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ESE- 2019 (Prelims) - Offline Test Series **Test-11**

ELECTRICAL ENGINEERING

SUBJECT: ENGINEERING MATHEMATICS AND COMPUTER FUNDAMENTALS - SOLUTIONS

01. Ans: (c)

Sol:

$$\begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{pmatrix}$$

$R_4 - (R_1 + R_2 + R_3)$

$$\sim \begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$R_1 \leftrightarrow R_2$

$$\sim \begin{pmatrix} 1 & -1 & -2 & -4 \\ 2 & 3 & -1 & -1 \\ 3 & 1 & 3 & -2 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$R_2 - 2R_1$; $R_3 - 3R_1$

$$\sim \begin{pmatrix} 1 & -1 & -2 & -4 \\ 0 & 5 & 3 & 7 \\ 0 & 4 & 9 & 10 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$5R_3 - 4R_2$

$$\sim \begin{pmatrix} 1 & -1 & -2 & -4 \\ 0 & 5 & 3 & 7 \\ 0 & 0 & 33 & 22 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$\therefore$ Rank = 3

02. Ans: (b)

Sol: $(AB) = \begin{pmatrix} 1 & a & 1 & 3 \\ 1 & 2 & 2 & b \\ 1 & 5 & 3 & 9 \end{pmatrix}$

$R_1 \leftrightarrow R_3$

$$\sim \begin{pmatrix} 1 & 5 & 3 & 9 \\ 1 & 2 & 2 & b \\ 1 & a & 1 & 3 \end{pmatrix}$$

$(R_2 - R_1)$ $(R_3 - R_1)$

$$\sim \begin{pmatrix} 1 & 5 & 3 & 9 \\ 0 & -3 & -1 & b-9 \\ 0 & a-5 & -2 & -6 \end{pmatrix}$$

$R_3 - 2R_2$

$$\sim \begin{pmatrix} 1 & 5 & 3 & 9 \\ 0 & -3 & -1 & b-9 \\ 0 & a+1 & 0 & 12-2b \end{pmatrix}$$

The given equations are consistent

$\Rightarrow$ at least one solution existing

if $\rho(A) = \rho(AB) \leq 3$ (no. of variables)

$\therefore \rho(A) = \rho(AB) = 2$

if $a = -1$ & $b = 6$

option (b) is correct.

03. Ans: (a)

Sol: $|A-\lambda I| = \begin{vmatrix} 2-\lambda & 3 \\ 1 & 2-\lambda \end{vmatrix}$

$= (\lambda^2 - 4\lambda + 1) = 0$

Let, $(A^2 - 4A + I) = 0$

$A^2 = (4A - I)$

$A^4 = (4A - I)(4A - I)$

$= (16A^2 - 8A + I)$

$= 16(4A - I) - 8A + I$

$= (56A - 15I)$

Option (a) is correct

04. Ans:(d)

Sol: We know that $AX = \lambda X$ it is possible only with option (d) with $\lambda = 1$

$$\begin{pmatrix} 2 & 4 \\ 1 & 5 \end{pmatrix}\begin{pmatrix} -4 \\ 1 \end{pmatrix} = 1\begin{pmatrix} -4 \\ 1 \end{pmatrix}$$

Other options fail

$\therefore$ Option (d) is correct

05. Ans: (b)

Sol: $|A-\lambda I| = \begin{vmatrix} 1-\lambda & 2 & 0 \\ 2 & 1-\lambda & -1 \\ -1 & 0 & 1-\lambda \end{vmatrix} = 0$

$(1-\lambda)(1-\lambda)^2 - 2(2-2\lambda-1) = 0$

$(1-\lambda)^3 - 4(1-\lambda) = 0$

$(1-\lambda)[(1-\lambda)^2 - 4] = 0$

$(1-\lambda)[(\lambda^2 - 2\lambda - 3] = 0$

$(-\lambda^3 + 3\lambda^2 + \lambda - 3] = 0$

$\therefore$ Option (b) is correct.

06. Ans: (b)

Sol: Let $v(x, y) = C$

$$dv = \left(\frac{\partial v}{\partial x}dx + \frac{\partial v}{\partial y}dy\right) = 0$$

$$= \left(\frac{-\partial u}{\partial y}dx + \frac{\partial u}{\partial x}dy\right) = 0$$

$dv = -6xydx + (2 - 3x^2 + 3y^2)dy = 0$

$= -3(x^2dy + 2xydx) + (2 + 3y^2)dy = 0$

$= -3d(x^2y) + (2 + 3y^2)dy = 0$

$\therefore v = -3x^2y + 2y + 3\left(\frac{y^3}{3}\right)$

Option (b) is correct.

07. Ans: (c)

Sol: $f^1(z) = \left(\frac{\partial u}{\partial x} + i\frac{\partial v}{\partial x}\right)$

$$= \left(\frac{\partial v}{\partial y} + i\frac{\partial v}{\partial x}\right) \quad \text{……… (1)}$$

$$\left.\begin{aligned}\frac{\partial v}{\partial y} &= -12x^2y + 4y^3 = 0 \ \ldots (2)\\ \frac{\partial v}{\partial x} &= 4x^3 - 12xy^2 = 4z^3 \ldots (3)\end{aligned}\right\} \text{(since } x\to z \ \& \ y\to 0\text{)}$$

(2) and (3) in (1)

$f^1(z) = 0 + i(4z^3)$

$\therefore f(z) = i4\left(\frac{z^4}{4}\right) + C$

$= iz^4 + C$

Option (c) is correct

08. Ans: (b)

Sol: $\int_C \left(y - x - 3ix^2\right)dz = \int_0^{(1+i)} \left(y - x - 3ix^2(dx + idy)\right)$

$= \int_{(0,0)}^{(1,1)} \left(y - x - 3ix^2\right)(dx + idy)$

($\because$ C is line $y = x \Rightarrow dy = dx$)

$= \int_0^1 \left(x - x - 3ix^2\right)(dx + idx)$

$= -3i\int_0^1 x^2(1+i)dx$

$= -3i(1+i)\left(\frac{x^3}{3}\right)_0^1$

$= -i(1+i) = (1-i)$

Option (b) is correct.

09. Ans: (a)

Sol: $\int_c \frac{e^z}{(z^2+4)}dz = \int_{|z-i|=2} \frac{e^z}{(z+2i)(z-2i)}dz$

$= \int_{|z-i|=2} \left(\frac{\frac{e^z}{z+2i}}{z-2i}\right) dz$

(Since, z = 2i lies inside C)

$= 2\pi i\left(\frac{e^{2i}}{2i+2i}\right)$

$= \frac{\pi}{2}e^{2i}$

Option (a) is correct

10. Ans: (b)

Sol: $\frac{e^{2z}}{(z-1)^3} = \frac{1}{(z-1)^3}e^{2(z-1)+2}$

$= \frac{e^2}{(z-1)^3}\left[1 + 2(z-1) + 4\frac{(z-1)^2}{2!} + \frac{8(z-1)^3}{3!} + \ldots\ldots\right]$

$\therefore$ Constant term $= \frac{8e^2}{3!}$

$= \frac{4e^2}{3}$

Option (b) is correct

11. Ans: (d)

Sol: $f(x) = 2x$ is an odd function in $(-\pi,\pi)$

$\therefore a_0 = 0$ and $a_n = 0$

Option (d) is correct.

12. Ans: (c)

Sol: Z = $(x^2 + a)(y^2 + b)$ .... (1)

$$\frac{\partial z}{\partial x} = 2x(y^2 + b) \quad \ldots\ldots\ldots(2)$$

$$\frac{\partial z}{\partial y} = 2y(x^2 + a) \quad \ldots\ldots\ldots(3)$$

$$(2)\times(3)\ \frac{\partial z}{\partial x}.\frac{\partial z}{\partial y} = 4xy(x^2 + a)(y^2 + b)$$

$$= 4xyz \quad \text{(from (1))}$$

Option (c) is correct

13. Ans: (b)

Sol: f(x, y) = $(x^2 + y^2 + 6x - 12)$

$$\frac{\partial y}{\partial x} = 0 \Rightarrow (2x + 6) = 0$$

$$x = -3$$

$$\frac{\partial f}{\partial y} = 0 \Rightarrow 2y = 0 \Rightarrow y = 0$$

$\therefore$ (–3,0) is the only stationery point

$$r = \frac{\partial^2 f}{\partial x^2} = 2,\ s = \frac{\partial^2 f}{\partial xdy} = 0,\ t = \frac{\partial^2 f}{dy^2} = 2$$

$\therefore$ At (–3,0) $(rt - s^2) = 4 > 0$

and r = 2 > 0

$\therefore$ Minimum value of f(xy) existing at (–3,0)

$\therefore$ f(–3,0) = (9+0–18–12) = –21

Option(b) is correct.

14. Ans: (b)

Sol: $\int_0^1\int_1^2 (x^2 + y^2)dxdy$

$$= \int_0^1 x^2dx\int_1^2 dy + \int_0^1 dx\int_1^2 y^2dy$$

$$= \left(\frac{x^3}{3}\right)_0^1 (y)_1^2 + (x)_0^1\left(\frac{y^3}{3}\right)_1^2$$

$$= \left(\frac{1}{3} - 0\right)(2-1) + (1-0)\left(\frac{8}{3} - \frac{1}{3}\right)$$

$$= \frac{1}{3} + \frac{7}{3} = \frac{8}{3}$$

Option (b) is correct

15. Ans: (a)

Sol: $y = \frac{2}{3}x^{3/2}$

$$\Rightarrow \frac{dy}{dx} = \frac{2}{3}.\frac{3}{2}x^{1/2} = x^{1/2}$$

$\therefore$ The required length = $\int_1^4 \sqrt{\left(1 + \left(\frac{dy}{dx}\right)^2\right)}\,dx$

$$= \int_1^4 \sqrt{(1+x)}\,dx$$

$$= \left[\frac{2}{3}(1+x)^{3/2}\right]_1^4$$

$$= \frac{2}{3}\left(5^{3/2} - 2^{3/2}\right)$$

Option (a) is correct.

16. Ans: (b)

Sol: The required volume $= \int_0^{\frac{\pi}{3}} \pi y^2 dx$

($\because$ y = sin3x is 0 at x=0 & $x=\frac{\pi}{3}$)

$$=\pi\int_0^{\frac{\pi}{3}}\sin^2 3x\,dx$$

$$=\frac{\pi}{2}\int_0^{\frac{\pi}{3}}(1-\cos 6x)dx$$

$$=\frac{\pi}{2}\left(x-\frac{\sin 6x}{6}\right)_0^{\frac{\pi}{3}}$$

$$=\frac{\pi}{2}\left[\left(\frac{\pi}{3}-0\right)-(0-0)\right]$$

$$=\frac{\pi^2}{6}$$

Option (b) is correct

17. Ans: (c)

Sol: $x\cos x\frac{dy}{dx}+y(x\sin x+\cos x)=\sin x$

$$\frac{dy}{dx}+y\left(\tan x+\frac{1}{x}\right)=\frac{\tan x}{x}$$

I.F = $e^{\int\left(\tan x+\frac{1}{x}\right)dx}$

$=e^{\log(\sec x)+\log x}$

$=e^{\log(x\sec x)}$

= xsecx

$\therefore$ y (xsecx) = $\int\frac{\tan x}{x}(x\sec x)dx$

$$=\int\sec x\tan x\,dx=\sec x+C$$

Option(c) is correct

18. Ans: (c)

Sol: $(x^2+y^2+2x)\,dx+2ydy=0$

$$\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)=(2y-0)=2y$$

$$\therefore\ \frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial u}\right)=\frac{2y}{2y}=1$$

$\therefore$ I.F. = $e^{\int 1.dx}=e^x$

Option(c) is correct

19. Ans: (b)

Sol: $(D^3-3D-2)y=x^2$

$$\therefore y_p=\frac{x^2}{(D^3-3D-2)}=\frac{-1}{2}\frac{x^2}{\left(1+\frac{3}{2}D-\frac{D^3}{2}\right)}$$

$$=\frac{-1}{2}\left[1+\left(\frac{3D}{2}-\frac{D^3}{2}\right)\right]^{-1}(x^2)$$

$$Y_p=\frac{-1}{2}\left[1-\left(\frac{3D}{2}-\frac{D^3}{2}\right)+\left(\frac{3D}{2}-\frac{D^3}{2}\right)^2\right](x^2)$$

$$=\frac{-1}{2}\left(1-\frac{3D}{2}+\frac{9D^2}{4}\right)(x^2)$$

$$=\frac{-1}{2}\left(x^2-\frac{3}{2}(2x)+\frac{9}{4}(2)\right)$$

$$=\frac{-1}{2}\left(x^2-3x+\frac{9}{2}\right)$$

$$=\frac{-1}{4}(2X^2-6X+9)$$

Option (b) is correct

20. Ans: (d)

Sol: $(D^3+5D^2+6D)\,y = 0$

$D(D^2+5D+6)\,y = 0$

$D(D+2)(D+3)\,y = 0$

$\therefore$ A.E. has roots 0, –2, –3

$\therefore y = (C_1 + C_2 e^{-2x} + C_3 e^{-3x})$

Option (d) is correct.

21. Ans: (b)

Sol: $$\frac{\cos 3x + e^x}{(D^2+9)} = \frac{\cos 3x}{(D^2+9)} + \frac{e^x}{(D^2+9)}$$

$$= \frac{x}{6}\sin 3x + \frac{e^x}{10}$$

Option (b) is correct

22. Ans: (b)

Sol: $\overline{A} = \left(x^2y\bar{i} + xy^2z\bar{j} + xyz\bar{x}\right)$

Div $\overline{A}$ = (2xy + 2xyz + xy)

(Div $\overline{A}$) $_{(1,-1,2)}$ = –2 –4 –1 = –7

Option (b) is correct

23. Ans: (c)

Sol: $$\text{Curl } \overline{F} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ (4x+3y+az) & (bx-y+z) & (2x+cy+z) \end{vmatrix}$$

$= (c-1)\,\bar{i} - (2-a)\,\bar{j} + (b-3)\,\bar{k}$

$\overline{F}$ is irrotational $\Rightarrow$ (c–1) = 0

(2–a) = 0

(b–3) = 0

$\therefore$ a = 2, b = 3, c = 1

Option(c) is correct.

24. Ans: (d)

Sol: $f = x^2y^3z^2$

$$\nabla^2 f = \left(\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial^2 f}{\partial z^2}\right)$$

$= (2y^3z^2 + 6x^2yz^2 + 2x^2y^3)$

$(\nabla^2 f)_{(1,2,1)} = (16+12+16) = 44$

Option (d) is correct.

25 Ans: (b)

Sol: Let $\phi = (2xy + z^2)$

$\nabla\phi = (2y\,\bar{i} + 2x\,\bar{j} + 2z\,\bar{k})$

$(\nabla\phi)_{(1,-1,3)} = (-2\,\bar{i} + 2\,\bar{j} + 6\,\bar{k})$

$$\bar{a} = \frac{(\bar{i}+2\bar{j}+3\bar{k})}{\sqrt{1+4+9}} = \frac{1}{\sqrt{14}}(\bar{i}+2\bar{j}+3\bar{k})$$

$$\therefore\ (\nabla\phi.\bar{a}) = \frac{1}{\sqrt{14}}(-2+4+18) = \frac{20}{\sqrt{14}}$$

Option (b) is correct.

26. Ans: (a)

Sol: 'C' is bounded by the two parabolae $y = x^2$ & $y^2 = x$, which is a closed curve intersecting at (0,0) & (1,1)

$\therefore$ By Green's theorem

$$\int_C (2xy - x^2)dx + (x^2+y^2)dy$$

$$= \iint_R (2y-2y)\,dxdy$$

$= 0$

Option (a) is correct

27. Ans: (b)

Sol: Let P = $\frac{1}{5}$

$$\Rightarrow q = \left(1-\frac{1}{5}\right) = \frac{4}{5}$$

n = 5

$\therefore$ From Bi-nominal distribution the required probability

$$= 5c_2\left(\frac{1}{5}\right)^2\left(\frac{4}{5}\right)^3$$

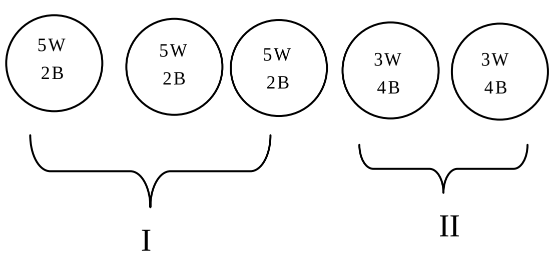
$$= \frac{10\times4\times4\times4}{5\times5\times5\times5\times5}$$

$$= \frac{128}{625}$$

Option (b) is correct.

28. Ans: (a)

Sol:



The required probability

$$= \frac{\frac{3C_1}{5C_1}\cdot\frac{2C_1}{7C_1}}{\left(\frac{3C_1}{5C_1}\cdot\frac{2C_1}{7C_1}+\frac{2C_1}{5C_1}\cdot\frac{4C_1}{7C_1}\right)}$$

$$= \frac{\left(\frac{3}{5}\frac{2}{7}\right)}{\left(\frac{3}{5}\cdot\frac{2}{7}+\frac{2}{5}\cdot\frac{4}{7}\right)} = \frac{6}{6+8}$$

$$= \frac{6}{14}$$

$$= \frac{3}{7}$$

Option (a) is correct.

29. Ans: (b)

Sol:

X	1	2	3	4	5
ρ(X)	0.1	0.2	0.4	0.2	0.1

The mean of X = $\sum$ XP(x)

= 1(0.1) +2 (0.2) + 3(0.4) +4(0.2) +5(0.1)

= 0.1 + 0.4 + 1.2 + 0.8 + 0.5

= 3

Option (b) is correct.

30. Ans: (c)

Sol: The required probability

$$= \frac{1}{3}\cdot\frac{4}{9}+\frac{2}{3}\cdot\frac{5}{11}$$

$$= \frac{2}{3}\left(\frac{2}{9}+\frac{5}{11}\right)$$

$$= \frac{2}{3}\left(\frac{22+45}{99}\right) = \frac{134}{297}$$

Option(c) is correct.

31. Ans: (b)

Sol: Let $f(x) = (x^3 - 2x - 5) = 0$

$f(2) = (8-4-5) = -1$

$f(3) = 27 - 6 - 5 = 16$

Let $x_0 = 2,\ x_1 = 3$

$$\therefore x_2 = \frac{x_o f(x_1) - x_1 f(x_0)}{f(x_1) - f(x_0)}$$

$$= \frac{2(16) - 3(-1)}{16 - (-1)}$$

$$= \frac{35}{17} = 2.059$$

Option(b) is correct.

32. Ans: (b)

Sol: $f(x) = (x^3 - x^2 + 4x - 4)$

$f^1(x) = (3x^2 - 2x + 4)$

$x_0 = 2$

$$x_1 = x_0 - \frac{f(x_o)}{f^1(x_0)}$$

$$= 2 - \frac{(8-4+8-4)}{(12-4+4)}$$

$$= 2 - \frac{8}{12}$$

$$= 2 - \frac{2}{3}$$

$$= \frac{4}{3}$$

Option (b) is correct.

33. Ans: (b)

Sol: Let $\frac{1}{7} = x$

$$\Rightarrow \left(\frac{1}{x} - 7\right) = 0$$

$$\therefore f(x) = \left(\frac{1}{x} - 7\right)$$

$$f^1(x) = \frac{-1}{x^2}$$

$x_0 = 0.2$

$$x_1 = x_0 - \frac{f(x_0)}{f^1(x_0)} = 0.2 - \frac{\left(\frac{1}{0.2} - 7\right)}{\left(-\frac{1}{0.04}\right)}$$

$$x_1 = 0.2 + \frac{0.04(1-1.4)}{0.2}$$

$= 0.2 + 0.2\ (-0.4)$

$= 0.2 - 0.08$

$= 0.12$

Option (b) is correct.

34. Ans: (c)

Sol: $$\frac{dy}{dx} = (x - y) = f(x, y)$$

$y(0) = 0 \Rightarrow X_0 = 0\ \&\ Y_0 = 0$

$h = 0.1$

Let $x_1 = 0.1$

$\therefore\ y(x_1) = y_1$

$$= y_0 + \frac{h}{2}\ [f(x_o, y_o) + f(x_1, y_o + hf(x_{.0}, y_o))]$$

$$y_1 = 0 + \frac{0.1}{2}[f(0,0) + f(0.1, 0 + 0.1 f(0,0))]$$

$$=\frac{0.1}{2}\left[(0-0)+f\left(0.1,0.1(0-0)\right)\right]$$

$$=\frac{0.1}{2}\left[f(0.1,0)\right]$$

$$=\frac{0.1}{2}(0.1-0)$$

$$=\frac{0.01}{2}=0.005$$

Option(c) is correct.

35. Ans: (c)

Sol: Let $\sqrt[3]{C}=x$

$(x^3 - C) = 0$

$\therefore f(x) = (x^3 - C)$

$f'(x) = 3x^2$

$$x_{n+1}=x_n-\frac{f(x_n)}{f^1(x_n)}$$

$$=x_n-\frac{(x_n^3-C)}{3x_n^2}$$

$$=\frac{2x_n^3+C}{3x_n^2}$$

Option (c) is correct.

36. Ans: (a)

Sol: $\frac{d^2y}{dx^2}-y=0$

$m^2 - 1 = 0$

$\Rightarrow m = \pm 1$

$y = c_1e^x + c_2e^{-x}$

$y(0) = 2 \Rightarrow 2 = c_1 + c_2$ ……….. (1)

$y' = c_1e^x - c_2e^{-x}$

$y'(0) = 0 \Rightarrow 0 = c_1 - c_2$ ..……… (2)

Solving (1) and (2), we get $c_1 = 1$ and $c_2 = 1$

$y = e^x + e^{-x}$

$y = 2\cosh x$

37. Ans: (d)

Sol: $g(x)=\frac{f(x)}{x+1}$

g(x) in continuous and differentiable in [0, 5].

By Lagrange's theorem, there exists a value $c \in (0, 5)$, such that

$$g^1(c)=\frac{g(5)-g(0)}{5-0}$$

$$=\frac{\left(-\frac{1}{6}\right)-4}{5}=\frac{-5}{6}$$

38. Ans: (b)

Sol: P.I = $\frac{1}{D^2+D-2}e^x$

$$=\frac{1}{(D+2)(D-1)}e^x$$

$$=\frac{1}{3}\frac{e^x}{D-1}$$

$$=\frac{1}{3}.x.\frac{e^x}{1}$$

$$=\frac{xe^x}{3}$$

39. Ans: (b)

Sol: If rank of A is 2, then |A| = 0

$\Rightarrow (x-1)\ (x^2 + x + 1) = 0$

$\Rightarrow x = 1,\ \dfrac{-1 \pm \sqrt{3}\,i}{2}$

$\therefore\ x = 1$

40. Ans: (b)

Sol: By addition theorem of probability,

Required Probability

= (0.1) + (0.05) – (0.1) (0.05)

= 0.145

41. Ans: (a)

Sol: TLB can be used to store few of the page table or segment table entries to decrease effective memory access time.

42. Ans: (C)

Sol: Effective memory access time

= 0.1* 1000+ 0.9 * 60

= 100+54

= 154 nsec

43. Ans: (d)

Sol: Size of ROM

= No. of multiplication results * 1 result size

$= (2^4 * 2^4) * 8\text{-bits}$

$= 2^8 * 8\text{-bits}$

$= 2^{11}\text{-bits}$

= 2K bits

44. Ans: (d)

Sol: $512k \times 8\text{-bits} \Rightarrow 2^{19} \times 8\text{-bits}$

address lines = 19

data lines = 8

power = 1

ground = 1

29

45. Ans: (d)

Sol: All are hardware solutions for branch difficulty. One software solution also possible which is "delayed branch" provided by compiler.

46. Ans: (b)

Sol: CPU goes for interrupt service only after completing current instruction execution. But DMA service can be performed even when the current instruction execution has not completed.

47. Ans: (a)

Sol: One instruction execution is performed by one instruction cycle, which contains following 6 phases:

1. Instruction fetch
2. Instruction decode
3. Effective address calculation
4. Operand fetch
5. Execution
6. Write back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48. Ans: (b)

Sol: Auto increment mode is post increment and auto decrement mode is pre decrement.

49. Ans: (d)

Sol: Most of the operating systems ignore the deadlocks all together and pretends that deadlocks never occur in the system including unix.

50. Ans: (d)

Sol: Option (a) will not initialize array. It is just declaration of array. So array elements will have garbage values.

51. Ans: (d)

Sol: The while loop will run infinite times because there is a semicolon(;) at the end of while statement. So any print but only infinite loop.

52. Ans: (c)

53. Ans: (b)

Sol: Pointer of any type occupies 2 Bytes.

Hence * p $\Rightarrow$2B

* fp[10] $\Rightarrow$ 10*2B = 20B

char x $\Rightarrow$ 1B

Total $\Rightarrow$ 2 + 20 +1 = 23B

54. Ans: (b)

55. Ans: (a)

Sol: 1 chip capacity $= \dfrac{\text{Total capacity}}{\text{number of chips}}$

$$= \frac{256\,\text{MB}}{16}$$

$$= \frac{2^{26}\,\text{B}}{2^4}$$

$$= 2^{22}\ \text{B}$$

Byte addressable chip,

hence chip memory $\Rightarrow 2^{22}\times 1\text{B}$

address $\Rightarrow$ 22-bits

56. Ans: (c)

Sol: DMA is used for data transfer between memory & I/O

57. Ans: (a)

Sol: Opcode is mandatory field in every instruction

58. Ans: (d)

Sol: In Real time system OS provides deadline to every process and process should execute within deadline itself.

59. Ans: (a)

60. Ans: (b)

Sol: Definition of printf() and scanf() functions are given in header file stdio.h. So if these functions are used in program then we will have to include this header file.

61. Ans: (d)

Sol: For structure variable dot(.) is used ; but for structure pointer arrow (→) is used.

62. Ans: (c)

Sol: 1 block is transferred when there is a miss in cache.

63. Ans: (b)

Sol: a=b is assignment operation and if condition will be true.

Hence a = 3 ⇒ a+b ⇒ 3+3 ⇒6

To compare a and b, a = = b should be written

64. Ans: (b)

65. Ans: (c)

Sol: A & B will return bit-wise AND of A and B.

$$\begin{array}{l} A \Rightarrow 5 \Rightarrow 101 \\ \underline{B \Rightarrow 6 \Rightarrow 110} \\ \qquad\qquad 100 \Rightarrow 4 \end{array}$$

66. Ans: (d)

Sol: All statements are valid.

67. Ans: (c)

Sol: All the instructions supported by a system are collectively known as instruction set.

68. Ans: (a)

69. Ans: (a)

Sol: Memory size $= 2^{16} \times 8$ bits

$= 2^{16} \times 1\text{B}$

$= 64$ KB

70. Ans: (b)

Sol: $30 = H \times 10 + (1 - H)(10 + 200)$

$30 = 10H + 210 - 210H$

$200H = 180$

$H = 0.9$

$= 90\%$

71. Ans: (a)

Sol: Statement II is correct reason of Statement I.

72. Ans: (a)

Sol: In vectored interrupt CPU receives address of ISR (Interrupt Service Routine) along with interrupt signal from device. Hence, the CPU directly can branch to ISR and can execute it.

73. Ans: (a)

Sol: Statement (II) is correct reason for Statement (I).

74. Ans: (a)

Sol: For Program data relocation in base register mode, new base address will be updated in base register hence no need to change in code.

75. Ans: (b)

Sol: Both the statements are definitions of external fragmentation and internal fragmentation.

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