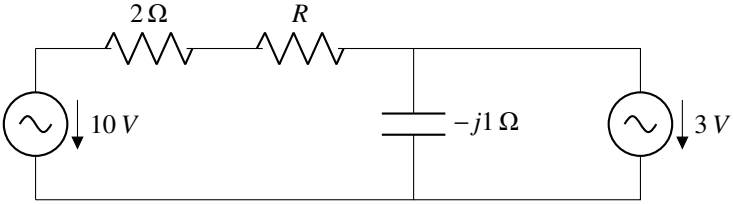
2012-GATE-EE-40-52

EE24BTECH11028 - Jadhav Rajesh

1) Asuuming both the voltage sources are in phase,the value of R for which maximum power is transferred from circuit A to circuit B is



a) 0.8Ω

b) 1.4Ω

c) 2Ω

d) 2.8Ω

2) The state variable description of an LTI system id given by

$$\begin{pmatrix}\dot{X}_1\\ \dot{X}_2\\ \dot{X}_3\end{pmatrix}=\begin{pmatrix}0 & a_1 & 0\\ 0 & 0 & a_2\\ a_3 & 0 & 0\end{pmatrix}\begin{pmatrix}X_1\\ X_2\\ X_3\end{pmatrix}+\begin{pmatrix}0\\ 0\\ 1\end{pmatrix}u$$

$$Y=\begin{pmatrix}1 & 0 & 0\end{pmatrix}\begin{pmatrix}X_1\\ X_2\\ X_3\end{pmatrix}$$

where Y is the output and u is the input.The system is controllable for

a) $a_1 \neq 0,\ a_2 = 0,\ a_3 \neq 0$

b) $a_1 = 0,\ a_2 \neq 0,\ a_3 \neq 0$

c) $a_1 = 0,\ a_2 \neq 0,\ a_3 = 0$

d) $a_1 \neq 0,\ a_2 \neq 0,\ a_3 = 0$

3) The fourier transform of a signal $h(t)$ is $H(j\omega) = \frac{(2\cos\omega)(\sin 2\omega)}{\omega}$.The value of $h(0)$ is

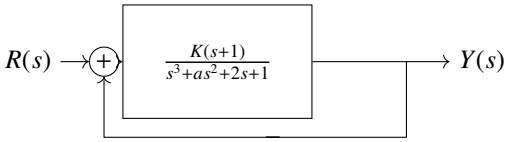
a) $\frac{1}{4}$

b) $\frac{1}{2}$

c) 1

d) 2

4) The feedback system shown below oscillates at 2 $\frac{rad}{s}$ when



a) $K = 2$ and $a = 0.75$

b) $K = 3$ and $a = 0.75$

c) $K = 4$ and $a = 0.5$

d) $K = 2$ and $a = 0.5$

5) The input $X(t)$ and output $Y(t)$ of the system are related as $y(t) = \int_{\infty}^{t} X(\tau)\cos(3\tau)\,d\tau$.The system is

a) time-invariant and stable

b) stable and not time-invariant

c) time-invariant and notstable

d) not time-invariant and not stable

6) An analog voltage uses external multiplier settings.With a multiplier setting of $20K\Omega$,it reads $440V$ and with a multiplier setting of $80K\Omega$,its reads $352V$.For a multiplier setting of $40K\Omega$, the voltmeter reads

a) $371V$

b) $383V$

c) $394V$

d) $406V$

7) The locked rotor current in a 3-phase, star connected $15KW$, 4-pole, $230V$, $50Hz$ induction motor at rated conditions is $50A$.Neglecting losses and magnetizing current, the approximate looked rotor line current draw when the motor is connected to a $236V$, $57Hz$ supply is

a) $58.8a$

b) $45.0A$

c) $42.7A$

d) $55.6A$

8) A singal phase $10KVA$, $50Hz$ transformer with $1KV$ primary winding draws $0.5A$ and $55W$, at rated voltage and frequency, on no load . A second transformer has a core with its linear dimensions $\sqrt{2}$ times the corresponding dimsensions of the first transformer.The core material and lamination thickness are the same in both transformers.The primary winding of both the transformers have the same number of turns. If a rated voltage of $2KV$ at $50Hz$ is applied to the primary of the second transformer, then the no load current and power, respectively, are

a) $0.7A$, $77.8W$

b) $0.7A$, $155.6W$

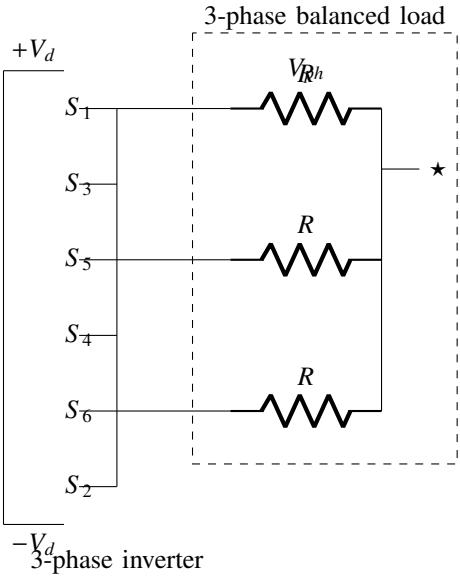
c) $1A$, $100W$

d) $1A$, $200w$

Common Data Question

Common Data for Question 48 and 49

In the 3-phase inverter circuit shown, the load is balanced and the gating scheme is 180°-conduction mode.All the switching devices are ideal.



3-phase inverter

9) The rns value of load phase voltageis

a) $106.1V$

b) $141.4V$

c) $212.2V$

d) $282.8V$

10) If the dc bus voltage $V_d = 300V$, the power consumed by 3-phase load is

a) $1.5kW$

b) $2.0kW$

c) $2.5kW$

d) $3.0kW$

Common Data for Question 50 and 51

With $10V$ dc connected at port A in linear nonrecirocal two-port network shown below, the following were observed

(i) 1Ω connected at port B draws a current of $3A$

(ii) 2.5Ω connected at port B draws a current of $2A$

11) For the same network, with $6V$ dc connected at port A, 1Ω connected at port B draws $\frac{7}{3}A$.If $8V$ dc connected to port A, the open circuit voltage at port B is

a) $6V$

b) $7V$

c) $8V$

d) $9V$

12) With $10V$ dc connected at port A, the current drawn by 7Ω connected at port B is

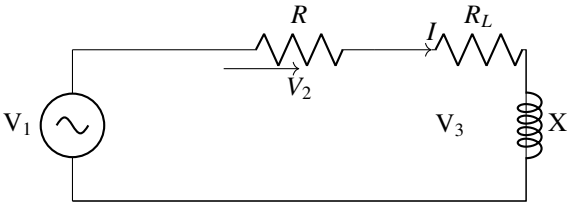
a) $\frac{3}{7}A$

b) $\frac{5}{7}A$

c) $1A$

d) $\frac{9}{7}A$

13) In the circuit shown,the three voltage reading are $V_1 = 220V$, $V_2 = 122V$, $V_3 = 136V$.The power factor of the load is



a) 0.45

b) 0.50

c) 0.55

d) 0.60