section
  - iii) Assume suitable data whenever necessary.

**Section A**

- Q.1 Solve any five questions of the following 10
- a) Define terms as static and dynamic regarding measuring instrument
  - b) What do you mean by linearity?
  - c) What are the different types of sources & detectors used in ac Bridge?
  - d) What are the classifications of measurement resistance with range?
  - e) What are the advantages of bridge circuit?
  - f) Define term reproducibility & span
  - g) Explain absolute instrument
  - h) What is poly phase wattmeter?
- Q.2 08
- a) Explain the construction and principle of kelvin double bridge
  - b) The following data is related to bridge as 07  
 Arm AB:  $R_1=200\Omega$   
 Arm BC:  $R_2=200\Omega$  in series with  $C_2=5\mu\text{f}$   
 Arm AD:  $R_3=500\Omega$  in series  $C_3=0.2\mu\text{f}$   
 Arm CD: constants of  $Z_x$ .  
 Find the value  $Z_x$  impedance
- Q.3 08
- a) Describe the construction and working of PMMC instrument
  - b) The coil of PMMC instrument has 42 turns and mean width of the coil is 2.5 cm of the axis 07  
 length of the coil is 2cm. If the flux density is 0.1 tesla. Calculate the torque on moving coil for a current of 15MA
- Q.4 08
- a) Derive expression for power measured in  $3\phi$  circuit with help of 2-wattmeter for a balanced star connected load. Draw the phasor diagram
  - b) Two-wattmeter connected to measure the power supplied to a 3 phase, 500V circuit indicates 07  
 the total input to be 10KW. The power factor is 0.3 lagging find the reading on each wattmeter
- Q.5 05
- a) Explain shunt and multipliers for extension of range of ammeter and voltmeter 05
  - b) Explain De sauty bridge for measurement of capacitance 05
  - c) What are different types of error in wattmeter? 05

## Section B

- Q.6 Solve any five of the following 10
- What are the different types of amplifiers used in CRO?
  - Define the terms applied to instrument transformer
    - Turns ratio
    - Nominal transformation ratio
  - What is the effect of shaded band on energy meter?
  - What is the different between dual trace and dual beam CRO?
  - What do you understand by the phase angle error of a PT?
  - What is strain gauge?
  - What do you mean by active and passive transducers? Give one example
  - What is principle on which all inductive transducer work?
- Q.7 08
- What are the types of errors occurs in energy meter? 08
  - A 230V, 50Hz 1 $\emptyset$  energy meter has a constant of 200rev/kwHr. While supplying a non-inductive load of 4.4A at normal voltage. The meter takes 3 minutes for 10 revolutions. Calculate the percentage error of the instrument 07
- Q.8 08
- List the advantages & disadvantages of electrical transducer 08
  - Explain the dual beam CRO working with the help of block diagram 07
- Q.9 08
- How we can measure the phase angle and frequency by Lissajous pattern using CRO? 08
  - What are the advantages of instrument transformer over shunt & multipliers? 07
- Q.10 08
- Draw the connection diagram and vector diagram for power measurement in 3 $\emptyset$  load using two wattmeter method 08
  - Explain the connection diagram of CT & PT in the circuit 07

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-281**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Analog and Integrated Circuits**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

1. Question No.1 and Q. No. 6 are compulsory.
2. Attempt from each section any two Questions from the remaining question.
3. Assume suitable data where necessary.

## Section A

- |     |  |                     |
|-----|--|---------------------|
| Q.1 | Answer any five  | 10                  |
|     | <ol style="list-style-type: none"> <li>1. What are the advantages of voltage follower?</li> <li>2. Draw pin diagram of IC 555 name each pin</li> <li>3. What is 555 timer?</li> <li>4. Write application of op-amp.</li> <li>5. What is the difference between saw tooth wave and triangular wave?</li> <li>6. Draw the symbol of op-amp.</li> <li>7. What is precision rectifier?</li> <li>8. What is Schmitt trigger?</li> </ol> |                     |
| Q.2 | <ol style="list-style-type: none"> <li>a) Compare the ideal and practical characteristics of op-amp.</li> <li>b) Explain the application of op. amp as summing amplifier with neat circuit diagram.</li> </ol>   | <p>07</p> <p>08</p> |
| Q.3 | <ol style="list-style-type: none"> <li>a) Explain the compensation techniques of op-amp.</li> <li>b) What is precision rectifier? Describe the operation of precision full wave rectifier with neat circuit diagram and output wave forms.</li> </ol>  | <p>08</p> <p>07</p> |
| Q.4 | <ol style="list-style-type: none"> <li>a) With neat circuit diagram and output waveforms explain the working of Wien bridge oscillators.</li> <li>b) Describe the operation of monostable multivibrator with neat circuit diagram.</li> </ol>  | <p>07</p> <p>08</p> |
| Q.5 | Write short notes on (any three)   | 15                  |
|     | <ol style="list-style-type: none"> <li>1. Current to voltages convertor</li> <li>2. Virtual ground and virtual short concept.</li> <li>3. Square wave generator</li> <li>4. Log and antilog amplifier.</li> </ol>  |                     |

## Section B

- Q.6 Solve any five 10
1. What is switching regulator?
  2. What is passive filter?
  3. What is band reject filter?
  4. What is PLL?
  5. What is high pass filter?
  6. What are the commonly used filters?
  7. Define cut-off frequency of centre frequency.
  8. What is VCO?
- Q.7 a) Draw the circuit diagram of high pass Butterworth filter and describe its operation. 07  
 b) Design low-pass filter having a cut-off frequency of 2 kHz with pass band gain 2.5. 08
- Q.8 a) Explain operating principle of PLL with block diagram of basic PLL? 07  
 b) Explain analog and digital phase detector? 08
- Q.9 a) Explain the internal structure of IC78540 and its applications. 07  
 b) Describe op-amp series voltages regulator with circuit diagram. 08
- Q.10 Write short notes on (any three) 15
- a) All pass filters.
  - b) Monolithic PLL
  - c) Active versus passive filter.
  - d) IC 723 voltage regulator.

Total No. of Printed Pages:5

**SUBJECT CODE NO:- H-174**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Network Analysis**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

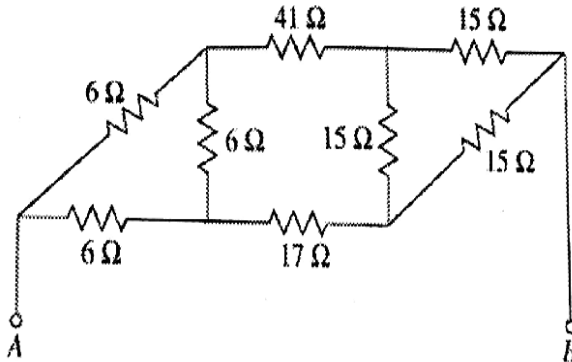
- N.B
1. Use & assume suitable data if required.
  2. Q.No.1 from section A & Q.No.6 Section B are compulsory.
  3. Solve any two questions from the remaining questions in each section A & B.

**Section A**

Q.1 Solve any five:

10

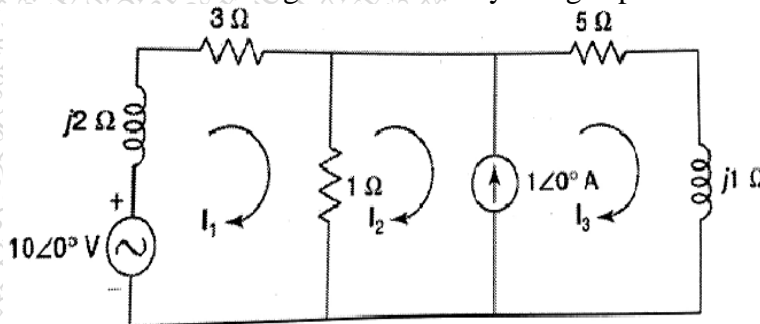
- a) What are initial and final conditions of Resistor, Capacitor & Inductor?
- b) Explain principle of duality.
- c) What are coupled circuits? Explain it.
- d) State the Superposition's Theorem.
- e) Find equivalent resistance between A & B.



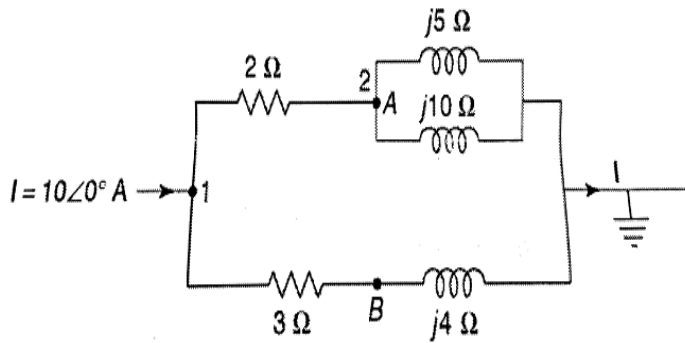
- f) Write applications of Laplace transform.
- g) Find Laplace transform of delayed Unit ramp function.
- h) State Reciprocity theorem.

Q.2 a) Find the current through  $3\Omega$  resistor by using super-mesh analysis.

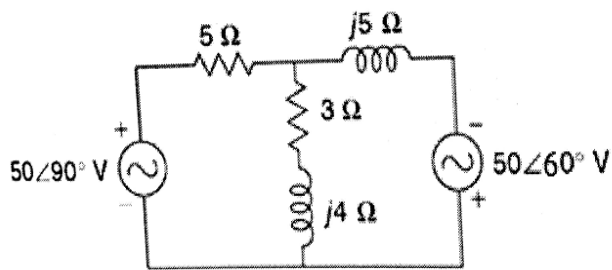
08



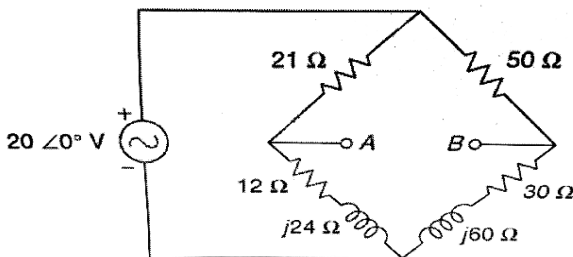
b) Determine the voltage across  $2\Omega$  impedance. 07



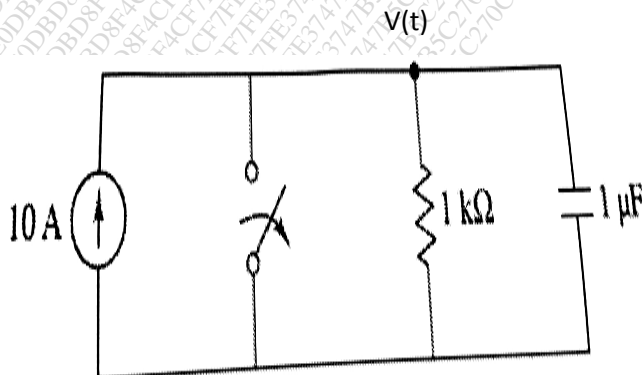
Q.3 a) Determine the voltage across  $(3 + j4)\Omega$  impedance. 07



b) Obtain Thevenin's Equivalent circuit for terminal A & B. 08

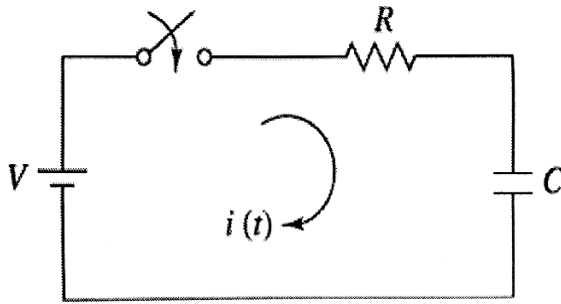


Q.4 a) Find  $v$ ,  $dv/dt$  &  $d^2v/dt^2$  for following circuit. 07





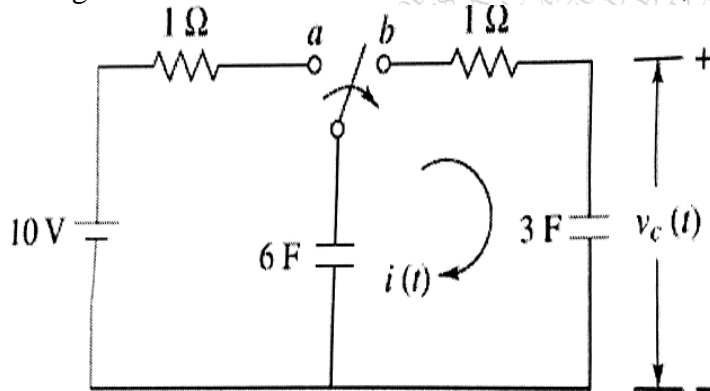
b) With help of Laplace transform find  $i(t)$  05



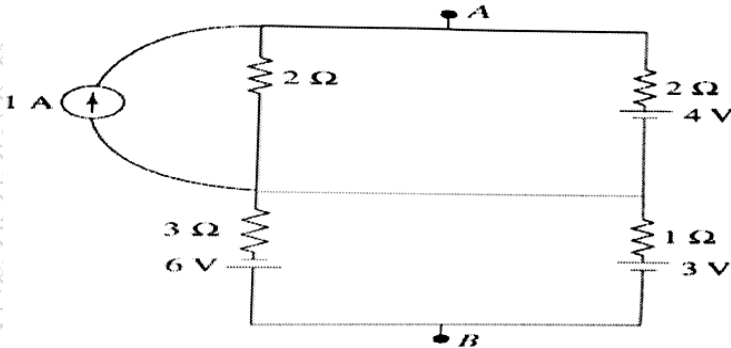
c) Write a short note on coupled circuits. 03

Q.5

a) In the given circuit switch is moved from a to b at  $t=0$ ; determine  $i(t)$  and  $V_c(t)$ . 08



b) Reduce circuit into single resistor & source by using source transformation. 04



c) Explain Source shifting in detail along with example. 03

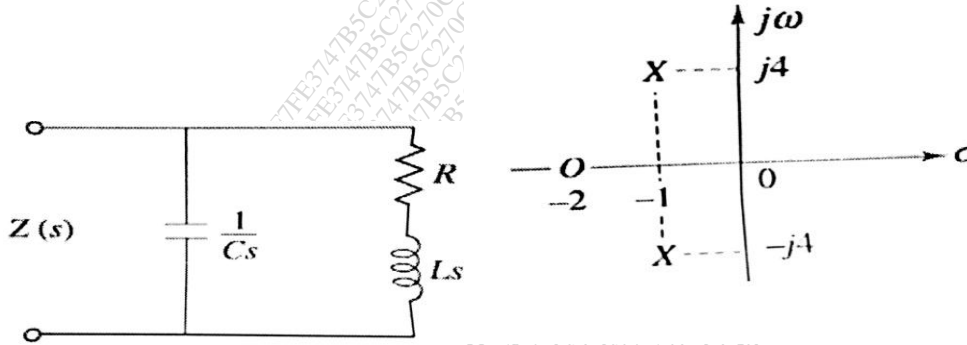
Section B

Q.6 Solve any five:

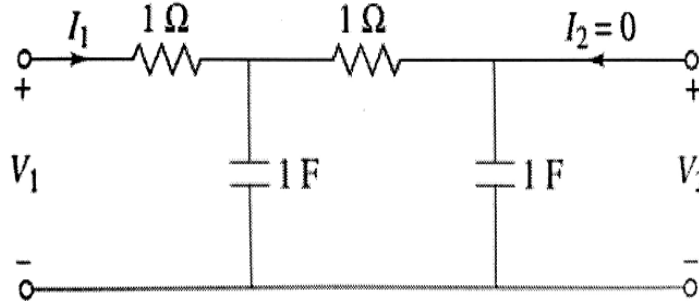
- Define & explain voltage & current transfer function.
- What is reactive power? Give its physical significance.
- Explain restrictions on Pole & Zero locations for Driving point function.
- Explain Short circuit admittance parameters.
- Define stability of a active network.
- What is reactive power? Give its physical significance.
- What is Fourier series & what are the application of Fourier transform.
- Draw T-network & ladder network.

10

Q.7 a) The pole zero diagram of the driving point impedance function of the circuit is shown. At dc, the input impedance is resistive and equal to  $2\Omega$ . Determine the values of R, L & C.



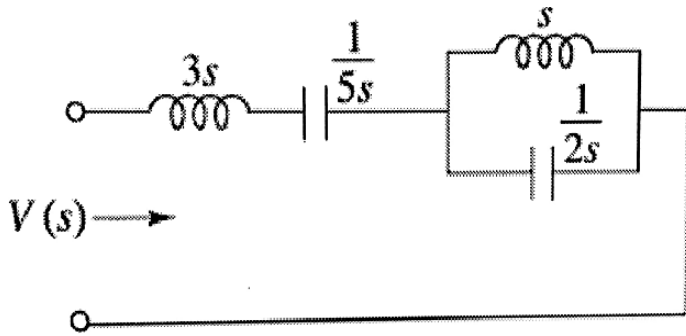
b) Determine Transfer Function  $V_2/V_1$



07

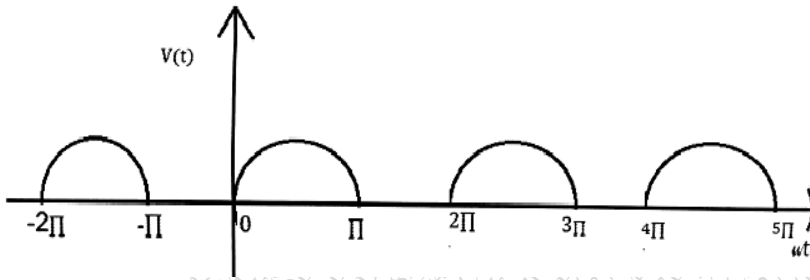
Q.8 a) Find driving point impedance of the network.

05

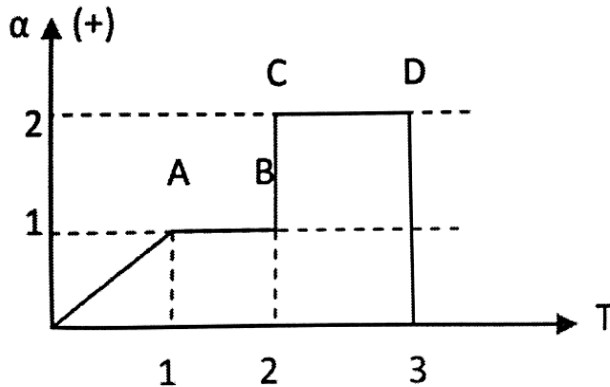


- b) Explain Insertion Loss in detail. 05
- c) Derive the inter conversion to convert h parameters into y parameters. 05

Q.9 a) Find Fourier Coefficient of following waveform. 05



b) Find the Laplace transform of the given waveform. 05



c) Explain in brief concept of even and odd functions. 05

Q.10 a) Derive the condition of the reciprocity for Z parameters. 08

b) Find the Fourier series for square wave defined as  $f(t) = +A$  for  $0 < t < T/2$  and  $f(t) = -A$  for  $T/2 < t < T$ . 07

Total No. of Printed Pages:3

**SUBJECT CODE NO:- H-302**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All)**  
**Engineering Mathematics – III**  
**(Revised)**

[Time: ThreeHours]

[Max.Marks: 80]

N.B Please check whether you have got the right question paper.

- 1) Q. No. 1 and Q. No. 6 are compulsory.  
 2) Solve any two questions from remaining questions of each section.  
 3) Figures to the right indicate full marks.  
 4) Assume suitable data, if necessary.

## Section – A

- Q.1 Solve any five from the following. 10
- Solve  $(D^2 - 13D + 36)y = 0$
  - Solve  $(D^3 - 7D - 6)y = 0$
  - Find particular integral (P.I.) of  $(D^3 + 1)y = 2^x$
  - Find Particular integral (P.I.) of  $(D^2 + 4)y = \sin 3x$
  - Write Kirchhoff's voltage law to electrical ckt.
  - Set – up the equation of motion of a body of weight 10kg attached to a spring given that 20 kg weight will stretch the spring to 10cm.
  - Find the Fourier cosine transform of  $f(x) = e^{-2x}$
  - Find the Fourier transform of  $f(x) = 1; \quad 0 < x < a$   
 $= 0 \quad \text{otherwise}$
- Q.2 05
- Solve  $(D^2 + 6D + 10)y = 50x$  05
  - An emf of 200v is in series with a 10 ohm resistance, a 1 henry inductor and 0.02 farad capacitor. At t=0 the charge Q and current I are zero. Find Q & I at any time t. 05
  - Solve  $(D^2 + 9)y = x \cos x$ . 05
- Q.3 05
- Solve  $(D^2 - 1)y = xe^x \sin x$  05
  - A body executive damped forced vibrations given by the equation 05  

$$\frac{d^2x}{dt^2} + 2k \frac{dx}{dt} + b^2x = e^{-kt} \sin wt$$
 Solve the equation for both the cases when  $w^2 \neq b^2 - k^2$  and  $w^2 = b^2 - k^2$ .
  - Find  $f(x)$  if  $Fs(\lambda) = \frac{e^{-a\lambda}}{\lambda}$  05

- Q.4
- a)  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin \log(x + 1)$  05
- b) The differential equation satisfied by beam uniformly loaded with one end fixed & second end subjected to a compressive force is given by  $EI \frac{d^2y}{dt^2} = py - \frac{1}{2}wx^2$  show that the elastic curve for the beam With condition  $y = 0, \frac{dy}{dx} = 0$  at  $x = 0$  given by  $y = \frac{w}{pn^2} (1 - \cos nx) + \frac{wx^2}{2p}$ , where  $n^2 = \frac{p}{EI}$  05

- c) Express  $f(x) = 1, 0 \leq x \leq \pi$  as a Fourier sine integral and hence evaluate  $\int_0^\infty \frac{(1 - \cos \pi \lambda) \sin \lambda x}{\lambda} d\lambda$  for  $x > \pi$  05

- Q.5
- a) Solve by using the method of variation of parameters.  $(D^2 + 4)y = \sec 2x$  05
- b) Solve the integral equation  $\int_0^\infty f(x) \cos \lambda x dx = e^{-\lambda}$  05
- c) Solve  $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x + 2 \log x$  05

Section – B

- Q.6 Solve any five from the following. 10

- a) Find the mean of the following data

|           |      |       |       |       |       |
|-----------|------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| Frequency | 14   | 17    | 22    | 26    | 23    |

- b)  $\nabla \cdot \vec{r} \text{ if } \vec{r} = xi + yj + zk$
- c) State Green's Theorem.
- d) Find  $\nabla \phi$  at  $(1,1,1)$  if  $\phi = x^2 + y^2 + z^2$ .
- e) Find the area under the normal curve between  $z = 0$  to  $z = 2$ .
- f) Find the Karl Pearson's coefficient of skewness if mean =3, mode = 5.2 and Standard Deviation = 2.5
- g) Show that  $\vec{A} = 3y^4z^2i + 4x^3z^2j - 3x^2y^2k$  is solenoidal.
- h) The probability of certain college students will pass is 0.8 Determine the probability that out of 10 students exactly 6 will pass.

Q.7 a) Evaluate  $\int_C [(x^2 + 2y)dx + (4x + y^2)dy]$  by Green's theorem, where c is the boundary of the region bounded by  $y = 0$ ,  $y = 2x$  and  $x + y = 3$ . 05

b) Show that  $\vec{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$  is both solenoidal and irrotational. 05

c) Find the Karl Pearson's coefficient of skewness for the following data. 05

|                 |     |      |       |       |       |       |
|-----------------|-----|------|-------|-------|-------|-------|
| Marks           | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 |
| No. of Students | 4   | 6    | 8     | 12    | 7     | 2     |

Q.8 a) Find the directional derivative of  $\phi = xy^2 + yz^2$  at the point  $(2, -1, 1)$  in the direction of the vector  $i + 2j + 2k$ . 05

b) Determine the equation for the regression line of the force on time for the following data 05

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| Force | 11.4 | 18.7 | 11.7 | 12.3 | 14.7 | 18.8 | 19.6 |
| Time  | 0.56 | 0.35 | 0.55 | 0.52 | 0.43 | 0.34 | 0.31 |

c) Evaluate by Stokes theorem  $\iint_S \nabla \times \vec{F} \cdot \hat{n} ds$  for the vector field  $\vec{F} = 4yi - 4xj + 3k$ , where S is a disk of radius one lying on the plane  $z = 1$ . 05

Q.9 a) The mean I.Q. of large number of children of age 14 is 100 with standard deviation 16. Assuming the distribution of I.Q. is normal, find the percentage of children having I.Q. between 70 to 120. 05

b) Evaluate  $div(\vec{r} \times \vec{a})$ , where  $\vec{a}$  is a constant vector and  $\vec{r} = xi + yj + zk$ . 05

c) Find the work done in moving a particle in the force field given by  $\vec{F} = yi + zj + xk$  along the parabola  $y^2 = x$  from the origin to the point  $4i + 2j$ . 05

Q.10 a) Find the standard deviation of the following data 05

|           |      |       |       |       |       |       |       |
|-----------|------|-------|-------|-------|-------|-------|-------|
| Class     | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| Frequency | 10   | 15    | 25    | 25    | 10    | 10    | 5     |

b) Express  $\iiint (y^2z^2i + z^2x^2j + z^2y^2k) \cdot \vec{ds}$  as a volume integral. Evaluate it by Gauss divergence theorem over the upper part of the sphere  $x^2 + y^2 + z^2 = 1$  above the XY plane. 05

c) Show that vector field  $\vec{A}$  is irrotational. Find scalar potential function  $\phi$  such that  $\vec{A} = \nabla\phi$  if  $\vec{A} = y^2i + 2xyj - z^2k$ . 05

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-175**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Electrical Power Transmission & Dist.**  
**(Old)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Q. No.1 and Q. No.6 are compulsory.
- ii. Attempt any two questions from Q. No.2 to Q. No.5 from section A.
- iii. Attempt any two questions from Q. No.7 to Q. No.10 from section B.

## Section A

- Q.1 Attempt any five 10
- a) Define Radial Distribution System.
  - b) Define Incentives and Penalties of a Distribution system.
  - c) Define Transmission. Efficiency.
  - d) Define Tariff list different types of tariff.
  - e) Draw a single Line Diagram showing a typical distribution system.
  - f) List the major equipment's in Transmissions substation.
  - g) What are the advantages and disadvantages of HVDC transmission?
- Q.2 05
- a) In a 33 kv overhead line, there are three units in a string of insulators. If the capacitance between each insulator pin and earth is 14% of the self – capacitance of each insulator, find:
    - i. The distribution of voltage over the three insulators
    - ii. String efficiency.
  - b) Compare EHvAc and HVDC transmission system. 05
  - c) Define load curve. What is its importance? 05
- Q.3 05
- a) A single phase transmission line has two parallel conductors 3m apart. The radius of each conductor is 1.2cm. calculate the loop inductance per km length of the line if the material of the conductor is
    - i. Copper
    - ii. Steel with Relative permeability of 100
  - b) Explain any one method of improving string Efficiency. 05
  - c) Write a note on GMR and GMD. 05
- Q.4 05
- a) What is skin Effect? Explain why is it absent in the D.C. System. 05
  - b) What are the different types of insulators? Write a note on Pin type insulator with a neat sketch. 05
  - c) Explain the effects of high voltage on the volume of copper and on efficiency. 05

- Q.5 a) Write a note on Instrument transformers. 05  
 b) Explain why Bundled conductors are used for Transmission voltage above 220kv. 05  
 c) Define corona. What are the factors that affect corona? 05

Section B

- Q.6 Attempt any 05 questions. 10  
 a) What is serving?  
 b) State any two faults in an underground cable.  
 c) What is meant by short, medium and long transmission line?  
 d) What is dielectric stress?  
 e) What is the effect of capacitance on a transmission line?  
 f) What is meant by transposition of conductors? Justify with the help of a diagram.  
 g) What is sag? Illustrate with the help of a figure.

- Q.7 a) What is Corona? What are the factors affecting it? 05  
 b) Derive the expression for capacitance of a 3 $\phi$  line with equilateral spacing. 05  
 c) A transmission line 200km long has the following constants: Resistance/ km = 0.250 $\Omega$ , 05  
 Reactance/km=0.75 $\Omega$  Susceptance /km = 2  $\times 10^{-10}$  the voltage at the receiving end is 132kv.  
 The transmission line delivers 50MW at 0.85p.f. Lagging at receiving end. Calculate:  
 i. Sending End Current  
 ii. Sending End Voltage  
 iii. Voltage Regulation

- Q.8 a) Draw and explain 'The Construction' of an Underground Cable. 05  
 b) State the values of Generalized Circuit Constants of ABCD in case of Medium 05  
 Transmission Line  
 i) T-equivalent circuit  
 ii)  $\pi$ -equivalent circuit  
 c) An overhead line at a river crossing is supported from two towers at heights of 45m and 80m above water level. The horizontal distance between the towers is 500 meters. If the maximum allowable tension is 1800kg, find the clearance between the conductor and water at a point midway between the towers. The weight of conductor is 1 kg / meter. 05

- Q.9 a) Using Rigorous method, derive the expression for sending end voltage and current for a long transmission line. 05  
 b) Compare the merits and demerits of an underground system versus an overhead system. 05  
 c) A single 3 -  $\phi$  line operates at 50hz and is arranged unequally as  $D_{12} = 1.5m$ ,  $D_{23} = 3m$  and  $D_{31} = 2.6m$ . the conductor diameter is 8mm. the line is regularly transposed determine the inductance and capacitance per km. 05

- Q.10 Write short notes on  
 a) ABCD parameters 05  
 b) XLPE Cables 05  
 c) Grading of Cables 05



Total No. of Printed Pages:4

**SUBJECT CODE NO:- H-140**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Network Analysis**  
**(OLD)**

[Time : Three Hours]

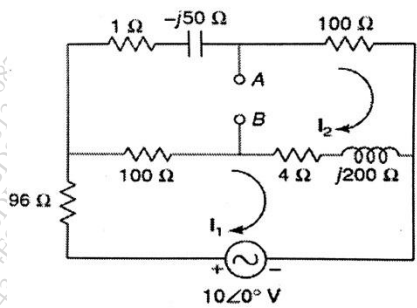
[Max. Marks :80]

Please check whether you have got the right question paper.

- N.B
- I. Use & assume suitable Data if required
  - II. Q.No.1 from Section A & Q.No.6 Section B are compulsory
  - III. Solve any two questions from the remaining questions in each section A & B

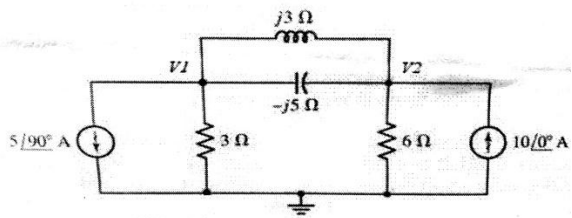
Section A

- Q.1 Solve any Five 10
- a. Define Self & Mutual Inductance
  - b. Explain Lumped & Distributed Networks
  - c. State the Milliman's Theorem
  - d. If Initially, during steady state, current was flowing through inductor & switch gets open now during transient how that inductor will act? And why?
  - e. Define Unit Ramp Function & Delayed Step Function
  - f. Give the principal of Duality
  - g. Replace the circuit into single current source and resistor
  - h. What is dependent sources? Explain Their Types
- Q.2 05
- a) State & Explain Reciprocity Theorem in details along with example
  - b) Find the voltage  $V_{AB}$  using Mesh analysis 05

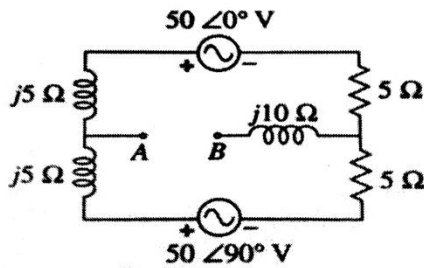


- c) Obtain Current through capacitance by using Superposition Theorem 05

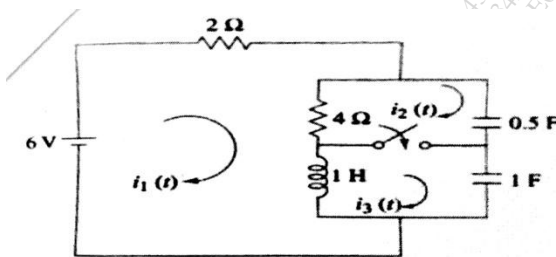
- Q.3 a) Find the voltage  $V_1$  &  $V_2$  in the circuit using nodal analysis 05



- b) State & Explain Millmans Theorem in details along with example 05
- c) Determine the potential difference between A & B using Thevenins Theorem 05

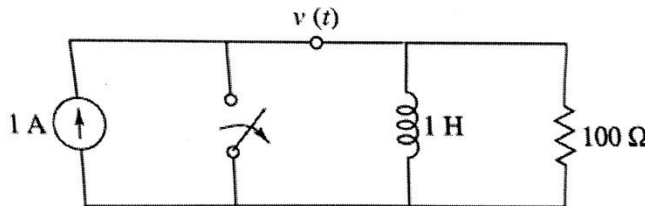


- Q.4 a) In given network a steady state is reached with switch is open, at  $t=0$  switch is closed. Find three loop current at  $t=(0^-)$  &  $t=(0^+)$  08



- b) Explain Super Mesh Analysis with an example 07

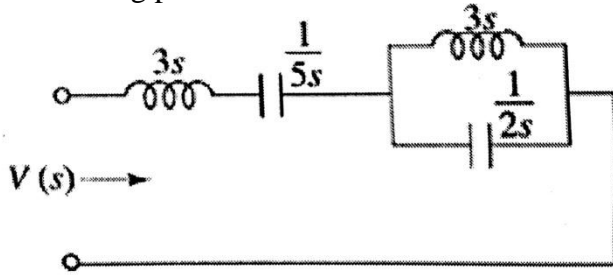
- Q.5 a) Explain Source transformation in detail with example 04  
 b) Explain Source shifting in detail along with example 04  
 c) Find  $v$ ,  $dv/dt$  &  $d^2v/dt^2$  for following circuit 07



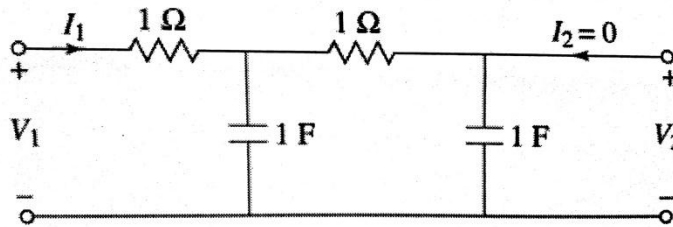
Section B

- Q.6 Solve any Five 10
- a. What is two port network?
  - b. What is reactive power? Give its physical significance
  - c. Write Y parameters of two port network
  - d. Define Fourier coefficients
  - e. What is stability of active network?
  - f. Draw T network & Ladder Network
  - g. What are the application of Fourier transform
  - h. Explain restrictions on Pole and Zero Location for transfer functions

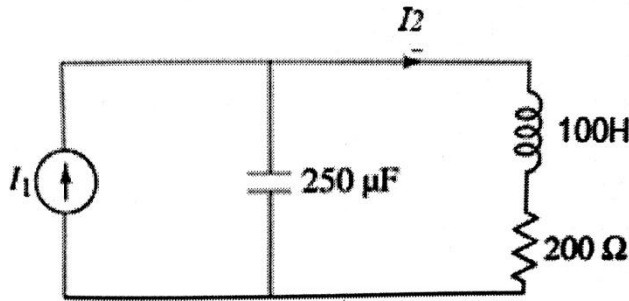
- Q.7 a) Find driving point admittance function of the network 05



- b) Explain the necessary conditions for transfer functions 05  
 c) Determine Transfer Function  $V_2/V_1$  05

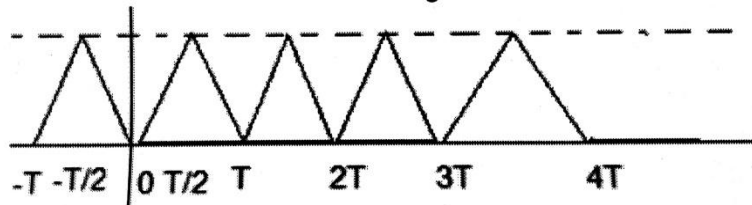


- Q.8 a) Draw Pole Zero diagram of  $I_2/I_1$  05



- b) State the limitation on pole & zero location in transfer function of two port network 05  
 c) Explain Insertion Loss in detail 05

- Q.9 a) Find Fourier Coefficient of following waveform 05





Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-282**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Analog & Digital Circuits**  
**(Old)**

[Time: Three Hours]

[Max. Marks:80]

N.B Please check whether you have got the right question paper.

- N.B
- 1) Q.1 & Q.6 are compulsory.
  - 2) Attempt two questions from remaining questions in each section.
  - 3) Assume suitable data wherever necessary.
  - 4) Figure to right indicate full marks.

**Section A**

- |     |  |  |          |
|-----|--|--|----------|
| Q.1 | <b>Solve any five:</b>   | <ol style="list-style-type: none"> <li>1) Draw the pin diagram of IC 555.</li> <li>2) State the applications of V to I converter &amp; I to V converter.</li> <li>3) Draw the circuit diagram of full wave rectifier using OP-Amp.</li> <li>4) Draw the circuit diagram of triangular generator.</li> <li>5) Define voltage regulation.</li> <li>6) Draw the half wave &amp; full wave rectifier using OP-amp.</li> <li>7) Explain Schmitt trigger.</li> </ol> | 10       |
| Q.2 | (a) Explain any two applications of OP-amp.<br>(b) Explain pin diagram of IC 555 with neat sketch.   |  | 08<br>07 |
| Q.3 | (a) Compare CB, CC and CE configuration of BJT amplifier.<br>(b) Explain with the neat diagram the class B push pull amplifier?                            |  | 07<br>08 |
| Q.4 | (a) Explain generation of sine & triangular wave using OP-amp.<br>(b) Describe the IC 741 and IC 324 with neat circuit diagram.                            |  | 07<br>08 |
| Q.5 | Define following terms: (any three)<br>(1) First order low pass filter<br>(2) Class A Amplifier.<br>(3) Explain BJT and FET<br>(4) Non-inverting Amplifier |  | 15       |

Section B

- Q.6 **Solve any five:** 10
- (a) List some disadvantages of DAC.
  - (b) Draw the state diagram of JK flip-flop.
  - (c) Perform 2S complement Subtraction of 010110 – 100101.
  - (d) What is the features of gray code? What are it's applications?
  - (e) Define up-down counter.
  - (f)  $(134)_{16} = (?)_{10}$ .
  - (g) List various types of flip-flop.
- Q.7 (a) Draw the logic diagram and excitation table of 08
- (i) D- flip – flop
  - (ii) J-K flip – flop
- (b) Explain the working of ADC. 07
- Q.8 (a) Explain ROM and PROM in detail. 08
- (b) Explain multiplexer and Demultiplexer in detail 07
- Q.9 (a) What are the advantages and disadvantages of Dual Slop ADC? List some applications. 08
- (b) Explain Shift register. 07
- Q.10 Define following term (any three) 15
- (a) Simplify following equations using k-map
    - (i)  $Y = \overline{A}BC\overline{D} + A\overline{B}C\overline{D} + \overline{A}BCD$
    - (ii)  $Y = \overline{A}BC\overline{D} + \overline{A}B\overline{C}D + \overline{A}BCD$
    - (iii)  $Y = ABC + \overline{A}BC$
    - (iv)  $Y = ABC\overline{D} + \overline{A}BCD + ABCD$

Total No. of Printed Pages: 2

**SUBJECT CODE NO:- H-330**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Transformers & DC Machines**  
**(Old)**

[Time: Three Hours]

[Max. Marks: 80 ]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory.
  2. Solve any two questions from Q.2 to Q.5
  3. Solve any two questions from Q.7 to Q.10
  4. Assume suitable data wherever necessary.
- Section - A
- Q. 1 Answer the following ( any five) 10
- a) Discuss the working principle of transformer.
  - b) What do you mean by no load current in transformer?
  - c) Why core of transformer is laminated.
  - d) Why rating of transformer is in KVA.
  - e) State the necessary conditions for parallel operations of two transformer.
  - f) What are the applications of stepper motor?
  - g) Define voltage regulation of transformer how does it change with load.
  - h) Give two important points of comparison between D.C servo motor conventional motor.
- Q. 2
- a) Explain the method of finding efficiency and regulation of transformer without loading it. 07
  - b) A 50KVA single phase transformers of 2300V/230V rating has the primary and secondary winding resistance of  $2\Omega$  and  $0.02\Omega$  respectively. The iron losses equal to 412 Watts. Calculate the efficiency, 08
    - i) At half full load
    - ii) at full load, when the power factor of the load is 0.8.
- Q. 3
- a) What is scott connection? Draw its connection diagram. Explain with its advantages and disadvantages. 08
  - b) Compare three phase transformer with bank of three single phase transformers. 07
- Q. 4
- a) Derive an expression for the saving in auto – transformer as compared to conventional transformer. 08
  - b) Explain construction and working of brush less DC motor. 07
- Q. 5 Write short notes ( any three) 10
- a) Stepper motor
  - b) P.M.D.C motor
  - c) Tertiary winding
  - d) Equivalent circuit of transformer

- e) No load operation of transformer.

Section – B

- Q. 6 Answer the following ( any five ) 10
- State the working principle of D.C generator.
  - Why armature winding in D.C machines placed on rotating parts.
  - Give two comparisons of lap and wave winding.
  - Draw power flow diagram of D.C machines.
  - Draw the external characteristics of D.C shunt generator.
  - What do you mean by back emf give its significance?
  - If the applied voltage of DC machine is 230volts. Then what will be back emf for maximum power developed.
  - Calculate voltage induced in armature winding of 4 pole lap wound DC machine having 728 conductors and running at 1800 rpm. The flux per pole is 30 mwb.
- Q. 7 a) Draw a section of four pole D.C machine. Label all parts and explain function of each part. 08
- b) An 8 pole D.C shunt generator has 778 wave connected armature conductor running at 500 rpm. Supplies a load of  $12.5\Omega$ . Resistance at terminal voltage of 250 volts. The armature resistance is  $0.24\Omega$  and field resistance  $250\Omega$ . Find out armature current & the induced emf. 07
- Q. 8 a) Explain the process of commutation for a d.c. generator. What are the causes of bad commutation? Explain methods of improve the commutation. 08
- b) With the help of neat diagram, explain working of four point starter. How is it different from three point starter? 07
- Q.9 a) Explain armature reaction in DC machines. What do you understand by the concept of demagnetizing and cross magnetizing ampere turns. 08
- b) Derive the torque equation of D.C. Motor. 07
- Q.10 Explain the following (any three). 10
- Three point starter
  - Swinburne test
  - Voltage buildup of D.C. generator
  - Losses in D.C. machines
  - Speed control of DC compound motor



Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-366**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EE/EEE/EEP)**  
**Electrical Measuring Techniques**  
**(Revised)**

[Time: Three Hours]

[Max. Marks:80]

- N.B Please check whether you have got the right question paper.  
 (i) Q.No.1 & Q.No.6 are compulsory.  
 (ii) Attempt any two questions from remaining questions of each section.  
 (iii) Assume suitable data, wherever necessary.

Section – A

- Q.1 Solve any five questions 10
- (i) What is difference between absolute and relative error?
  - (ii) How is electro static wattmeter superior to other types of wattmeter?
  - (iii) Why eddy current damping not possible in moving iron Instruments?
  - (iv) What is meant by limiting error?
  - (v) What are advantages of Bridge circuit?
  - (vi) Define term: accuracy, sensitivity resolution
  - (vii) Give the classification of Resistance with range.
  - (viii) What do meant by drift and dead zone?
- Q.2 a) Explain with block diagram the generalized measurement system. 08  
 b) Derive the expression for torque of PMMC instrument. 07
- Q.3 a) Derive the expression for balance conduction of an Schering Bridge. Draw phasor diagram 08  
 also.  
 b) A Capacitor is tested by Schering bridge it forms one arm AB of the bridge the other arms 07  
 are AO a non-reactive resistance of  $100\Omega$ ; DC a non reactive resistance of  $300\Omega$  shunted  
 by Capacitor  $0.5 \mu F$ , BC standard loss free capacitor of  $100 \times 10^{-6} \mu F$ . The supply  
 frequency is 50Hz. The bridge is balance of above components & hence find the  
 capacitance and p.f.
- Q.4 a) Explain the earth tester for measurement of earth resistance. 08  
 b) Two Wattmeter connected to measure the power supplied to a  $3\phi$ , 500V circuit indicate 07  
 the total input to be 10KW. The p.f. is 0.3 lagging find the reading on each Wattmeter.
- Q.5 a) Explain the construction & working of an electro dynamometer type of Wattmeter. 08  
 b) Explain & determine the balance equation for Andersons Bridge. 07

## Section B

- Q.6 Solve any Five questions 10
- (i) What are limitations of Oscilloscope?
  - (ii) What is meant by transducers?
  - (iii) What are applications of CRO?
  - (iv) What do you mean by creeping in energy meter?
  - (v) What is lissajous pattern?
  - (vi) What is difference between energy meter & wattmeter?
  - (vii) The power input to  $3\phi$  I.M. is read by 2 Wattmeter the reading  $900W$  &  $250W$ .  
Calculate the p.f. of wattmeter.
  - (viii) What do understand by the phase angle error of a PT?
- Q.7 a) What are advantages of CT & PT over shunt & multiplier for range extension? 07
- b) The constant of  $3\phi$  two element energy meter is 0.24 revolution of disc/hour. If the meter is normally used with a PT ratio  $22\text{ KV}/220\text{V}$  and CT ratio of  $500/5\text{A}$  determine the error expressed as percentage of correct reading. Line voltage  $220\text{V}$  current –  $5.25\text{A}$  & p.f – 1 to complete 80 revolution in 61 secs. 08
- Q.8 a) Explain the method for frequency measurement by lissajous pattern. 08
- b) Explain the basic principle of resistive and inductive transducer. 07
- Q.9 a) Explain the connection diagram of CT & PT in the circuit. 08
- b) Explain the dual beam CRo & working with help of block diagram. 07
- Q.10 a) Explain the various source of errors and compensation in  $1\phi$  energy meter. 08
- b) Derive the torque expression of  $1\phi$  induction type energy meter. 07

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-400**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E (EE/EEE/EEP)**  
**Electrical Power Generation and its Economics**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q. No. 1 & Q. No.6 are compulsory.
  - ii) Attempt any two from remaining question in each section.
  - iii) Assume suitable data if necessary.
  - iv) Figure to the right indicates full marks.

## SECTION A

- |     |  |          |
|-----|--|----------|
| Q.1 | Solve any five.  | 10       |
|     | <ol style="list-style-type: none"> <li>a) What is function of economizer?</li> <li>b) What is function of air – preheater?</li> <li>c) Define thermal &amp; overall efficiency.</li> <li>d) Define hydrograph.</li> <li>e) Give the function of Isolator and circuit breaker.</li> <li>f) Give the classification of renewable energy sources.</li> <li>g) What is nuclear fission?</li> <li>h) What are fissile and fertile materials?</li> </ol> |          |
| Q.2 | <ol style="list-style-type: none"> <li>a) Write prospectus and development of thermal power station in India.</li> <li>b) What are the different components of Thermal Power Plant give the function of each.</li> </ol>   | 08<br>07 |
| Q.3 | <ol style="list-style-type: none"> <li>a) Explain coal handling plant with suitable diagram.</li> <li>b) Write a short note on nuclear waste disposal.</li> </ol>  | 08<br>07 |
| Q.4 | <ol style="list-style-type: none"> <li>a) Compare Thermal, hydro and nuclear power station.</li> <li>b) Give the site selection of hydro power plant.</li> </ol>   | 08<br>07 |
| Q.5 | <ol style="list-style-type: none"> <li>a) Write a short note on economics of power generation.</li> <li>b) Explain load curve and base load plant.</li> </ol>  | 08<br>07 |

SECTION B

- Q.6 Solve any five. 10
- a) Differentiate between fixed cost and operating cost.
  - b) What are the methods to find depreciation cost?
  - c) Give the application of solar power.
  - d) What are the fuel used in geothermal power plant.
  - e) List the methods to improve thermal efficiency.
  - f) Give the factors affecting cost of generation.
  - g) Draw the output curve of hydropower plant.
  - h) Define load shedding.
- Q.7 08
- a) Explain working of gas power plant.
  - b) Explain working of wind power station. 07
- Q.8 08
- a) Explain economic loading of generators.
  - b) Explain base load and peak load plant with suitable diagram. 07
- Q.9 08
- a) Discuss the advantages and disadvantages of Interconnected System.
  - b) Explain how is reduction of cost is done by using interconnected system. 07
- Q.10 Write a short note on - 05
- a) Non – conventional energy 05
  - b) MHD plant 05
  - c) Choice of size and number of generator units 05

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-399**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Electrical Power Generation & its Economics**  
**[OLD]**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Question no1 and Q. no. 6 are compulsory.
  2. Attempt any two questions from remaining four questions from each section.
  3. Assume suitable data if necessary.
  4. Figures to the right indicate full marks.

**SECTION – A**

- |     |   |                |
|-----|---|----------------|
| Q.1 | Solve any five questions.   | 10             |
|     | <ol style="list-style-type: none"> <li>a) List different types of nuclear reactors.</li> <li>b) What is hydrology</li> <li>c) What is function of storage and pondage in hydro power plant?</li> <li>d) Define a high head plant</li> <li>e) Write two characteristics of Turbines</li> <li>f) What is importance of coal crushing</li> <li>g) Draw a surge tank sketch</li> <li>h) What is a Dam.</li> </ol> |                |
| Q.2 | <ol style="list-style-type: none"> <li>a) Explain working of hydro power plant.</li> <li>b) Explain air and gas circuit in thermal stations.</li> <li>c) Explain fire tube boilers</li> </ol>   | 05<br>05<br>05 |
| Q.3 | <ol style="list-style-type: none"> <li>a) Explain economizer in brief.</li> <li>b) Draw and explain impulse turbine</li> <li>c) Explain liquid fuels and gaseous fuels.</li> </ol>  | 05<br>05<br>05 |
| Q.4 | <ol style="list-style-type: none"> <li>a) Illustrate the various steps in coal handling.</li> <li>b) Explain the Canal and penstocks in hydro power plant.</li> <li>c) Write the factors of selecting the site</li> </ol>   | 05<br>05<br>05 |
| Q.5 | <ol style="list-style-type: none"> <li>a) What are the types of nuclear reactions plant in nature?</li> <li>b) Draw the heat circuit in an atomic power plant.</li> <li>c) Write advantages of thermal Reactors.</li> </ol>   | 05<br>05<br>05 |

**SECTION – B**

- |     |   |    |
|-----|---|----|
| Q.6 | Solve any five questions.   | 10 |
|     | <ol style="list-style-type: none"> <li>a) Write applications of gas turbine plants.</li> <li>b) Draw the sketch of regenerator.</li> <li>c) What is inter cooling.</li> </ol> |    |

- d) Write fuels for gas turbine plants.
- e) What is meant by Zero energy house.
- f) What are the forms of geothermal energy?
- g) What are the types of wind mills?
- h) Define load factor & Diversity factor.

- Q.7 a) Explain base load and peak load plants. 05  
 b) Write short note on incremental fuel cost curve. 05  
 c) What are the factors affecting site selection of wind mill. 05
- Q.8 a) Explain the comparison of all power plants. 05  
 b) Describe in brief cost of electrical energy. 05  
 c) Write short note on MHD plant. 05
- Q.9 a) Write the advantages of tidal power plant. 05  
 b) What are the fuels required for gas turbine plants explain. 05  
 c) Write advantages of geothermal plant. 05
- Q.10 a) Briefly explain the vertical axis wind turbine generator. 05  
 b) What are the methods for improving thermal efficiency of gas turbine plant? 05  
 c) Write the limitations of using fuel cell. 05

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-436**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E.( EE/EEE/EEP)**  
**Elective – I : Electronics Devices & Circuits**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Q.No.1 and Q.No.6 are compulsory
2. Solve any two questions from Q.2 to Q.5 & Q.7 to Q.10.
3. Assume suitable data if necessary.
4. Figure to right indicate full marks.

## Section A

|     |   |          |
|-----|---|----------|
| Q.1 | Solve any five  | 10       |
|     | <ol style="list-style-type: none"> <li>1) Differentiate between breakdown voltage &amp; PIV of a PN diode.</li> <li>2) Differentiate avalanche &amp; zener breakdowns.</li> <li>3) Write down some applications of zener diode.</li> <li>4) Compare LEDs &amp; LCDs.</li> <li>5) What is an ideal diode &amp; compare ideal diode as a switch.</li> <li>6) Find state of transistor &amp; its currents / voltage (Si BJT with <math>\beta = 100, \beta_{min} = 50</math>)</li> <li>7) Draw &amp; explain working of BJT.</li> </ol> |          |
| Q.2 | <ol style="list-style-type: none"> <li>a) Define applications of MOSFET as a amplifiers &amp; switch</li> <li>b) Compare CE, CB &amp; CC amplifiers on various parameters.</li> </ol>   | 08<br>07 |
| Q.3 | <ol style="list-style-type: none"> <li>a) Compare half wave rectifier, full wave rectifier &amp; bridge rectifier.</li> <li>b) Define and explain DC analysis of differential amplifier.</li> </ol>   | 08<br>07 |
| Q.4 | <ol style="list-style-type: none"> <li>a) Explain different configuration of differential amplifier? Explain any one in detail.</li> <li>b) Explain constant current bias in detail.</li> </ol>   | 08<br>07 |
| Q.5 | Define following terms  | 15       |
|     | <ol style="list-style-type: none"> <li>a) CCD's</li> <li>b) CMOS inverter</li> <li>c) OP-amp &amp; its features.</li> </ol>   |          |

Section B

- Q. 6 Solve any five 10
- 1) Explain types of negative feedbacks.
  - 2) Explain what is pulse & pulse circuits.
  - 3) What is multivibrator? List the different types of multivibrator.
  - 4) Define CMRR
  - 5) Define switching circuits.
  - 6) What is Miller's effect?
  - 7) Why a high-pass RC circuit is called differentiator.
- Q.7 a) Explain the operation of RC phase shift oscillator & list its limitations. 08  
 b) Compare class A, B, AB , C power amplifier. 07
- Q.8 a) Define Clipper & given its applications. 08  
 b) Explain the high frequency response of FET amplifier. 07
- Q.9 a) Explain class-B complementary symmetry amplifier. 08  
 b) Explain RC control blanking oscillator with neat diagram. 07
- Q.10 Define following terms. 15
- 1) Video Amplifier
  - 2) Class AB Amplifier
  - 3) Difference between Clippers & Clampers



Total No. of Printed Pages: 2

**SUBJECT CODE NO:- H-435**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE)**  
**Elective – I : Electrical Engineering Materials**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N. B

1. Q. No. 1 and Q. No. 6 are compulsory
2. Attempt any two questions from the remaining sections.

## Section A

- |      |  |          |
|------|--|----------|
| Q. 1 | Solve any five   | 10       |
|      | <ol style="list-style-type: none"> <li>a) State the working of PV cells.</li> <li>b) State the factors affecting breakdown strength.</li> <li>c) Define 'Ionization coefficient'.</li> <li>d) What is Pyro-electricity?</li> <li>e) State the application of <math>sf_6</math> gas.</li> <li>f) What is polarization?</li> </ol> |          |
| Q. 2 | <ol style="list-style-type: none"> <li>a) What is dielectric loss? Explain loss tangent &amp; its significance.</li> <li>b) Explain the construction, working &amp; applications of photo-emissive cells.</li> </ol>   | 08<br>07 |
| Q. 3 | <ol style="list-style-type: none"> <li>a) Explain the insulating material used for rotating machines.</li> <li>b) Explain the properties &amp; applications of transformer oil.</li> </ol>   | 08<br>07 |
| Q. 4 | <ol style="list-style-type: none"> <li>a) Give the classification of magnetic materials in detail with properties &amp; applications of each class.</li> <li>b) State the different breakdown mechanism. Explain any one of them.</li> </ol>   | 08<br>07 |
| Q. 5 | Write notes on (any three)   | 15       |
|      | <ol style="list-style-type: none"> <li>a) Asbestos and varnish</li> <li>b) Transformer oil</li> <li>c) Insulating resins</li> <li>d) Material used for power transformer's</li> </ol>  |          |

## Section B

- |      |  |    |
|------|--|----|
| Q. 6 | Solve any five.  | 10 |
|      | <ol style="list-style-type: none"> <li>a) Differentiate in between low &amp; high resistive materials.</li> <li>b) State applications of conductors.</li> <li>c) State the applications of Nano-tubes</li> <li>d) What is alloying?</li> <li>e) What is soldering material?</li> <li>f) What is super conductivity?</li> </ol> |    |



Total No. of Printed Pages:3

**SUBJECT CODE NO:- H-434**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E.( EEE)**  
**Electronics Devices & Circuits**  
**(Old)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

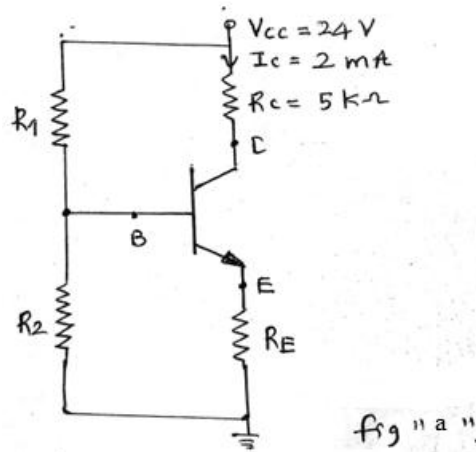
- N.B
1. Q.No.1 and Q.No.6 are compulsory
  2. Solve any two questions from each section from the remaining questions.
  3. Assume suitable data if necessary.

## Section A

- |     |  |          |
|-----|--|----------|
| Q.1 | Solve any five   | 10       |
|     | <ol style="list-style-type: none"> <li>a) What is the necessity of Rectifier?</li> <li>b) What is load regulation and line regulation?</li> <li>c) Draw transistor as an amplifier.</li> <li>d) What is power MOSFET?</li> <li>e) Draw voltage feedback biasing circuit.</li> <li>f) What is Q point?</li> <li>g) State advantages of RC coupled amplifier.</li> <li>h) Draw <math>\Pi</math> type filter.</li> </ol>  |          |
| Q.2 | <ol style="list-style-type: none"> <li>a) A full wave rectifier with a centre-tapped transformer supplies a d.c. current of 100 mA to a load resistance of <math>R = 20\Omega</math>. The secondary resistance of the transformer is <math>1\Omega</math>. Each diode has a forward resistance of <math>0.5\Omega</math>. Determine the following.               <ol style="list-style-type: none"> <li>i. RMS value of the signal voltage across each half of the secondary.</li> <li>ii. D.C power supplied to the load.</li> <li>iii. PIV rating of each diode</li> <li>iv. A.C power input to the rectifier</li> <li>v. Conversion efficiency.</li> </ol> </li> <li>b) Draw and explain the operations of half wave rectifier using capacitor filter. Draw input and output waveform.</li> </ol> | 08<br>07 |
| Q.3 | <ol style="list-style-type: none"> <li>a) Compare Enhancement MOSFET and Depletion MOSFET.</li> <li>b) Explain how transistor is tested by different methods.</li> </ol>   | 08<br>07 |

- Q.4 a) A silicon transistor with  $\beta = 100$  is to be used in self biasing circuit, such that Q point corresponds to  $V_{CE} = 12V, I_c = 2mA$ , find  $R_E$  if  $V_{CC} = 24 \text{ volt}$  and  $R_c = 5k\Omega$ .

08



- b) Explain self-biasing circuit for FET. State advantages and disadvantages.

07

- Q.5 Write notes on

15

- Diode voltage multiplier
- Early effect in Transistor
- R.C coupled amplifier

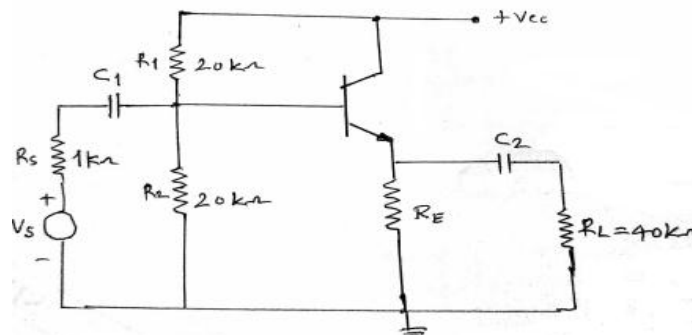
Section B

- Q.6 Answer the following (any five)

10

- What is DRIFT in amplifiers?
- What is positive feedback?
- Draw hybrid equivalent circuit of common emitter amplifier.
- What is Emitter follower circuit?
- State Miller's theorem.
- Draw class A power amplifier.
- What is Barkhausen criteria?
- What is Tuned amplifier?

- Q.7 a) Calculate the current gain  $A_I$ , voltage gain  $A_V$ , input resistance  $R_I$  and output resistance  $R_O$  for the common collector amplifier as shown in fig(b). The transistor parameters are  $h_{ic} = 1.4k\Omega$ ,  $h_{fc} = 100$ ,  $h_{rc} = 20\mu A/v$ . 08



fig(b)

- b) Draw and explain the operation of transformer coupled amplifier. State advantages and disadvantages. 07
- Q.8 a) Explain the effect of negative feedback on gain, input and output impedance, Noise and Distortion of amplifier. [Give some derivation treatments] 08
- b) What is differential amplifier? Explain. 07
- Q.9 a) Explain the effect of Junction capacitance in high frequency amplifiers. 08
- b) Draw and explain the operation of push pull class B amplifier. State advantages, 07
- Q.10 Write notes on 15
- Double tuned amplifier
  - CEYSTAL oscillator
  - RC oscillator