GANPAT UNIVERSITY
B. TECH SEM- I (EE/CIVIL/MC/ME)
REGULAR EXAMINATION– NOV/DEC-2014
## 2EE101:- ELEMENTS OF ELECTRICAL ENGINEERING

MAX. TIME: 3 HRS

MAX. MARKS: 60

Instructions: -   1. This Question paper has two sections. Attempt each section in separate answer book.

2. Figures on right indicate marks.

3. Be precise and to the point in answering the descriptive questions.

4. Make suitable assumptions wherever necessary.

SECTION-I

Que-1 [A] Discuss voltage and current divider rule with necessary circuit diagram. [05]

[B] State the maximum power transfer theorem and prove the statement. [05]

OR

Que-1 [A] Explain the method of transforming a star network in to a delta network and vice-versa. [05]

[B] State and explain Kirchhoff's laws. [05]

Que- 2 [A] Discuss electric field strength, electric potential, charge and capacitance. [05]

[B] Distinguish between permeability and permittivity of a medium and derive the unit of reluctance & explain reluctivity. [05]

OR

Que- 2 [A] Compare magnetic circuit with electric circuit. [05]

[B] Derive an expression of capacitance for a parallel plate composite medium capacitor and energy stored in a capacitor. [05]

Que-3   **Attempt any three.** [10]

[A] Discuss Joule's law of electric heating and thermal efficiency. Electric motor takes input power of 750 W. Average use of motor is 5 hrs/day. Calculate energy consumption in kwh for January month and cost of energy at a rate of 5 Rs/kwh.

[B] Explain types of lighting scheme and requirement of good lighting.

[C] Using Thevenin's theorem to calculate the current in 5 Ω resistance in the network shown below.
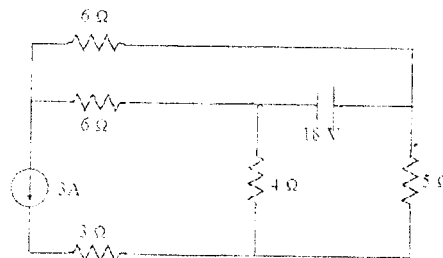
[D] A capacitor of 50 μF in series with a 1000 ohm resistance is suddenly connected across a 100 V dc supply. Calculate (i) initial current (ii) time constant (iii) equation of charge as a function of time (iv) value of current when the time is equal to the time constant (v) charge on capacitor plates after 0.06 second (vi) voltage across resistance after 0.06 second (vii) charging current after 0.06 second.

SECTION-II

Que-4
[A] Discuss rms value, average value, form factor, phase and phase difference. [05]
[B] Prove that power consumption in a pure inductive circuit is zero. [05]

OR

Que-4
[A] Explain electrical resonance in parallel circuit. Derive the expression of resonant frequency. [05]
[B] A resistor of 30 Ω and a capacitor of unknown value C are connected in parallel across 110 V, 50Hz supply. The combination draws a current of 5 A from the supply calculate the value of unknown capacitance. Now the combination is again connected across a 110 V supply of unknown frequency. The current drawn from the main reduces to 4 A. Determine the frequency of the supply. [05]

Que- 5
[A] What is an impedance triangle? Draw impedance triangle, vector and phasor diagram for series R-L, series R-C and series R-L-C circuit. [05]
[B] A series circuit with a resistor of 100 Ω, capacitor of 20 μf and inductor of 0.15 H is connected across 220V, 60Hz supply. Calculate (i) current (ii) power (iii) power factor of the circuit. [05]

OR

Que- 5
[A] What is the relationship between phase voltage & line voltage, phase current & line current for star and delta systems? Derive these relations. [05]
[B] Three equal impedances, each consisting of R and L in series are connected in star and are supplied from a 400 V, 3-Phase, 3-wire, 50 Hz symmetrical supply. The power input to the load is measured by two wattmeter method. The two wattmeters read 3 KW and 1 KW. Determine the resistance and inductance in each impedance. [05]

Que-6 Attempt any three. [10]
[A] Discuss induced emf, self inductance and mutual inductance.
[B] Prove that total inductance L= L₁+L₂ ± 2M. If two coils connected in series with self inductance of L₁ & L₂ and mutual inductance M.
[C] Explain different types of tariff.
[D] A 15 mH coil is connected in series with another coil. The total inductance is 70 mH. When one of the coils is reversed, the total inductance is 30mH. Find the self inductance of second coil, mutual inductance and coefficient of coupling.
[E] Write short note on magnetic hysteresis.

END OF PAPER
Best of Luck