B-Tech-sem-I, (2014, course), computer - winter-2018

B.Tech. SEM -I (Civil/ Electrical/ Mechanical/ Production/ Computer/ Info. Tech. 2014 Course (CBCS) : WINTER - 2018

SUBJECT: FUNDAMENTALS OF ELECTRICAL ENGINEERING

Day : Saturday
Date: 01/12/2018

W-2018-2266

Time : 10.00 AM TO 01.00 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data, if necessary.

Q. 1 **a)** Prove that: **(05)**

$$\alpha_t = \frac{\alpha_0}{1 + \alpha_0 t}$$

b) A belt driven pulley 0.4 m in diameter rotates at a speed of 4 rps. The tension in the tight side of belt is 450 N and that on slack side is 100 N. Calculate: **(05)**

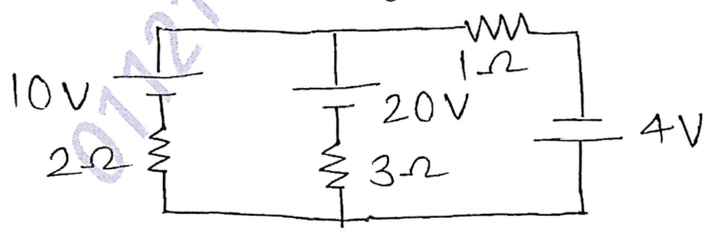
i) Torque on the pulley
ii) The power developed

OR

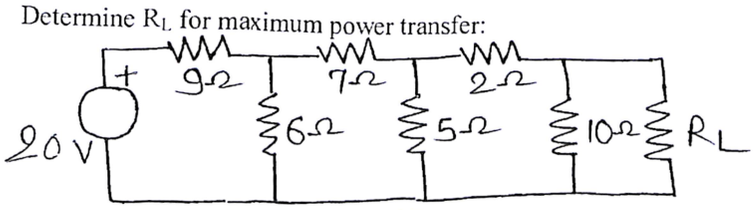
a) Define temperature coefficient of resistance. Also derive an expression of it. **(05)**

b) A specimen of copper wire has a temperature coefficient of $\frac{1}{254.5}$ per ^{0}C at 20 ^{0}C. Find the temperature coefficient at 0 ^{0}C. **(05)**

Q. 2 **a)** Calculate current in 3 Ω resistor using Thevenin's theorem: **(05)**

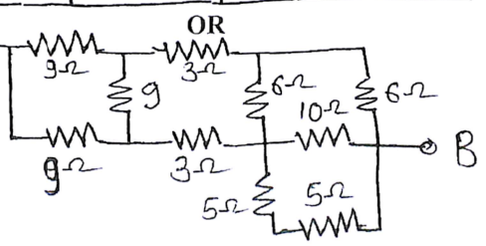


b) Determine R_L for maximum power transfer: **(05)**



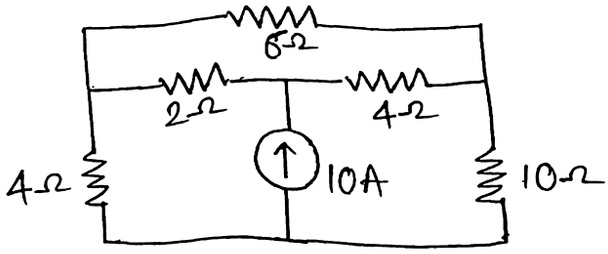
OR

a) Fine R_{AB} **(05)**



P. T. O.

b) Find the voltage drop in 10 Ω resistor using Nodal analysis: **(05)**



Q. 3 a) Define the following. Give their expression and units: **(05)**

i) Electric flux density

ii) Permittivity

b) Calculate the capacitance of a parallel plate capacitor consisting of two metal plates each 60 cm × 60 cm separated by a dielectric 1.5 mm thick and of relative permittivity 3.5. If a potential of 500 V is applied find charge, electric flux density **(05)**

OR

a) Derive the expression for the energy stored in capacitor. **(05)**

b) A parallel plate capacitor has two metal plates of area 2.5 m^2 separated by three slabs of different dielectric materials. The relative permittivity of these dielectric materials are 1, 3, 5 and the thickness is 0.5, 1, 2 mm. respectively. Calculate: Capacitance of the capacitor. **(05)**

Q. 4 a) Explain in brief **(05)**

i) Statically induced EMF

ii) Dynamically induced EMF

b) A 3300/110 V, 50Hz, 50 kVA transformer has bull load copper loss of 1600 W and iron loss of 1800 W. Estimate transformer efficiency at: **(05)**

i) Full load and 0.7 lagging p.f

ii) Half load and 0.85 lagging p.f

OR

a) Write a short note on B-H curve. **(05)**

b) Draw the neat connection diagram and explain the procedure for determining voltage regulation and efficiency by direct loading method for transformer having ratings 1 kVA, 230/115V, 1 phase, 50 Hz. Also write proper ranges of meters used. **(05)**

Q. 5 a) What is series resonance? Obtain the expression for resonant frequency. **(05)**

b) Define the following in case of an AC quantity:

Average value, RMS value, instantaneous value, form factor, peak factor

OR

a) Define: **(05)**

i) Impedance

ii) Admittance of circuit and sketch impedance and admittance triangle.

b) A circuit consisting of resistance of 20 Ω and inductance of 0.1 H in series, is connected across single phase 220 V, 50 Hz supply: **(05)**

Calculate:

i) Current drawn

ii) P.f.

iii) Power consumed by circuit

Q. 6 **a)** Why earthing is necessary? Write a brief note on any one type of earthing with sketch. **(05)**

b) Write a detailed note on LED. **(05)**

OR

a) State and explain various charges included in electricity bill. **(05)**

b) State various types of electric wiring. Explain any one. **(05)**

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