

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, EXAMINATIONS,
DECEMBER-2018**Subject: Electromagnetic Fields

Branch: EEE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. How the unit vectors are defined in cylindrical co- ordinate system?
2. Define polarization.
3. Write equation for torque acting on the rectangular loop.
4. Write expression for force on a current carrying element in a magnetic field.
5. What is displacement current density?

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Convert the given rectangular co-ordinate A ($x = 3, y = 2, z = 2$) into corresponding cylindrical coordinates.
2. Find the force between two charges, $30\mu\text{C}$ and $-30\mu\text{C}$ situated at $(0, 1, 2)$ m & $(2, 0, 0)$ m, respectively in free space.
3. Write boundary conditions for electric field.
4. Electric field inside a conductor is zero. Justify.
5. State Ampere's circuital law. Give any two applications
6. Write Lorentz force equation for a moving charge.
7. What are the limitations of scalar magnetic potential?
8. Define vector magnetic potential. Write its applications.
9. Write the expressions for energy stored and energy density in magnetic field.
10. Calculate the inductance of a ring shaped coil having a mean diameter of 20 cm wound on a wooden core of 2 cm diameter. The winding is uniformly distributed and contains 200 turns.

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. (a) Determine divergence and curl of the given field $\vec{F} = 20 \vec{a}_x + 3xy \vec{a}_y + 3xz^2 \vec{a}_z$ at a point $(0.5, 1, -1)$ and hence state the nature of the field.

(b) Find curl \vec{H} , if $\vec{H} = (5 \rho \cos\phi \vec{a}_\rho - 2 \rho \sin\phi \vec{a}_\phi + 3 \vec{a}_z)$.**(OR)**

2. What are the different types coordinating systems. Explain?

Q3. (a) Derive an expression for potential due to infinite uniformly charged line and also derive potential due to electric dipole.

(b) Drive an expression for energy density in an Electrostatic field.

(OR)

4. Derive the expression for capacitance of following capacitors

(a) Spherical capacitors.

(b) Co-axial capacitors.

5. (a) Obtain the expression for magnetic field intensity at the center of the Square loop wire. [6M]
 (b) A steady amount of 'I' A flows in a conductor is bent in the form of square loop of side 'a'. What is the field 'H' at the centre? [4M]

(OR)

6. (a) Derive the expression for MFI due to an infinite sheet carrying a current 'I'.
 (b) State and Prove Biot-Savart's Law
7. (a) Obtain the expression for force between two parallel current carrying conductors when current flowing them in (i) same direction (ii) opposite direction. [6M]
 (b) Find the force between two long conductors A & B are separated by 5cm in air and carrying current of 40 A.
 i) In the same direction ii) In Opposite direction. [4M]

(OR)

8. Derive the expression for torque on rectangular loop placed in a magnetic field 'B'.
9. (a) Derive the expression for mutual inductance between square loop wire and long straight conductor place in a same plane.
 (b) A uniformly wound solenoid of 500 turns is 1m long and 15 cm diameter is allowing to flows a current of 1.5 A. Determine
 i) Flux density 'B' ii) Energy density 'W' iii) Inductance of solenoid 'L'

(OR)

- 10 (a) What is toroid? Derive the expression for self-inductance of toroid. [6M]
 (b) A toroid is made of closed iron ring would with 300 turns of insulated 'Cu' wire. The cross sectional area of ring is 5 cm^2 . The mean radius of the ring is 10 cm. $\mu_r = 1000$. Find 'L' of toroid of coil. [4M]

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018Subject: Electrical Machines-IBranch: **EEE**Time: **3 hours**Max. Marks: **75****PART – A****I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. What is electromagnetic conversion?
2. Write EMF equation of Dc generator
3. Draw Load Characteristics of DC generator
4. Explain the action of coupling medium in case of motor
5. Why starter necessary for a dc motor

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Give applications of Singly excited system?
2. equation of multi excited magnetic system?
3. Define the simplex lap winding and wave winding.
4. What is the process of commutation?
5. Define critical resistance and critical speed
6. Derive the output equation of DC machine
7. Discuss the significance of back e.m.f. in a d.c. motor
8. Compare the merits and demerits associated with each method of speed control of dc motor?
9. List the advantages and disadvantages of high number of poles in dc machine?
10. Explain Regenerative braking?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. a) What are the significances of energy and co-energy in Energy conservation system?
b) Derive expression for the magnetic force developed in linear electromagnetic system

(OR)

2. a) Derive expressions for field energy, co-energy and magnetic force in a singly excited electromechanical unit.
b) Derive an expression for reluctance torque in a rotating electrical machine

3. Explain open circuit characteristics of DC generator and also explain how to find critical speed of DC generator.

(OR)

4. Explain the different methods of excitation and characteristics of DC generators with suitable diagrams.
5. Explain experimental determination of critical field resistance for a self excited generator?

(OR)

6. A 10 kW, 250 V d.c. shunt generator has total no-load rotational loss of 400 W. The armature circuit resistance and shunt field resistances are 0.5Ω and 250Ω respectively. Calculate the shaft power input and the efficiency at rated load?

7. Describe and compare various methods of speed control of dc motors?

(OR)

8. Explain the construction and operation of 3-point starter used for starting of d.c. motor?
9. Explain the 4-point ^{starter} and discuss different protective devices are in starter?

(OR)

- 10 How to conduct Swinburne's test in shunt motor? Why Swinburne's test is not applied to dc series motor?

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1. Write the units of Kinematic Viscosity.
2. Define law of conservation of momentum.
3. A jet of water 5 cm, in diameter, issues with a velocity of 20m/sec and impinges a stationary flat which destroys in forward motion. Find the force exerted by the jet on the plate.
4. Write the difference between turbine and pump.
5. What is priming

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Explain weight density.
2. Distinguish between Rotational and Irrotational flow
3. Draw a neat sketch of Pitot tube and write its uses
4. Define potential head and velocity head
5. Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of jet.
6. A Nozzle of 5cm diameter delivers a stream of water at 20m/sec perpendicular to a plate that moves away from the jet at 5m/sec. Find the force on the plate, the work done and efficiency of jet
7. Write the differences between impulse and reaction turbines
8. What are unit quantities?
9. State the significance of characteristics curves of a centrifugal pump
10. How does the specific speed of a centrifugal pump differ from that of a turbine?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. a) Derive the equation of continuity in 1-Dimensional flow by writing the assumptions. (4M)
- b) For a 3-dimensional flow the velocity distribution is given by $u = -x$, $v = 3-y$ and $w = 3-z$.
What is the equation of stream line passing through point (1,1,2). (4M)
- c) Define rotational and irrotational flow with examples. (2M)

OR

2. a) Define viscosity and derive the equation of viscosity with standard notations. (5M)
- b) An inverted U tube differential manometer containing oil of specific gravity 0.9 is connected
to find the difference of pressure between two points of a pipe which contains water. If the manometer reading is 400 mm, find the difference of pressures. (5M)

3. a) Derive equation for sudden enlargement of a pipe with standard notations.
 b) A piping system consists of three pipes arranged in series: the lengths of the pipes are 1200 m, 750 m and 600 m and diameters are 750mm, 600mm and 450mm respectively.
 - i) transform the system in to an equivalent 450mm diameter pipe and
 - ii) determine the equivalent diameter for the pipe of length 2550m.

OR

4. a) Derive the Euler's equation of motion along a stream line with assumptions. (5M)
 b) 360 liters / sec of water is flowing in a pipe and the pipe is bent by 120° . The pipe bend measures 360mm X 240mm and volume of bend is 0.14m^3 . The pressure at the entrance is 72KN/m^2 and the exit is 2.4m above the entrance, find the force exerted by the water on the bend. (5M)
5. A jet of water having a velocity of 35 m/ sec impinges on a series of vanes moving with a velocity of 20 m/sec. The jet makes an angle of 30° to the direction of motion of vanes when entering and leaves at an angle of 120° . Draw the velocity triangles at inlet and outlet and find (i) the angles of vane tips so that water enters and leaves without shock.(ii) The workdone per N of water entering the vane, and (iii) efficiency.

OR

6. A jet of water moving at 12 m/ sec impinges on a concave shaped vane to deflect the jet through 120° when stationary. The vane is moving at 5 m/sec. Draw the velocity triangles at inlet and find (i) the angle of jet at inlet so that there is no shock.(ii) The absolute velocity of the jet at exit both in magnitude and direction and (iii) The work done per second per N of water. Assume vane is smooth.
7. Laboratory tests were conducted on a 1/5 scale model of a Francis turbine under a head of 3m and indicated that it could develop 5KW power when operating at 450mm. Determine the speed and power developed by a full size turbine when working under a head of 30m.

OR

8. 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.
9. The inner and outer diameter of the impeller of a centrifugal pump are 250 mm and 500 mm. The velocity of flow through the impeller is constant and 5m/sec. Taking outlet vane angle as 45° ; find inlet vane angle, absolute velocity of water at outlet, power available at the pump when it is running at 1200 rpm and discharge is $0.2\text{ m}^3/\text{sec}$. [10]

OR

10. A centrifugal pump impeller has diameter of 60cm and width of 6cm at the outlet. The pumps at 1450rpm and delivers $0.8\text{m}^3/\text{sec}$ against a head of 80m. The leakage loss after the impeller is 4 percent of discharge, the external mechanical loss is 10kw and the hydraulic efficiency is 80%. Determine the blade angle at outlet, the power required and the overall efficiency of the pumps.

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II B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018Subject: Electronic Devices And CircuitsBranch: **EEE****Time: 3 hours****Max. Marks: 75****PART – A****I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. Write applications of CRO?
2. Define Fermi level?
3. What is the cut in voltage for Zener Diode?
4. Derive the Peak Inverse Voltage (PIV) across the diode in full wave Rectifier?
5. Write the different types of biasing techniques?

II. Answer ALL questions of the following**10x2Mark=20 Marks**

1. Draw the block diagram of CRT?
2. What is Hall Effect?
3. Mention some applications of PN Diode?
4. Define Zener break down and Avalanche break down Mechanisms?
5. Draw the basic Structure of Full Wave Rectifier?
6. What is meant by Tunneling?
7. What is Q-point?
8. What are the different features of FET?
9. Define biasing and load line?
10. Write different types of Bias compensation Techniques?

PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. (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]

(OR)

2. Explain the operation of CRO with neat diagram?

(10M)

3. i) Sketch V-I Characteristics of PN Junction Diode for Forward bias voltage.

ii) Distinguish between Static and Dynamic Resistance.

(5+5)

(OR)

4. i) With the help of necessary sketches explain the potential distribution in an open circuited PN junction?

ii) Determine the value of forward current in the case of a p-n junction diode, with $I_0 = 10\mu A$, $V_F = 0.8V$ at $T = 300^\circ K$. Assume silicon diode

[5+5]

5. (a) With neat sketches explain the V-I Characteristics of ZENER Diode?

(b) Draw the circuit diagram of Half Wave rectifier and derive expressions for ripple factor and efficiency of a half wave rectifier.

[5+5]

(OR)

6. Describe the following briefly

i) Principle of operation of a photodiode?

ii) Energy band structure and V-I characteristics of a tunnel diode?

[4+6]

7. (a) Draw the input and output characteristics of Common Base Configuration.

(b) Determine the values of I_C and I_E or transistor circuit of $\beta = 200$ $I_B = 0.125mA$.

[5+5]

(OR)

8. Give the constructional details of N-Channel JFET and explain the operation.

(10)

9. (a) What is meant by Stability Factor 'S'? Derive the expression for Stability Factor 'S'.

(b) What is meant by Thermal Runaway?

[5+5]

(OR)

10 (i) Explain how the biasing is provided to FET through voltage divider bias with circuit analysis?

(ii) A self biased P-channel JFET has a pinch-off voltage of $V_P = 5V$ and $I_{DSS} = 12mA$. The

supply voltage is 12V. Determine the values of R_D and R_S so that $I_D = 5mA$ and $V_{DS} = 6V$ [5+5]

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Branch: Common to EEE & ECE

Time: 3 hours

Max. Marks: 75

PART – A**I. Answer ALL questions of the following**

5x1Mark=5 Marks

1. Define ordinary point.
2. Write the Legendre's differential equation
3. Find K such that $u(x,y) = x^3 + 3kxy^2$ may be harmonic
4. Obtain the Taylor series expansion of $f(z) = \frac{1}{z}$ about the point $z = 1$
5. Define Translation and Rotation.

II. Answer ALL questions of the following

10x2Mark=20 Marks

1. Write the working procedure to solve the Cauchy Euler differential equations.
2. Determine whether $x=0$ is a regular singular point or irregular singular point of the differential equation $x^2y'' + y' + x^2y = 0$.
3. Define Legendre's polynomial $P_n(x)$
4. Show that $P_n(1) = 1$
5. Determine P such that the function $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1}\left(\frac{y}{x}\right)$ be an analytic function.
6. Prove that the function $f(z) = \bar{z}$ is not analytic at any point
7. Find the poles for $f(z) = \frac{z^2}{(z-1)(z+2)^2}$
8. What type of singularity have the function $F(z) = z e^{\frac{1}{z^2}}$
9. Under the transformation $W = \frac{1}{z}$ find the image of the circle $|z - 2i| = 2$
10. What is the region of the w-plane into which the rectangular region in the Z-plane bounded by the lines $x = 0, y = 0, x = 1, y = 2$ is mapped under the transformation $w = z + (2-i)$?

PART-B**Answer ALL questions of the following**

5x10 Marks= 50Marks

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

OR

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

3. Express $2 - 3x + 4x^2$ in terms of Legendre's polynomial

OR

4. a) Prove that $\frac{d}{dx} [xJ_n(x)J_{n+1}(x)] = x[J_n^2(x) - J_{n+1}^2(x)]$ [4M]

b) Derive Rodrigue's formula. [6M]

5. If $V = x^2 - y^2 + \frac{x}{x^2 + y^2}$ is imaginary part of an analytic function, find the analytic function and its real part.

OR

6. State and prove Cauchy's integral formula

7. By integrating around a unit circle, Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 - 4\cos\theta} d\theta$

OR

8. a) Expand $f(z) = \frac{1+2z}{z^2+z^3}$ in a series of positive and negative powers of Z

b) Evaluate $\int_c \frac{ze^z}{z(z-3)} dz$ where c is $|z|=2$ by residue theorem

9. Find the image of the hyperbola $x^2 - y^2 = 1$ under the transformation $w = \frac{1}{z}$

OR

10. Find the bilinear transformation which maps the points $z = \infty, i, 0$ onto the points $W = 0, i, \infty$.

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DECEMBER-2018**Subject: ELECTRICAL CIRCUITS

Branch: Common to EEE & ECE

Time: 3 hours

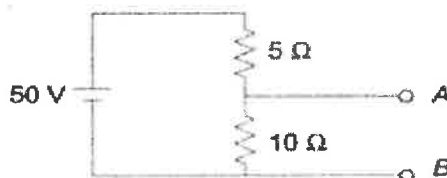
Max. Marks: 75

PART – A**I. Answer ALL questions of the following****5x1Mark=5 Marks**

1. Illustrate the Voltage-Current relationship for resistor, inductor and capacitor?
2. Define Active power and Reactive power?
3. Define self and mutual inductance of the coil?
4. Define Tie-set and cut-set?
5. Illustrate the statement of Norton's theorem (AC)?

II. Answer ALL questions of the following**10x2Mark=20 Marks**

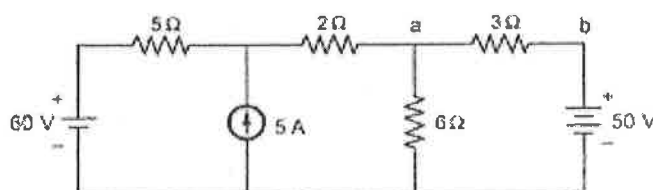
1. What is the voltage across 10Ω resistor for the circuit shown in the figure?



2. Define R,L,C parameters and give the expressions for current and voltages?
3. What is J operator. Explain the significance of J operator?
4. Define Q-factor and Band width?
5. What is meant by dot convention?
6. Two identical coupled coils have an equivalent inductance of 60mH when connected in series aiding and 30mH in series opposing. Find L_1 , L_2 , M and K?
7. Define graph, node and degree of a node?
8. Write the properties of dual networks?
9. Illustrate the statement of Thevenin's theorem (DC)?
10. Illustrate the statement of Maximum Power Transfer theorem (DC) and What its Maximum Power condition?

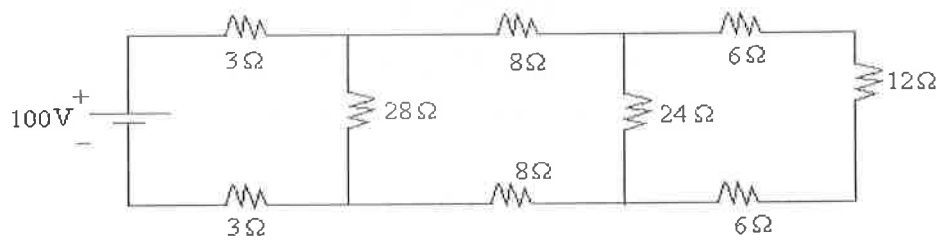
PART-B**Answer ALL questions of the following****5x10 Marks= 50Marks**

1. Find the current through branch a-b by using mesh analysis for the circuit shown in the figure?

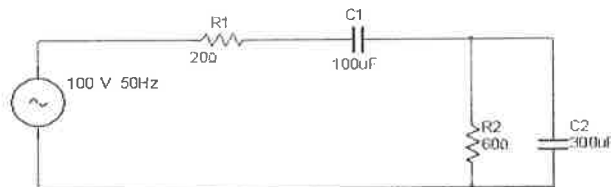


(OR)

2. Find the current delivered by the source for the network shown in the figure by using network reductions technique?

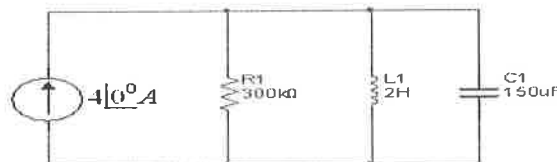


3. For the circuit shown in the figure. Calculate i) Impedance ii) Total current iii) Phase angle



(OR)

4. For the network shown in the figure. Find i) Resonance frequency ii) Current in all branches. iii) Quality factor.



5. Derive an expression for parallel opposing of coupled coils?

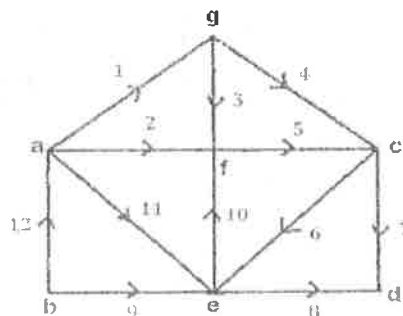
(OR)

6. An iron ring of 20cm in diameter and 15cm^2 in area of cross section is wound with coil of 400 turns. Determine the current in the coil to establish a flux density of 1.5wb/m^2 . If the relative permeability of iron is 800. In case if an air gap of 2.5mm is cut in the ring, what is the current in the coil to establish the same flux density. Neglect leakage flux.

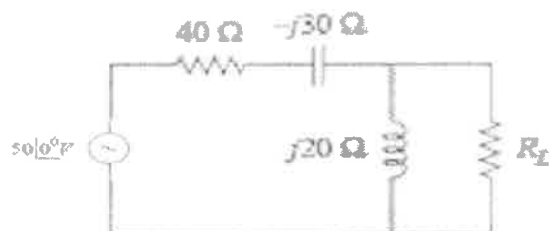
7. Explain the procedure for obtaining fundamental cut-set matrix of given network.

(OR)

8. a) Explain about loop method of analysis of networks with dependent and independent sources?
b) For the following graph draw all the possible trees and all possible loops. a,b,c,d,e,f,g are the nodes of the graph?



9. Find the value of R_L by using maximum power transfer theorem? And also find the value of maximum power?



(OR)

- 10 Find the current through load resistor R_L by using Millman's theorem for the circuit shown below?

