$y_1^{(C)} = y_0 + \frac{h}{2}[f(x_0, y_0) + f(x_1, y_1)]$ …… corrector Method

Predictor corrector: $y_1^{(PC)} = y_0 + \frac{h}{2}\left[f(x_0, y_0) + f\left(x_1, y_1^{(1)}\right)\right]$

As $y_0 = 1$ & $x_0 = 0, x_1 = x_0 + h = 0.3$

$y_1^{(p)} = 1 + 0.3(-2 \times (0) \times 1) = 1$

$y_1^{(C)} = 1 + \frac{0.3}{2}[0 + (-2)(0.3)^2(1)]$

$= 0.973$

$y_1^{(P-C)} = 1 + \frac{0.3}{2}[0 + (-2)(0.3)^2(0.973)]$

$= 0.973729$

18. **[Ans. *] Range: 0.66 to 0.67**

Error in three equations is

$\varepsilon_1 = 3x - 2$

$\varepsilon_2 = 2x - 1$

$\varepsilon_3 = 4x - 3$

$f(x) =$ sum of square erros

$= \varepsilon_1^2 + \varepsilon_2^2 + \varepsilon_3^2$

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

For minimum value of sum of squares

$f'(x) = 0$

$f''(x) > 0$

$f'(x) = 2(3x - 2) + 2(2x - 1) + 2(4x - 3) = 0$

$9x - 6 = 0$

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

$f''(x) = 2(3) + 2(2) + 2(4) > 0$

$\therefore f(x)$ is minimum at $x = \frac{2}{3}$

$x^3 - 6x^2 - 13x + 42 = 0$

19. **[Ans. B]**

First approximation using second order R-K method

$y_1 = y_0 + k$

$k = \frac{k_1 + k_2}{2}$

$k_1 = hf(x_0, y_0)$

$k_2 = hf(x_0 + h, y_0 + k_1)$

Where $f(x, y) = \frac{dy}{dx}$

In the above question $y_0 = 2, x_0 = 1, h = 0.2$

$k_1 = 0.2\left(3 - \frac{2}{1}\right) = 0.2$

$$k_2 = 0.2\left(3 - \frac{(2+0.2)}{1+0.2}\right) = 0.2333$$

$k = 0.2166$

$y_1 = 2 + 0.2166 = 2.2166$

20. **[Ans. B]**

For bisection method

$$\frac{b-a}{2^n} \leq \text{accuracy}$$

$$\frac{2-1}{2^n} \leq 10^{-4}$$

$10^4 \leq 2^n$

$n = 14$

Option (C) is correct answer.