Code No.: **30401/40401** MR13 & MR14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **ELECTRONIC DEVICES AND CIRCUITS**

Branch: **Common to EEE & ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I . Answer all the questions 5x1M=5 Marks

1.What is sweep time in CRO?
2. Explain the term 'dynamic resistance'?
3. Define form factor?
4. Define pinch-off voltage?
5. what is meant by bias stability?

II. Answer all the questions 10x2M=20 Marks

1. Prove that the path of an electron in electric field is a parabola?
2. What is a Fermi level?
3.Explain Avalanche breakdown?
4. Define the term diffusion capacitance C_D of a diode?
5. List the applications of a photo diode?
6. Which type of diode capacitance is used in Varactor diode?
7. Write short notes on large signal current gain?
8. Why we call FET as a voltage controlled device?
9. What do you mean by biasing for zero current drift?
10.What are the different biasing methods of JFET?

PART-B

Answer all questions **5x10 Marks= 50Marks**

1. i) Explain the function of vertical deflection system in a CRO with block diagram?
   ii) Explain about electrostatic deflection sensitivities? [5+5]

(or)

2. i).Derive the expressions for acceleration, velocity of a charged particle placed in an electric field E?
   ii) Derive the expression for continuity equation? [5+5]
3. i) Explain V-I charecteristics of a PN junction diode?
   ii)Explain how a barrier potential is developed at the PN junction? [6+4]

(or)

4. Explain the switching charecteristics of diode with the help of simple diode circuit? [10]
5. Explain the V-I charecteristics of tunnel diode with negative resistance region.state the applications? [10]

(or)

6.Derive the expressions for Ripple factor,Regulation and Rectifier Efficiency for Half wave Rectifier? [10]
7.Explain the input and output charecteristics BJT in CB configuration? [10]

(or)

8.With a neat sketch explain the drain source charecteristic and transfer charecteristics of enhancement type MOSFET? [10]
9. Calculate the quiescent current and voltage of collector to base bias arrangement using the following data: V_{cc}=10v, R_b=100KΩ, R_C=2KΩ, β=50 and also specify avalue of R_b so that V_{CE}=7V? [10]

(or)

10.What are requirements of FET biasing? verify these requirements in source self bias circuit? [10]

Code No.: **40341** MR 14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Fluid Mechanics And Hydraulic Machinery**

Branch: **EEE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. Distinguish between a ideal fluid and real fluid
2. What is the expression for loss of head due to sudden contraction?
3. Define Impact of jet
4. Define impulse turbine
5. Write an expression for the specific speed for centrifugal pump.

II. Answer All Questions **10x2Marks=20Marks**

1. What is the principle of manometers, while measuring the pressure?
2. Write the relation between absolute pressure, atmospheric pressure and gauge pressure.
3. Define pressure head, velocity head, and elevation head for a fluid stream and express them for a fluid stream whose pressure is P, velocity is V, and elevation is z.
4. Draw a neat sketch of Pitot tube and write its uses
5. What are the different types of hydropower plants?
6. What is mass curve and its uses?
7. Define the specific speed of turbine
8. Define the term governing of turbine.
9. What is the significance of priming in centrifugal pump?
10. State the significance of characteristics curves of a centrifugal pump.

PART-B

Answer all questions **5x10 Marks= 50Marks**

1) a) Distinguish between U-tube differential manometers and inverted U-tube differential manometers. Discuss their applications.

   b) Define compressible and incompressible fluid. What is specific gravity? How it is related to density?

(OR)

2) a) Define streamline, path line and streak line. And what do these lines indicate? How the streak lines differ from stream lines?

   b) The hydraulic lift in a car repair shop has an output diameter of 300 mm and is to lift cars up to 20kN. Determine the fluid gauge pressure that must be maintained in the reservoir.

3) State the Bernoulli's theorem for steady flow of an incompressible fluid. Derive expression for Bernoulli's theorem from the first principles and state the assumptions made.

(OR)

4) a) Derive an expression to find out the discharge through a venturimeter.

b) A venturimeter with 150mm diameter at inlet and 100mm at throat is laid with its axis horizontal and is used for measuring the flow of oil specific gravity 0.9. The oil mercury differential manometer shows a guage difference of 200mm.Calculate the discharge. Assume the coefficient of venturimeter as 0.98

5) A jet of water having a velocity of 35m/s impinges on a series of vanes moving with a velocity of 20 m/s. The jet makes an angle of 30^0 to the direction of motion of vanes when entering and leaves at an angle of 120^0. Draw the velocity triangles at inlet and outlet and find

a. The angles of vanes tip so that water enters and leaves without shock.
b. The work done for N of water entering the vanes and
c. The efficiency

(OR)

6) a) What are the different types of hydropower plants? Describe each one briefly? [6]

b) Explain various components of hydro power plants [4]

7) Design a Francis turbine for the given data; Gross head available is 100m; Losses in the penstocks is 14% of gross head; Speed of the turbine is 750 rpm; Output power developed is 450kw; hydraulic efficiency is 96% and overall efficiency is 85%. Assume 5% of the circumferential area of the runner is occupied by the thickness of vanes. The velocity of flow remains constant throughout. Assume any missing data suitably.

(OR)

8) a) What is a draft tube? Why it is used in a reaction turbine? Explain with neat Sketch two different types of draft tubes [6]

b) Discuss the working proportions of a Pelton wheel turbine [4]

9) a) What is specific speed of a centrifugal pump and obtain the expression for the same? [4]

b) A centrifugal pump has an impeller 45 cm in diameter running at 450rpm. The discharge at inlet is entirely radial. The velocity of flow at outlet is 1.2m/s. The vanes are curved backwards at outlet at 30^0 to the wheel tangent. If the discharge of the pump is $0.15 m^3$/sec. calculate the impeller power and the torque on the shaft. [6]

(OR)

10) a) Find the number of pumps required to lift water from a deep well under a total head of 89 m. All the pumps are identical and are running at 800 r p m. The specific speed of each pump is given as 25 while the rated capacity of each pump is 0.16 m^3/s. [6]

b) What are the operating characteristic curves of a centrifugal pump? Explain them. [4]

MR 14

Code No.: **40M04**

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Mathematics-IV**

Branch: **Common to EEE & ECE**

Time: 3 hours **Max. Marks: 75**

I. Answer All Questions **5x1Mark=5Marks**

1) In which case Frobenius method is preferred.
2) Write the Legendre's equation.
3) State necessary and sufficient conditions for f(z) to be analytic in Cartesian Co ordinates.
4) Write Taylor's series expansion of Cos Z.
5) Define conformal mapping.

II. Answer All Questions **10x2Marks=20Marks**

1) Write the working procedure to solve the differential equations.
2) Write the complementary function for $\frac{d^2y}{dx^2}+a^2y=\sec ax.$
3) Write the value of $[J_{\frac{1}{2}}(x)]^2+[J_{\frac{-1}{2}}(x)]^2$
4) Write the formula of generating function for $J_n(x)$.
5) Show that f(z) = xy + iy is everywhere continuous but not analytic.
6) State generalized Cauchy's integral formula.
7) Find the poles for $f(z)=\frac{Z^2}{(Z-1)(Z+2)^2}$.
8) Find the residue for $f(Z)=\frac{Z}{Z^2-4}$.
9) Define bilinear transformation.
10) Write the cross ratio property of four points.

PART-B

Answer all questions **5x10 Marks= 50Marks**

1. Solve in series $xy''+2y'+xy=0$ by using Frobenious method.

(OR)

2. Solve in series $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+4y=0$

3. Prove that $\frac{d}{dx}[xJ_n(x)J_{n+1}(x)] = x[J^2{}_n(x) - J^2{}_{n+1}(x)]$

(OR)

4. Express $x^3 + 2x^2 - x - 3$ in terms of Legendre polynomials.

5. Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}dz$ where C is the circle $|z| = 3$.

(OR)

6. Find a and b if $f(z) = (x^2\text{-}2xy + ay^2) + i\,(bx^2\text{-}y^2 + 2xy)$ is analytic. Hence find f(z) in terms of Z.

7. Obtain the Taylor series expansion of $f(z) = \frac{e^z}{z(z+1)}$ about $Z = 2$.

(OR)

8. Show that $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta} = \frac{2\pi}{\sqrt{3}}$.

9. Find the bilinear transformation which maps the points *(2, i ,-2)* in to the points *(1, i, -1)*.

(OR)

10. Find the image of the domain in the Z –plane to the left of the line x= - 3 under the transformation $w = z^2$.

Code No.: 30201/40201

MR13 & MR 14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Electrical circuits**

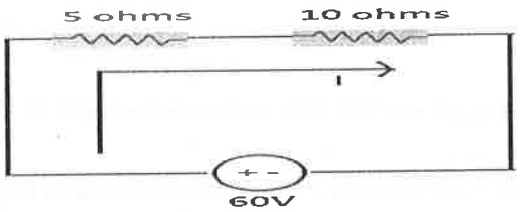
Branch: **Common to EEE & ECE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. Find the voltage across the two resistances for the given circuit.



2. Explain the significance of J notation.
3. Define Magnetic flux Density.
4. Define oriented Graph.
5. Write the limitations of super position theorem.

II. Answer the following. **10x2M=20 Marks**

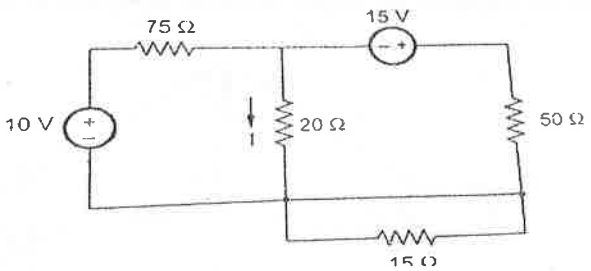
1. Write short notes on super node and super mesh.
2. Write Short notes on Source Transformation.
3. Explain about Active, Reactive and Apparent powers.
4. Derive the Expression for Complex power.
5. State and explain the laws of Magnetism.
6. Derive the relation between M.M.F, Reluctance and the flux.
7. Write down the Procedure to construct the Dual of Network.
8. What is an Incidence Matrix? What are the properties of complete incidence matrix?
9. State Reciprocity theorem?
10. Explain Tellegen's Theorem for D.C Excitations?

PART-B

Answer all questions **5x10 Marks= 50Marks**

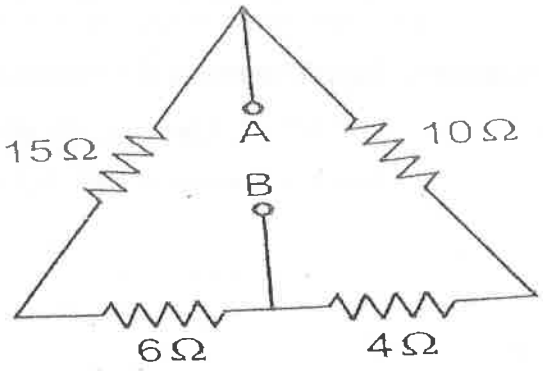
1. a) Derive the VI Relationships for Passive Elements? [4+6]

b) For the circuit shown in fig find the current through 20 Ω Resistance.



2. a) Explain the voltage division and current division rules. [5+5]

b) Find the Equivalent Resistance between points A-B.



3. a) Find the R.M.S value of i) v(t)=25coswt+15sinWt [5+5]

ii) i(t)=100sinwt-10cos2wt

b) Derive the Expression for i(t) for R-L series circuit when Excited by a sinusoidal source.

(OR)

4. An Inductive coil having a resistance of 20 Ω and an inductance of 0.02 H is connected in series with 0.02μF calculate [10]

i) Resonant frequency? ii) Q factor of coil iii) Half power frequencies.

5. a) Explain Dot convention with neat circuit diagram. [4+6]

b) Two similar coils connected in series give a total inductance of 600 mH and when one of the coils is reverse, the total inductance is 300 mH. Determine mutual inductance and coefficient of coupling.

(OR)

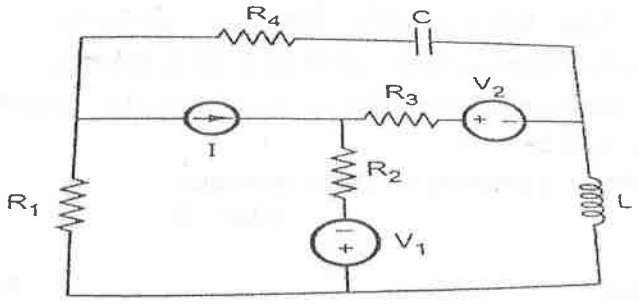
6. a) Derive an Expression for coefficient of coupling. [4+6]

b) If a coil of 800 μH is magnetically coupled to another coil of 200 μH.The coefficient of coupling between two coils is 0.05. Calculate inductance if two coils are connected in,

i) Series aiding ii) Series opposing iii) Parallel aiding iv) Parallel opposing

7. a) Differentiate between Planar and non-planar graph with suitable example. [4+6]

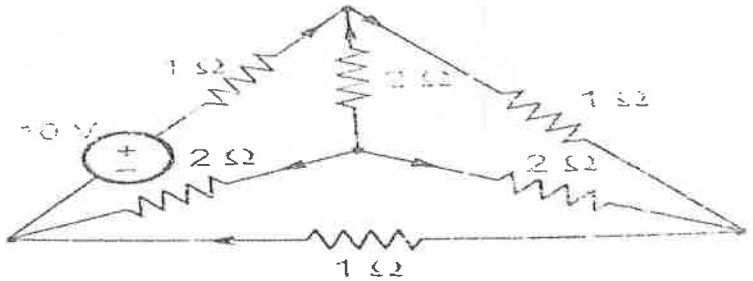
b) Draw dual network of the given planar network as shown in the fig.



(OR)

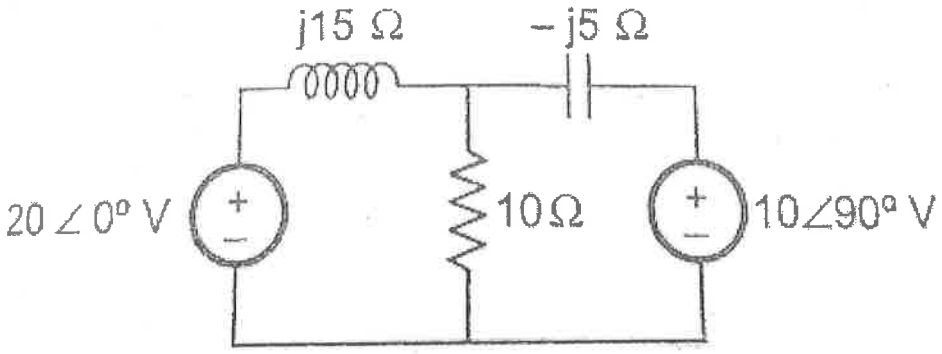
8. a) Define Basic cutest with an example. [4+6]

b) For the circuit shown in fig draw the graph and write down the tie set matrix.



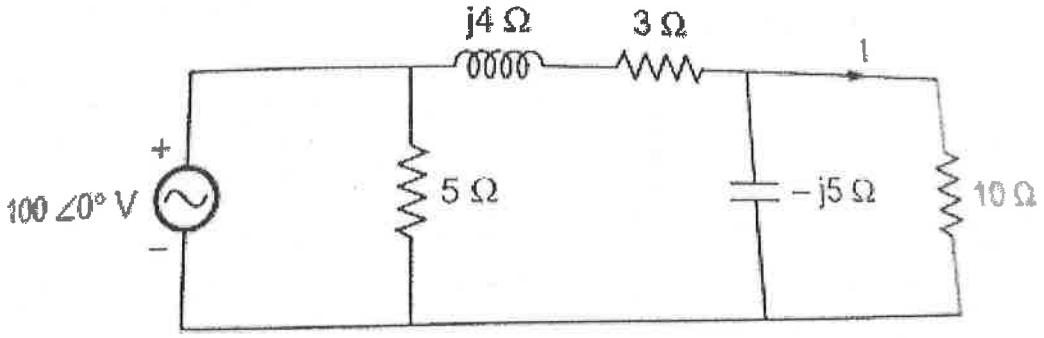
9. a) State and explain Millimans Theorem. [4+6]

b) Determine the current through 10Ω resistance of the network shown in fig by using superposition theorem.



(OR)

10. Verify the reciprocity theorem for the network shown in fig. [10]



Code No.: **40202** MR 14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **Electromagnetic Fields**

Branch: **EEE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. Define Gauss's law?
2. Show that Polarization is dimensionally equal to c/m^2
3. What is the main objective of oersted's experiment?
4. Define Poisson's equation?
5. Explain Neumann's formula

II. Answer All Questions **10x2Marks=20Marks**

1. Define Stokes theorem?
2. State and explain Coulombs law of electrostatics. What are limitations?
3. Find electric field E at (0, 3, 4) in Cartesian co-ordinate system due to point charge Q=0.5 μC at (0, 0, 0).
4. What is meant by boundary conditions for electric and magnetic fields?
5. Write Maxwell equation in sinusoidal variation.
6. Define Ampere's circuit law?
7. Express the magnetic vector potential directly in terms of source current.
8. Define vector magnetic potential?
9. Define self and mutual inductance.
10. Define Faraday's laws of Induction and Lenz's law?

PART-B

Answer all questions **5x10 Marks= 50Marks**

Q1. a) State and prove divergence theorem

b) Determine laplacian of scalar field $A=x^2y+xyz$.

(OR)

Q2. a) Mention the properties of a potential function?

b) Derive an expression for EFI due to an infinite surface charge density

Q3. a) Derive Ohms law in point form .Also mention its significance

b) Explain Equation of continuity

(OR)

Q4. a) Derive an expression for energy stored in the electrostatic field in terms of E and D?

b) Obtain the expressions for the electric field and the potential due to a small electric Dipole oriented along z-axis.

Q5. a)what is the inconsistency in Amperes law? How it is rectified by Maxwell?

b) A parallel plate capacitor with plate area of $5cm^2$ and plate separation of 3mm has a voltage 50sin103t V applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$.

(OR)

Q6. a) Define Maxwell's equations in point form for time varying fields.

(b) Prove $\nabla \times E = {}^{\partial B}/_{\partial t}$

Q7. a) Derive Poisson's equation for homogeneous region.

b) Find the magnetic field about a long straight wire with current flow 'F' by means of the vector potential.

(OR)

Q8. Explain the nature of line, surface and volume current distributions as applicable to static magnetic fields list out the expressions for the magnetic field intensity in these three cases

Q9. Write short notes on:

a) Poynting Theorem

b) Modify Maxwell's equation for time varying fields

(OR)

Q10. a) Calculate the self-inductance per unit length of an infinitely long solenoid

b) Derive the expression for induced emf.

$$e=\int_s \frac{\partial \overline{B}}{\partial t}.d\overline{s} + \oint(\overline{V}x\overline{B}).d\overline{L}$$

Code No.: **40203** MR 14

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.

II B.Tech I Semester Supplementary Examinations, NOVEMBER-2017

SUBJECT: **ELECTRICAL MACHINES-I**

Branch: **EEE**

Time: 3 hours **Max. Marks: 75**

PART – A

I. Answer All Questions **5x1Mark=5Marks**

1. State the co energy of a energy conversion device [1M]
2. What for brushes are employed in dc machines? [1M]
3. What is the purpose of compensating winding in a dc machine? [1M]
4. Which method we must adopt to control the speed of a dc shunt motor below the base speed? [1M]
5. What are the possible causes of sparking at brushes. [1M]

II. Answer All Questions **10x2Marks=20Marks**

1) Write any two applications of singly excited electromechanical energy conversion devices [2M]
2) In what way Electromagnetic torque develops in an electrical machine [2M]
3) Write any two characteristics of simplex Wave winding. [2M]
4) Draw the Magnetisation curve for DC machine [2M]
5) Is equalizer bar needed for parallel operation of under compounded generators? Justify [2M]
6) What are the conditions for self excitation for a series wound dc generator [2M]
7) Write the Expression of developed torque in dc series motor. [2M]
8) Why a dc series motor should not be started on no-load? [2M]
9) What are speed control methods used for dc motors? [2M]
10) Mention the disadvantage of Hopkinson's test [2M]

PART-B

Answer all questions **5x10 Marks= 50Marks**

1) a) Explain the principle of energy conversion [6M]
b) Establish the relation between electromagnetic torque, mechanical torque and frictional torque [4M]

(OR)

2) a) Explain about Multi excited system [7M]
b) Derive the Magnetic force in doubly excited field system [3M]

3) a) Explain principle and operation of DC generators with neat sketches. [6M]

b) Explain clearly the function of the following in dc machines (i) Compensating windings (ii)interpoles [4M]

(OR)

4) An 8 pole lap wound armature rotated at 350rpm is required to generate 260V.The useful flux per pole is about 0.05Wb.If the armature has 120 Slots. Calculate a suitable number of conductors per slot and hence determine the actual value of flux required to generate the same voltage. [10M]

5) Sketch and explain the complete load characteristics of a dc series generator and indicate there in the region of operation of the machine as a voltage booster and as a current source. [10M]

(OR)

6) a) Explain the working of equalizer bar in parallel operation of dc series generators. [4M]

b) A 500V, 250kW, long shunt compound generator induces an emf of 480V when running at 1000 rpm no on load. On full load the speed of the machine drops to 975rpm,the flux increases by 15% and the terminal voltage rises to 500V.if the series and shunt field resistances are 0.02 Ω and100 Ω respectively. Calculate the armature resistance. Assume a voltage drop of 1V per brush. [6M]

7) a) Discuss and compare various methods of electric braking. [6M]

b) Draw the speed-current, torque-current and speed-torque characteristics of dc series motor. [4M]

(OR)

8) a) A dc series motor, with unsaturated magnetic circuit and negligible resistance, when running at a certain speed on a given load takes 50A at 500V.If the load torque varies as the cube of the speed, find the resistance to be inserted to reduce the speed by 50%. [5M]

b) Explain the necessity of starter in a dc motor and describe three point starter with neat sketch. [5M]

9) a) Write short notes on field test for dc series machines. [5M]

b) Describe all types of losses in a shunt and compound wound generator. State which comprise constant loss. [5M]

(OR)

10) a) Derive the condition for maximum efficiency of a dc generator. [4M]

b) Describe about regenerative testing [6M]