2010-XE- 53-65

EE24BTECH11021 - Eshan Ray

Statement for Linked Answer Questions 53 & 54
Consider the following quadrature formula

$$\int_0^1 12f(x)\,dx = [f(0) + 2bf(0.25) + 2f(0.5) + 2df(0.75) + f(1)]$$

53) If the above formula is used as Simpson's $\frac{1}{3}$ rule,then
   a) $b = d = 1$
   b) $b = d = 2$
   c) $b = 2d = 1$
   d) $b = 2d = 2$

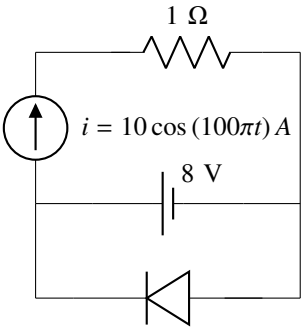
54) Using the correct values of b and d from $Q.53$ in the quadrature formula the value of $\int_0^1 \frac{12}{1+x^2}\,dx$ evaluated correct up to 4 decimal places is
   a) 8.3091
   b) 8.3121
   c) 8.3151
   d) 8.3191

Statement for Linked Answer Questions 27 & 28 :
Consider the initial value problem $\frac{dy}{dx} = f(x,y) = 2xy$ with $y(0) = 1, y(0.2) = 1.0408, y(0.4) = 1.1735$ and $y(0.6) = 1.4333$

55) Choose the correct predictor scheme to solve the above initial value problem at $x = 0.8$ from the following
   a) $y_{n+1} = y_n + \frac{4h}{3}(2f_{n-1} - f_{n-2} + 2f_{n-3})$
   b) $y_{n+1} = y_{n-3} + \frac{4h}{3}(2f_{n-2} - f_{n-1} + 2f_n)$
   c) $y_{n+1} = y_{n-1} + \frac{h}{3}(4f_{n-1} - 5f_n + 4f_{n+1})$
   d) $y_{n+1} = y_{n-3} + \frac{4h}{3}(2f_{n-1} - f_{n-2} + 2f_{n-3})$

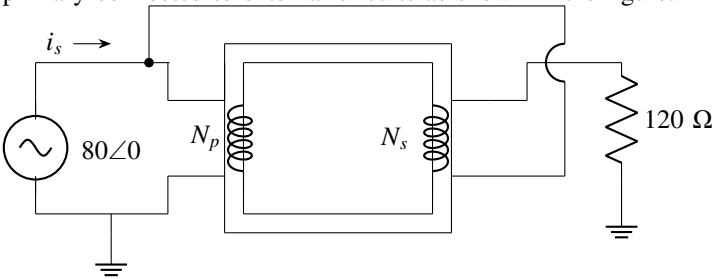
56) Using the correct predictor scheme from $Q.55$, the value of $y(0.8)$ is
   a) 1.8680
   b) 1.8750
   c) 1.8890
   d) 1.9055

57) Assuming all components are ideal, the average power delivered by the dc voltage source in the network shown in the figure is



a) $-28\,W$
b) $0\,W$
c) $64\,W$
d) $80\,W$

58) An ideal transformer with 10 turns in primary and 30 turns in secondary has its primary connected to external circuits as shown in the figure.



The current provided from the sinusoidal voltage source is

a) $0.67\angle 0$
b) $2.0\angle 0$
c) $2.67\angle 0$
d) $10.67\angle 0$

59) In a three-phase, Y-connected squirrel cage induction motor, if N_s is the synchronous speed, N_r is the rotor speed and s is the slip, then the speeds of the airgap field and the rotor field with respect to the stator structure will respectively be

a) N_s , sN_r
b) N_S , N_s
c) N_r , N_r
d) N_s , sN_s

60) The equivalent conductance of the forward biased diode, with bias voltage V, at the room temperature is

a) constant
b) proportional to V
c) proportional to V^2
d) proportional to $exp\,(KV)$

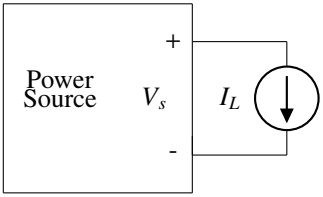
61) A number is represented as $(1010\,1010)_2$ using $8-bits$ in signed magnitude representation. The decimal number represented is

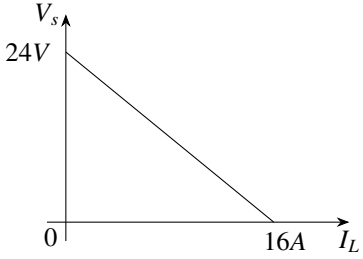
a) -42
b) -85
c) -86
d) -176

62) A $10-bit$ DAC has a full scale output of $5\,V$. The DAC's resolution and step size will respectively be

a) 0.0978%, $500\,mV$
b) 0.0978%, $488\,mV$
c) 0.195%, $9.76\,mV$
d) $0.195\%\,500\,mV$

63) A power source has an open circuit voltage of $24\,V$ and short circuit current of $16\,A$. At intermediate operating conditions its terminal characteristics is as shown in the figure. The condition under which maximum power can be extracted from the power source is when the



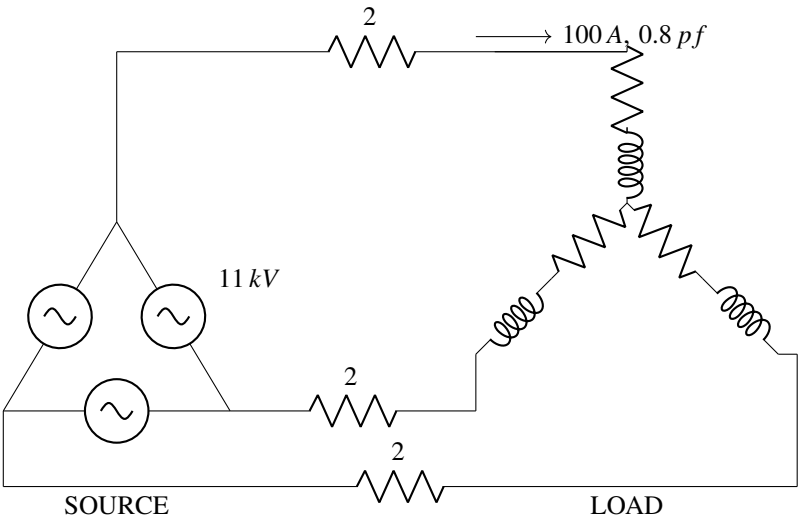


a) load current is $16\,A$
b) source voltage is $24\,V$
c) load power is $96\,W$
d) load power is $384\,W$

64) A $100\,kVA$, $\frac{11\,kV}{415\,V}$ transformer has 2% winding resistance and 4% leakage reactance. The voltage regulation at rated kVA, $0.8\,pf$ lagging load is

a) 2%
b) 4%
c) 4.8%
d) 6%

65) The source voltage of the three-phase network shown in figure is $11\,kV$



The line voltage at the load end and the phase angle with respect to the source voltage will be

a) $10.7\,kV, 0$
b) $10.7\,kV,\ 1.08\,lagging$
c) $10.7\,kV,\ 1.08\,leading$
d) $11\,kV,\ 1.08\,lagging$