

**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 II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **SPECIAL FUNCTIONS & COMPLEX VARIABLE**Branch: **COMMON TO EEE,ECE**Time: **3 hours**Max. Marks: **60****PART – A**Answer **ALL** questions of the following**5x2M=10 M**

1. Evaluate  $\int_0^\infty e^{-x^2} dx$  using  $\beta$  and  $\Gamma$  functions.
2. Prove that  $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x$ .
3. Prove that the function  $f(z) = 3x - 4y + i(4x + 3y)$  is analytic.
4. Consider the region  $1 \leq |z| \leq 2$ . If B is the positively oriented boundary of this region, then find  $\int_B \frac{dz}{z^2(z^2+16)}$ .
5. Find the residue of  $f(z) = \frac{1}{z^2 \sinh z}$  at  $z = 0$ .

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

1. a) Define Beta function and Show that  $\beta(m, n) = \int_0^\infty \frac{x^{n-1}}{(1+x)^{m+n}} dx$ .  
(b) Evaluate  $\int_0^\infty \frac{x^3(1+x^5)}{(1+x)^{13}} dx$ .

**OR**

2. Prove that  $\int_0^1 \frac{x^2 dx}{\sqrt{1-x^4}} \times \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$
3. Show that  $2nJ_n(x) = x[J_{n+1}(x) + J_{n-1}(x)]$

**OR**

4. a) Show that  $\frac{d}{dx}[x^n J_n(x)] = x^n J_{n-1}(x)$ .  
b) Prove that  $J_0(x) = 1 - \frac{x^2}{2^2} + \frac{x^4}{2^2 4^2} - \frac{x^6}{2^2 4^2 6^2} + \dots$

5. a) Find the Mobius transformation that maps  $z = 0, -i, -1$  into  $w = i, 1, 0$ .

- (b) Under the transformation  $W = \frac{1}{z}$ , find the image of the circle  $|z - 2i| = 2$ .

**OR**

6. a) Show that the function  $u = 2 \log(x^2 + y^2)$  is harmonic and find its harmonic conjugate.  
b) Find the analytic function  $f(z) = u + iv$ , if  $u - v = e^x(\cos y - \sin y)$ .

7. If  $f(a) = \int_c \frac{4z^2 + z + 5}{z-a} dz$  where  $c$  is  $\left(\frac{x}{2}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$ .

Find (i)  $f(3.5)$ , (ii)  $f(i)$ , (iii)  $f'(-i)$  and (iv)  $f''(-i)$

**OR**

8. a) Evaluate  $\int_C \frac{z^2 - 2z - 2}{z(z^2 + 1)^2} dz$  where  $C$  is  $|z - i| = \frac{1}{2}$  using Cauchy's integral formula.

b) Evaluate  $\int_C \frac{z^3 - \sin 3z}{\left(z - \frac{\pi}{3}\right)^3} dz$  where  $C: |z| = 2$  using Cauchy's integral formula.

9. Expand  $f(z) = \frac{1}{(z-1)(z-2)}$  in a Laurent series valid in

(i)  $|z| < 1$

(ii)  $1 < |z| < 2$

(iii)  $|z| > 2$

**OR**

10. Evaluate  $\int_{-\infty}^{\infty} \frac{dx}{x^4 + 1}$

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**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **DC MACHINES & TRANSFORMERS**Branch: **EEE**

Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

5x2M=10 M

1. Write the expression of magnetic field energy  $W_{fd}$  in terms of  $\Psi$  and  $L$ .
2. What is critical field resistance? Write its significance.
3. What are the advantages and disadvantages of Swinburne's test?
4. Draw the equivalent circuit of transformer when referred to primary side.
5. What is tertiary winding? State its advantages.

**PART-B**

Answer ALL questions of the following

5x10 M= 50M

1. Explain Hysteresis and Eddy current losses in AC Machine.  
**OR**
2. a) Prove that energy and co-energy in a linear magnetic system are given by identical expressions.  
b) Draw and explain the general block diagram of an electromechanical energy conversion system.
3. Derive an EMF equation of DC generator and also brief the types of DC generators.  
**OR**
4. In a DC compound generator the armature, shunt-field and series field winding resistances are  $0.6 \Omega$ ,  $150 \Omega$  and  $0.3 \Omega$  respectively. The machine is connected to a load of 15kW, 200V. Find the i) EMF generated ii) Armature current and iii) power generated by armature when the machine is connected in Long shunt mode.
5. a) A 440 V D.C shunt motor is running at 1500 rpm and it takes a line current of 30 A. The output is 15HP. The load torque varies as the square of speed. Calculate the resistance to be connected in series with the armature for reducing the motor speed to 1300 rpm.  
b) What is the need of starter? With neat diagram, explain the four point starter.  
**OR**
6. a) List out the advantages of 4 point starter over 3-point starter.  
b) A 200 V DC shunt motor with armature and field resistances 0.25 ohm and 100 ohm respectively, takes 30 A and runs at a speed of 1000 r.p.m. To reduce the speed of motor to 600 r.p.m, find the amount of resistance to be added in armature resistance control method, torque remaining the same.
7. Explain the parallel operation of two single phase transformers with sketch the Circuit diagram.  
**OR**
8. The OC and SC test data of 4kVA, 200/400V, single phase Transformer when supplying full load at 0.8 lagging p. f. is given below.  
OC test: 200V, 0.8A, 70W (HV open circuit)  
SC test: 20V, 10A, 60W (LV short circuit)  
Calculate efficiency at a) Full Load b)  $\frac{1}{2}$  Full load and c) Voltage regulation at Full load.
9. a) Explain the working operation of scott-connection with neat diagram.  
b) Explain the working operation of star/delta transformer.  
**OR**
10. a) What is the significance of Y-Y, Y-Delta, Delta – Y and Delta-Delta connections in 3-phase transformers?  
b) Derive the expression for saving of copper in auto transformer when it compared to ordinary two winding transformer?



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### II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: POWER GENERATION & DISTRIBUTION

Branch: **EEE**

Time: **3 hours**

Max. Marks: **60**

#### PART – A

Answer **ALL** questions of the following

**5x2M=10 M**

1. What is the function of air preheater in thermal power plant?
2. Write the advantages of Kaplan turbine over the Francis turbine.
3. What is the functionality of busbars in substations?
4. List the design considerations of distribution system.
5. Write the significance of diversity factor.

#### PART-B

Answer **ALL** questions of the following

**5x10 M= 50M**

1. Explain the principle and operation of Gas turbine power plants with neat diagram?  
OR
2. Draw a single line diagram of thermal power station and describe the functions of its components.
3. Draw the layout of hydel power plant and explain.

OR

4. Explain the design, working and efficiency calculation of Francis turbine.
5. Draw the main and transfer bus scheme line diagram.

OR

6. Explain the maintenance and advantages of GIS.
7. A two wire DC distributor AB, 600m long is loaded as under

Distance from A (metres)	:	150	300	350	450
Loads in amperes	:	100	200	250	300

The feeding point A is maintained at 440 V and that of B at 430 V. If each conductor has a resistance of 0.01 ohm per 100 meters, calculate

- (a) the currents supplied from A to B
- (b) the power dissipated in the distributor.

OR

8. Explain the voltage drop calculation of AC distribution system for power factor with respect to respective load voltages.

9. a) What are various points to be considered for fixing up the tariff? Explain in detail.
- b) A consumer is offered electricity at the following tariff: Rs. 70.00 per kVA of his maximum demand plus 5 paise per unit consumed. The consumer has an aggregate motor load of 250 kW at power factor of 0.8 lagging. Calculate the consumer's annual bill for a load factor of 100 percent.

OR

10. a) A consumer has a maximum demand of 200 kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10 paise per kWh, find the overall cost per kWh.
- b) Explain power factor tariff

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**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **PULSE & DIGITAL CIRCUITS**Branch: **COMMON TO EEE & ECE**Time: **3 hours**Max. Marks: **60****PART – A**Answer **ALL** questions of the following**5x2M=10 M**

1. What is meant by linear wave shaping?
2. Mention the applications of clippers and clampers.
3. Draw the circuit diagram of astable multivibrator.
4. Why are the sampling gates called linear gates?
5. Why time base generators are called sweep circuits?

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

1. a) Derive an expression for the output of high-pass circuit excited by an exponential input.  
b) Derive an expression for the output of a high-pass RC circuit excited by a ramp input.
- OR**
2. a) Analyze the low pass circuit for the exponential inputs, with the help of waveforms.  
b) Prove that  $t_r = T/2RC$  for ramp as input to the High pass RC-Circuit.
3. a) Explain the principle of clamping. What is the need for a shunting resistors R in parallel with the diode in the basic clamping circuit?  
b) Define i) Rise time ii) Fall time iii) Delay time iv) Storage time.

**OR**

4. a) Explain negative peak clipper with and without reference voltage.  
b) List out the applications of clippers and clampers.
5. Write short notes on:  
a) Gate width of Mono-stable multi vibrator.  
b) Astable multi vibrator as a voltage to frequency converter.

**OR**

6. a) Design a collector-coupled monostable multivibrator using an n-p-n silicon transistor with  $h_{FE}(\min) = 40$ ,  $V_{BE}(\text{cut off}) = 0 \text{ V}$  and  $I_B(\text{sat}) = 1.5I_B(\min)$ .  
Given that:  $V_{CC} = 10 \text{ V}$ ,  $I_C(\text{sat}) = 5 \text{ mA}$ ,  $R_{C1} = R_{C2} = R_C$ ,  $V_{CE}(\text{sat}) = 0.2 \text{ V}$  and  $V_{BE}(\text{sat}) = 0.7 \text{ V}$ . If the pulse width required is 1ms, calculate the value of C.  
  
b) Design a Schmitt trigger circuit for the following specification:  $UTP = 8 \text{ V}$ ,  $LTP = 5 \text{ V}$ ,  $V_{CC} = 15 \text{ V}$ ,  $I_C(\text{sat}) = 2 \text{ mA}$ ,  $h_{FE}(\min) = 25$ .

7. a) Design the universal gates using DTL logic and verify the truth tables.  
b) Verify the truth table of RTL AND gate with the circuit diagram of two inputs.

**OR**

8. Draw the OR gate and AND gate with diodes and analyze.
9. a) With the help of a circuit diagram and wave forms, explain frequency division by an astable multivibrator.  
b) How does the sync signal affect the frequency of operation of the sweep generator?

**OR**

10. Compare the process of synchronization of Astable and monostable multivibrators.



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**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019****Subject: POWER TRANSMISSION SYSTEMS**Branch: **EEE****Time: 3 hours****Max. Marks: 60****PART – A****Answer ALL questions of the following****5x2M=10 M**

1. Define contribution factor.
2. What is meant by surge impedance loading of a transmission line?
3. Explain static shielding of overhead insulators.
4. What are reflected and refracted waves referred to long transmission line?
5. What are methods of grading in cables and represent where each method is preferred?

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

1. Derive the relationship between the load factor and loss factor.

**OR**

2. There are 4 consumers of electricity having different load requirements at different times. Consumer 1 has maximum demand of 2 KW at 9 p.m. a demand of 1.6 KW at 8 p.m. and a daily load factor of 15%. Consumer 2 has a maximum demand of 2 KW at 12 noon, a load of 1 KW at 8p.m. and an average load of 500W. Consumer 3 has a maximum demand of 8KW at 5pm, load of 5KW at 8pm and a daily load factor of 25%. Consumer 4 has an average load of 1 KW and his maximum demand is 4KW at 8pm. Determine (i) the load factor and average load of each consumer, (ii) the average load and load factor of combined load.
3. Determine the efficiency and regulation of a 3-phase, 100 km, 50Hz transmission line delivering 20 MW at a p.f. of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm per km, 1.5 cm outside dia, spaced equilaterally 2 meters between centres. Neglect leakage and use (i) nominal-T, and (ii) nominal-  $\pi$  method.

**OR**

4. Find the ABCD parameters of a 3-phase, 80Km, 50Hz transmission line with series impedance of  $(0.15 + j 0.28)$  ohms per Km and a shunt admittance of  $j5 \times 10^{-4}$  ohm per Km for the both  $\pi$  and T networks.
5. A 3-phase, 50 Hz, 138 kV transmission line has conductors in equilateral formation spaced 2.5 meters apart. The conductor diameter is 1.04 cm and the surface factor is 0.85. The air pressure and temperature are 74 cm of Hg and 21°C respectively. Determine the critical visual voltage for corona and the corona loss per km per phase of the line,  $m_v = 0.72$ .

**OR**

6. a) A transmission line has a span of 240 meters. Find the weight of the conductor per meter length if the sag, ultimate tensile strength and factor of safety are 1.6 meters, 5300 kg and 2 respectively

b) A transmission line of span 250m between level supports with conductor of Effective diameter 1.88cm and weighs about 0.87kg/m having ultimate Strength=8100kg. Calculate the sag referring to following data Radial thickness of ice on conductor=1.2cm; density of ice=913kg/m<sup>3</sup>; Wind pressure=38kg/m<sup>2</sup> of projected area; Factor of safety=2.

7. Explain about Bewley's Lattice diagrams for any two cases with examples.

**OR**

8. a) What is a travelling wave? Explain the development of such a wave on an overhead line.

b) A 500 kV 2  $\mu$  sec rectangular surge on a line having a surge impedance of 350 ohms approaches a station at which the concentrated earth capacitance is 3000 pF.

Determine the maximum value of the transmitted wave.

9. a) Explain about intersheath grading in detail.

b) Determine the economic overall diameter of a 1-core cable metal sheathed for a working voltage of 85 kV if the dielectric strength of the insulating material is 65 kV/cm.

**OR**

10. A single core cable has an inner diameter of 5cms and a core diameter of 1.5cm. Its paper dielectric has a working maximum dielectric stress of 60 kV/cm. Calculate the maximum permissible line voltage when such cables are used on a 3-phase power system.

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**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **ELECTRICAL MEASUREMENTS & INSTRUMENTATION**Branch: **EEE**Time: **3 hours**Max. Marks: **60****PART – A**Answer **ALL** questions of the following**5x2M=10 M**

1. Discuss the limitations of a moving iron instrument.
2. Draw a De-Sauty Bridge and explain what the application of this bridge is.
3. How do you test a current transformer?
4. Give the applications of CRO.
5. What are the main characteristics the transducers?

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

1. a) Explain the theory and shape of scale of electro-dynamometer wattmeters.  
b) Develop the torque equation for a MI instrument and mention few applications.
- OR**
2. a) Explain deflecting system, controlling system and damping system with reference to an electrical indicating instrument.  
b) Explain with a neat sketch working of such an instrument when used as an ammeter.
  3. Obtain the equations for balance in case of Maxwell's bridge with necessary phasor diagram.
- OR**
4. a) Derive the circuit of a Kelvin's Double Bridge used for measurement of low resistance. Also derive the condition for balance.  
b) Describe the working of a low voltage Schering bridge. Derive the equations for capacitance and dissipation factor. Draw the phasor diagram of the bridge under conditions of balance.
  5. a) Draw the circuit diagram of a basic slide wire D.C. potentiometer. Explain its working?  
b) Obtain the expression for power, in terms of correction factor, wattmeter reading, actual ratio of PT and CT, in case of power measurement along with instrument transformers.
- OR**
6. a) Explain the construction and working principle of a polar type potentiometer with a neat sketch.  
b) Draw the equivalent circuit and phasor diagram of a current transformer.
  7. a) Explain the basic circuitry of cathode ray oscilloscope.  
b) Explain the procedure to measure angle of phase shift using Lissajous patterns.
- OR**
8. What is a Lissajous pattern? Explain and draw Lissajous patterns with different phases and frequency.  
b) Explain how frequency, phase and amplitude measurements are made using CRO.
  9. a) Explain the working principle of Thermistors.  
b) Describe the principles of operation of capacitive transducers.
- OR**
10. a) What is a transducer? Give some of the parameters where electrical transducer depends on.  
b) With a neat sketch, explain the principle of operation of straining gauge transducer.



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**II B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: ENVIRONMENTAL SCIENCEBranch: **COMMON TO EEE,ECE,CSE,IT**

Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

5x2M=10 M

1. Why pyramid of energy is always upright?
2. Mention any four uses of mineral resources.
3. What are the point and non point sources of water pollution?
4. Write the reaction involving in the depletion of ozone layer.
5. Write any four conservation methods of water.

**PART-B**

Answer ALL questions of the following

5x10 M= 50M

1. Define food chains & food webs. Give suitable examples.

**OR**

2. Explain scope & importance of an ecosystem.
3. Explain the requirement of renewable energy resources to meet the growing energy needs.

**OR**

4. Explain how consumption of human effect biodiversity.
5. Write the effect of air pollution on human health & plants.

**OR**

6. "Marine disposal of industrial waste causes degradation of coastal ecology" analyze your opinion on the above statement.
7. What are green house gases and their effect? Discuss the potential and contribution of these gases to global warming phenomenon.

**OR**

8. Discuss the difference of opinions between north block & south block countries during earth summit.
9. Define sustainable development? Why it is necessary?

**OR**

10. Explain the concept of green house building.

