

Course Code: 2BSC4

Course: MATHS-II

Credit: 4

Last Submission Date: October 31, (for January session)

April 30 (for July Session)

Max. Marks:-30

Min. Marks:-10

Note:-attempt all questions.

Que1. If $y = \sin(m \sin^{-1}x)$ then show that $(1-x^2) \frac{dy^2}{dx^2} + x \frac{dy}{dx} + m^2 y = 0$

Que2. State and five machaurin's theorem.

Que3. Evaluate –

(i) $\int \frac{dx}{x^2+1} \frac{1}{(x^2+1)}$

(ii) $\int \cos^7 x \, dx$

(iii) $\int \frac{dx}{5+4\cos x}$

Que4. Show that-

(i) $\int_0^1 x^2(1-x^2)^{3/2} dx = \frac{\pi}{32}$

(ii) $\int_0^{29} x^9/2 (29-x)^{-1/2} dx = \frac{63\pi a^5}{8}$

Que5. Solve the linear differential equation

$$(1-x^2) \frac{dy}{dx} + 2xy = x \sqrt{1-x^2}$$

Que6. Solve

(i) $(D^2 - 6D + 7)y = e^x + e^{-x}$

(ii) $(D^2 - 3D + 2)y = 6e^{2x} + \sin 2x$

Que7. Solve

$$x \frac{d^2}{dx^2} - (2x-1) \frac{dy}{dx} + (x-1)y = 0$$

Que8. Solve by the method of variation of parameters

$$\frac{dy^2}{dx^2} + y = \operatorname{cosec} x.$$

Que9. if $r = xi + yj + zk$, then show that

(i) $\operatorname{Grad} r = \hat{r}$

(ii) $\operatorname{Grad} \log |r| = \frac{\hat{r}}{r^2}$

(iii) $\operatorname{Grad} \left(\frac{1}{r} \right) = -\frac{\hat{r}}{r^2}$

(iv) $\operatorname{Grad} n^r = nr^{n-r} \hat{r}$

Que10. Find the directional derivative of

$$\varphi = xy + yz + zx \text{ in the}$$

Direction of the vector $i+2j + 2k$ at the point $(1,2,0)$