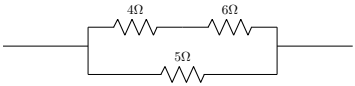
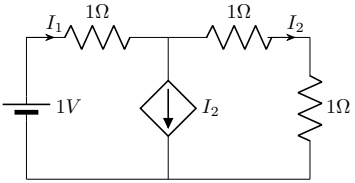
EE 2012 14-26

EE24BTECH11005 - Arjun Pavanje

17) In the portion fo a circuit shown, if the ehat generated in 5Ω resistance is 10 calories per second, the heat generated by the 4Ω resistance, in calories per second is, _____



18) In the given circuit, the current supplied by the battery, in ampere is,_____



19) In a 100 bus power system, there are 10 generators. In a particular iteration of Newton Raphson load flow technique (in polar coordinates), two of the *PV* buses are converted to *PQ* type. In this iteration,
   a) the number of unknown voltage angles increases by two and the number of unknown voltage magnitudes increases by two.
   b) the number of unknown voltage angles remains unchanged and the number of unknown voltage magnitudes increases by two.
   c) the number of unknown voltage angles increases by two and the number of unknown voltage magnitudes decreases by two.
   d) the number of unknown voltage angles remains unchanged and the number of unknown voltage magnitudes decreases by two.

20) The magnitude of three-phase fault currents at buses *A* and *B* of a power system are $10pu$ and $8pu$, respectively. Neglect all resistances in the system and consider the pre-fault system to be unloaded. The pre-fault voltage at all buses in the system is $1.0pu$. The voltage magnitude at bus B during a three-phase fault at bus *A* is $0.8pu$. The voltage magnitude at bus *A* during a three-phase fault at bus *B*, in *pu*, is

21) Consider a system consisting of a synchronous generator working at a lagging power factor, a synchronous motor working at an overexcited condition and a directly grid-connected induction generator. Consider capacitive VAr to be a source and inductive VAr to be a sink of reactive power. Which one of the following statements is TRUE?

a) Synchronous motor and synchronous generator are sources and induction generator is a sink of reactive power.
b) Synchronous motor and induction generator are sources and synchronous generator is a sink of reactive power.
c) Synchronous motor is a source and induction generator and synchronous generator are sinks of reactive power.
d) A 4-pole, lap-connected, separately excited dc motor is drawing a steady current of 40 A while running at $600rpm$. A good approximation for the waveshape of the current in an armature conductor of the motor is given by

22) A steady dc current of $100A$ is flowing through a power module (S, D) as shown in Figure (a). The V-I characteristics of the IGBT (S) and the diode (D) are shown in Figures (b) and (c), respectively. The conduction power loss in the power module (C, D), in watts, is _____

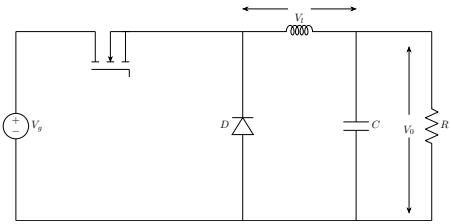


Fig. 1

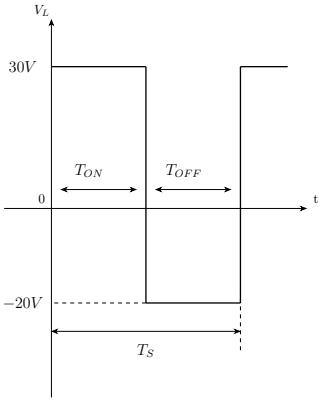


Fig. 2

23) A steady dc current of $100A$ is flowing through a power module (S,D) as shown in (1). The $V - I$ characteristics of the IGBT (S) and the diode (D) are shown in Figures (2), (3) respectively. The conduction power loss in the powewr module (S,D) in watts is _____

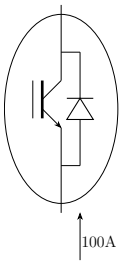


Fig. 3

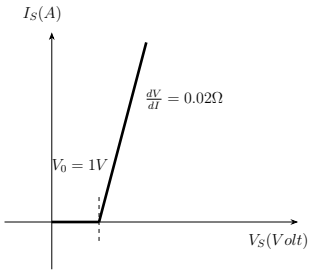


Fig. 4

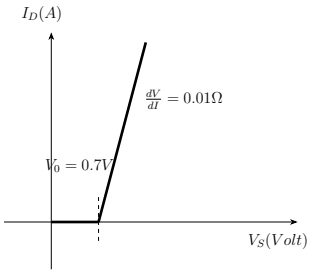
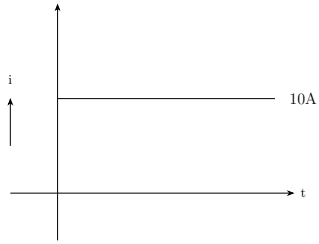


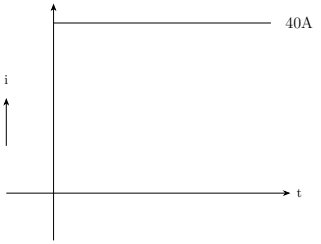
Fig. 5

24) A 4-pole, lap-connected, separately excited dc motor is drawing a steady current of 40 A while running at 600rpm. A good approximation for the waveshape of the current in an armature conductor of the motor is given by

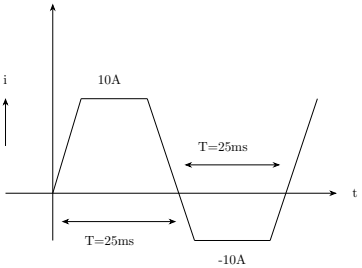
a) .



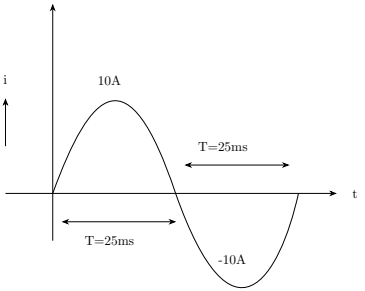
b) .



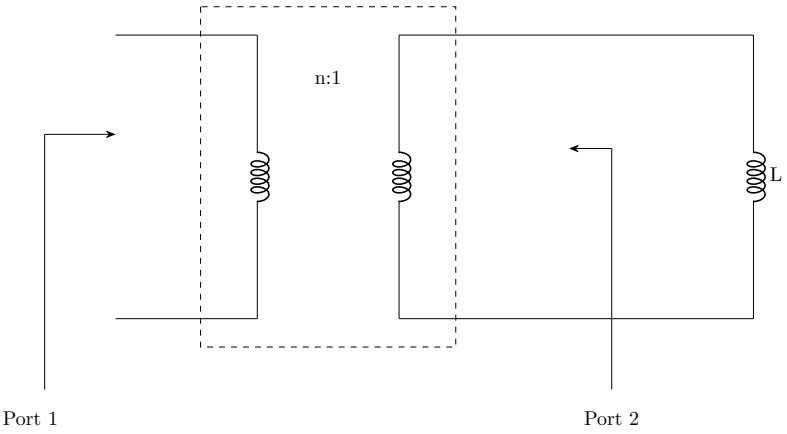
c) .



d) .



25) If an ideal transformer has an inductive load element at port 2 shown in the ifgure below, the equivalent inductance at port 1 is



a) nL
b) n^2L
c) $\frac{n}{L_2}$
d) $\frac{n^2}{L}$

26) Candidates were asked to come to an interview with 3 pens each. Black, blue green and red were the permitted pen colors that the cnadidate could bring. The probability that a condidate comes with all 3 pens having the same color is _____

27) Let $S = \sum_{n=0}^{\infty} n\alpha^n$ where $|\alpha| < 1$. The value of α in the range $0 < \alpha < 1$, such that $S = 2\alpha$ is _____

28) let the eigenvalues of a 2×2 matrix A be $1, -2$ with eigenvectors x_1, x_2 respectively. Then the eigenvalues and eigenvectors of the matrix $A^2 - 3A + 4I$ would, respectively be

a) $2, 14; x_1, x_2$
b) $2, 14; x_1 + x_2; x_1 - x_2$
c) $2, 0; x_1, x_2$
d) $2, 0; x_1 + x_2; x_1 - x_2$

29) Let A be a 4×3 real matrix with rank 2. Which of the following statement is TRUE?

a) Rank of $A^\top A$ is less than 2
b) Rank of $A^\top A$ is equal to 2
c) Rank of $A^\top A$ is greater than 2
d) Rank of $A^\top A$ is between 1 and 3