XE-2007

EE24Btech11022 - Eshan Sharma

Consider the following C program segment

```
#include <stdio.h>
void print_mat (int [][3]);
void main(){
        int i,j,sum=0;
        int m[3][3] = {{1,3,5},{7,9,11},{13,15,17}};
        for(i=0;i<3;i++){
                for(j=2;j>1;j--){
                        sum += m[i][j]*m[i][j-1];
                }
        }
        printf("%d",sum);
        print_mat(m); // FUNCTION CALL
}

void print_mat(int mat[][3]){
        int(*p)[3]=&mat[1];
        printf("%d␣and␣%d", (*p)[1], (*p)[2]);
}
```

1) The values printed after the function call(marked as FUNCTION CALL) are (xe-2007)

a) 3 and 5 b) 7 and 9 c) 9 and 11 d) 13 and 15

Consider the following quadrature formula
$\int_0^1 12f(x)\,dx = (f(0) + 2bf(0.25) + 2f(0.5) + 2df(0.75) + f(1))$.

2) If the above formula is used as Simpson's 1/3 rule, then (xe-2007)

a) $b = d = 1$ b) $b = d = 2$ c) $b = 2d = 1$ d) $b = 2d = 2$

3) Using the correct values of b and d from above part in the quadrature formula, the value of $\int_0^1 \frac{12}{1+x}\,dx$ evaluated correct up to 4 decimals is (xe-2007)

a) 8.3091 b) 8.3121 c) 8.3151 d) 8.3191

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 $y(0.6) = 1.4333$.

4) Choose the correct predictor scheme to solve the above initial problem at $x = 0.8$ from the following (xe-2007)

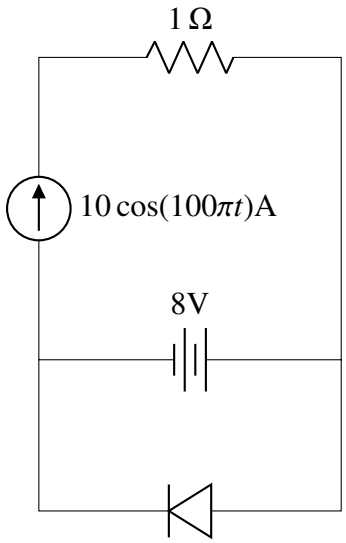
a) $y_{n+1} = y_n + \frac{4h}{3}(2f_{n-1} - f_{n-2} + 2f_{n-3})$
b) $y_{n+1} = y_{n-3} + \frac{4h}{3}(2f_{n-2} - f_{n-1} + 2f_n)$

c) $y_{n+1} = y_{n-1} + \frac{h}{3}(4f_{n-1} - 5f_n + 4f_{n+1})$
d) $y_{n+1} = y_{n-3} + \frac{4h}{3}(2f_{n-1} - f_{n-2} + 2f_{n-3})$

5) Using the correct predictor scheme from above, the value of $y(0.8)$ is (xe-2007)

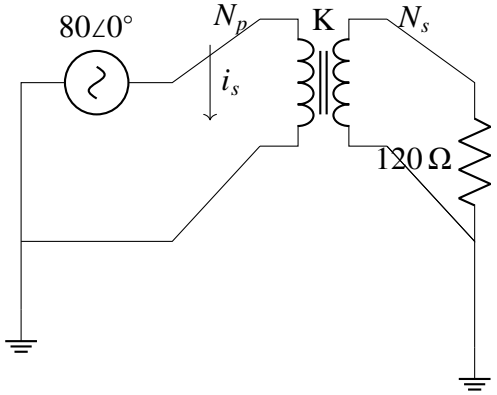
a) 1.8680 b) 1.8750 c) 1.8890 d) 1.9055

6) Assuming all components are ideal, the average power delivered by the dc voltage source network shown in the figure is (xe-2007)



a) −28 W b) 0 W c) 64 W d) 80 W

7) 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. (xe-2007)



a) 0.67∠0° b) 2.0∠0° c) 2.67∠0° d) 10.67∠0°

8) 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 (xe-2007)

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

9) The equivalent conductance of the forward biased diode, with bias voltage V, at the room temperature is (xe-2007)

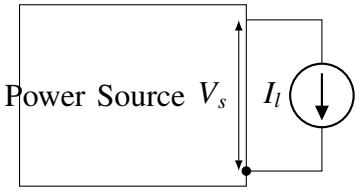
a) constant
b) proportional to V
c) proportional to V^2
d) proportional to $exp(KV)$

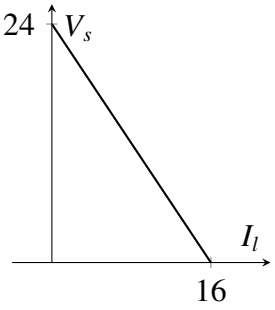
10) A number is represented as $(\mathbf{1010\ 1010})_{\mathbf{2}}$ using 8-bits in signed magnitude representation. The decimal number represented is (xe-2007)

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

11) A 10-bit DAC has a full scale output of $5V$. The DAC's resolution and step size will respectively be (xe-2007)
a) $0.0978\%, 500mV$
b) $0.0978\%, 4.88mV$
c) $0.195\%, 9.76mV$
d) $0.195\%, 500mV$

12) A power source has open circuit voltage of $24V$ 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 (xe-2007)

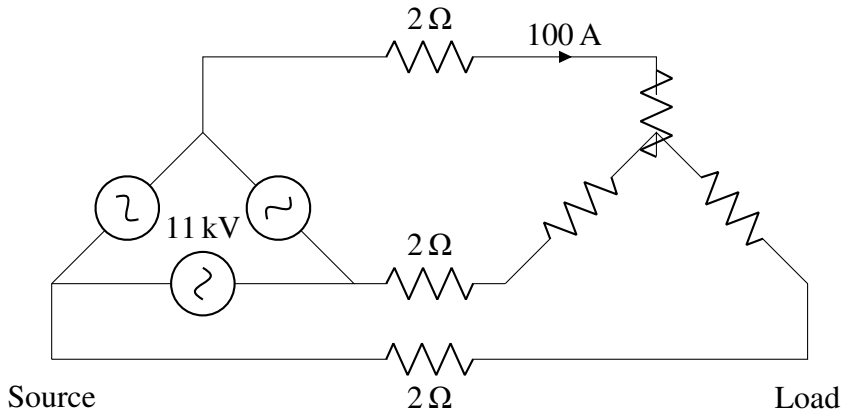




a) load current is $16A$
b) source voltage is $24V$
c) load power is $96W$
d) load power is $384W$

13) A $100kVA, 11kV/415V$ transformer has 2% winding resistance and 4% leakage reactance. The voltage regulation at rated $kVA, 0.8pf$ lagging load is (xe-2007)
a) 2%
b) 4%
c) 4.8%
d) 6%

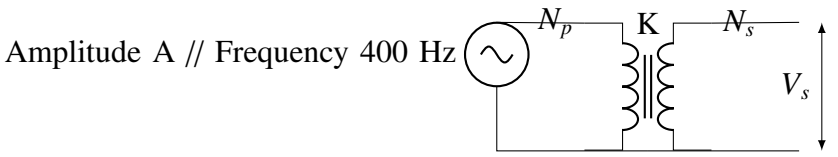
14) The source voltage of the three-phase network shown in the figure is $11kV$.



The line voltage at the load end and the phase angle with respect to the source voltage will be (xe-2007)

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

15) A sine-wave voltage at $400Hz$ feeds the transformer having $50turns$ in the primary winding as shown in the figure. The transformer core material has a saturation flux density of $1.2T$ and the hysterisis effects are neglected. The core area is $10cm^2$ and its relative permeability is 10^3 till the core reaches saturation.



The maximum amplitude of the sine-wave that can be applied on the primary winding without causing saturation under steady state conditions is (xe-2007)

a) $24V$
b) $48V$
c) $75.4V$
d) $150.8V$