gate 5
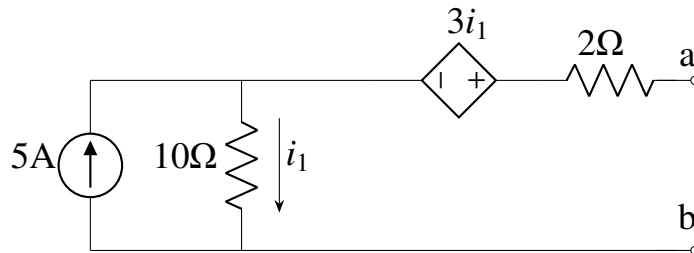
EE24Btech11041 - Mohit

1) For the network shown,the equivalent Thevenin voltage and Thevenin impedance as seen across terminals 'ab' is   (EE 2021)

   a) 10 V in series with 12 Ω
   b) 65 V in series with 15 Ω
   c) 50 V in series with 2 Ω
   d) 35 V in series with 2 Ω

2) Which one of the following vector functions represents a magnetic field **B** ? ($\hat{x}$, $\hat{y}$, and $\hat{z}$ unit vectors along x-axis, y-axis and z-axis respectively)   (EE 2021)
   a) $10x\hat{x} + 20y\hat{y} - 30z\hat{z}$
   b) $10y\hat{x} + 20x\hat{y} - 30z\hat{z}$
   c) $10z\hat{x} + 20y\hat{y} - 30x\hat{z}$
   d) $10x\hat{x} + 20z\hat{y} - 30y\hat{z}$

3) If the input $x(t)$ and output $y(t)$ of s system are related as $y(t) =$max$(0, x(t))$,then the system is   (EE 2021)

   a) linear and time-variant
   b) linear and time-invariant
   c) non-linear and time-variant
   d) non-linear and time-invariant

4) Two discreate-time linear time-invariant systems with impulse responses $h_1[n] = \delta[n-1] + \delta[n+1]$ and $h_2[n] = \delta[n] + \delta[n-1]$ are connected in cascade, where $\delta[n]$ is the kronecker delta. The impulse resoponse of the casacded system is   (EE 2021)
   a) $\delta[n-2] + \delta[n+1]$
   b) $\delta[n-2]\delta[n] + \delta[n+1]\delta[n-1]$
   c) $\delta[n-2] + \delta[n-1] + \delta[n] + \delta[n+1]$
   d) $\delta[n]\delta[n-1] + \delta[n-2]\delta[n+1]$

5) Consider the table given :

Constructional feature	Machine type	Mitigation
(P) Damper bars	(S) Induction motor	(X)Hunting
(Q)Skewed rotor slots	(T)Transformer	(Y) Magnetic locking
(R) Compensating winding	(U) Synchronous machine	(Z) Armature reaction
	(V) DC machine	

   The correct combination that relates the constructional feature,machine type and migretion is   (EE 2021)

   a) P-V-X, Q-U-Z, R-T-X

b) P-U-X, Q-S-Y, R-V-Z
c) P-T-Y, Q-V-Z, R-S-X
d) P-U-X, Q-V-Y, R-T-Z

6) Consider a power system consisting of N number of buses. Buses in this power system are categorized into slack bus, PV buses, and PQ buses for load flow study. The number of PQ buses is N_L. The balanced Newton-Raphson method is used to carry out load flow study in polar form. H, S, M, and R are sub-matrices of the Jacobian matrix J as shown below :

$$\begin{pmatrix} \Delta P \\ \Delta Q \end{pmatrix} = J \begin{pmatrix} \Delta \delta \\ \Delta V \end{pmatrix}, \text{ where } J = \begin{pmatrix} H & S \\ M & R \end{pmatrix}$$

The dimension of the sub-matrix M is   (EE 2021)

a) $N_L \times (N-1)$
b) $(N-1) \times (N-1-N_L)$
c) $N_L \times (N-1+N_L)$
d) $(N-1) \times (N-1+N_L)$

7) Two generators have cost functions F_1 and F_2. Their incremental-cost charcterstics are

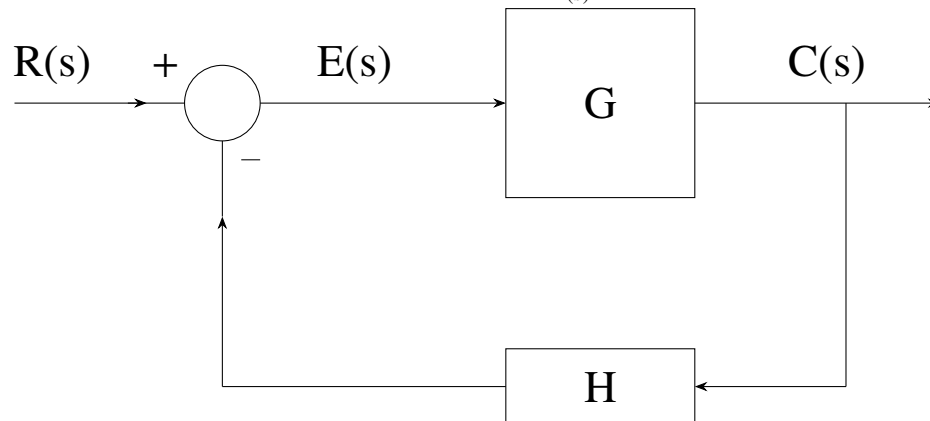$\frac{dF_1}{dP_1} = 40 + 0.2P_1$

$\frac{dF_2}{dP_2} = 32 + 0.4P_2$

They need to deliver a combined load of 260 MW.Ignoring the network losses, for economic operations, the generations P_1 and P_2 (in MW) are

(EE 2021)

a) $P_1 = P_2 = 130$
b) $P_1 = 160, P_2 = 100$
c) $P_1 = 140, P_2 = 120$
d) $P_1 = 120, P_2 = 140$

8) For the closed-loop system shown,the transfer function $\frac{E(s)}{R(s)}$ is   (EE 2021)

a) $\frac{G}{1+GH}$
b) $\frac{GH}{1+GH}$
c) $\frac{1}{1+GH}$
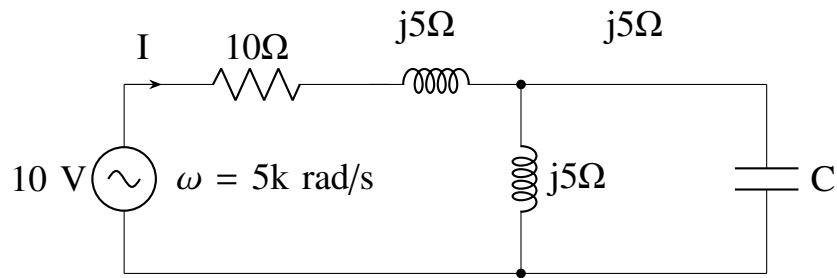d) $\frac{1}{1+G}$

9) Inductance is measured by   (EE 2021)

a) Schering bridge
b) Maxwell bridge
c) Kelvin bridge
d) Wein bridge

10) Suppose the circles $x^2 + y^2 = 1$ and $(x-1)^2 + (y-1)^2 = r^2$ intersect each other orthogonally at the point (u, v). Then $u + v = $ _____ .   (EE 2021)

11) In the given circuit, the value of capacitor C that makes current $I = 0$ is _____ μF . (EE 2021)

12) Two single-core power cables have total conductors resistance of 0.7 Ω and 0.5 Ω, respectively, and their insulation resistance (between core and sheath) are 600 $M\Omega$ and 900 $M\Omega$, respectively. When the two cables are joined in series, the ratio of insulation resistance to conductor resistance is _____ $\times 10^6$. (EE 2021)

13) In the given circuit, for voltage V_y to be zero, the value of β should by _____.(Round off to 2 decimal places). (EE 2021)