

8. Find the $\frac{dy}{dx}$ for $\cos \sqrt{x}$ CO4- App

- (a) $-\sin \sqrt{x}$ (b) $\frac{-\sin \sqrt{x}}{2\sqrt{x}}$ (c) $-\cos \sqrt{x}$ (d) $\frac{\cos \sqrt{x}}{2\sqrt{x}}$

9. $\iint_R dx dy$ gives _____ CO6- U

- (a) Volume of R (b) Area of the region R (c) Length of R (d) None of these

10. $\int_0^1 \int_0^2 \int_0^3 dx dy dz$ is equal to CO5- App

- (a) 2 (b) 3 (c) 4 (d) 6

PART – B (5 x 2= 10Marks)

11. Derive R from the premises $P \rightarrow Q, Q \rightarrow R$ and P CO1- App

12. Find the number of positive integers not exceeding 100 that are divisible by 5 or by 11 CO2- App

13. In an abelian group prove that $(ab)^2 = a^2b^2$ CO3-App

14. Differentiate $e^{\sin x^2}$ CO4- App

15. Change the order of integration $\int_0^a \int_y^a f(x, y) dx dy$ CO5- App

PART – C (5 x 16= 80Marks)

16. (a) (i) Prove the following using CP Rule. CO1- App (8)

$$P \rightarrow (Q \rightarrow S), \neg R \vee P, Q \Rightarrow R \rightarrow S$$

(ii) Using truth table find PCNF and PDNF for $(P \wedge Q) \vee (\neg P \wedge R) \vee (Q \wedge R)$ CO1- App (8)

Or

(b) (i) Show that the premises “one student in this class knows how to write programs in JAVA” and “Every one who knows how to write programs in JAVA can get a high- paying job” imply the conclusion “some one in this class can get high paying job” CO1 - App (8)

(ii) Prove the following using Indirect method . CO1 -App (8)
 $P \rightarrow Q, Q \rightarrow R, \neg P \vee \neg R, P \vee R \Rightarrow R$

17. (a) (i) Find the number of positive integers between 1 and 600 divisible by 2, 3, 5 or 7 CO2 -App (8)

(ii) Using Mathematical Induction show that, $n^3 + 2n$ is divisible by 3 CO2 -App (8)

Or

(b) (i) There are seven men and six women in a room. Find the number of ways four persons can be drawn from the room if CO2 -App (8)

(a) they can be male or female,

(b) two must be men and two women,

(c) they all are of the same Gender.

(ii) Using generating functions Solve $a_n = 2a_{n-1} + 2^n, a_0 = 2$ CO2 -App (8)

18. (a) (i) Let G be a finite group of order 'n' and H be any subgroup of G CO3- App (8)
Then the order of H divides the order of G. (i.e) $O(H) / O(G)$

(ii) The intersection of two subgroup of a group is also a subgroup of the group CO3- App (8)

Or

(b) (i) Prove that in a group G is abelian iff $(a*b)^n = a^n * b^n$ CO3- App (8)

(ii) Prove that the union of two subgroup of G needs not a subgroup CO3- App (8)

19. (a) (i) If $y = e^{ax} \cos bx$ Prove that $\frac{d^2y}{dx^2} - 2a \frac{dy}{dx} + (a^2 + b^2)y = 0$ CO4-App (8)

(ii) Determine the reduction formula for $\int \sin^n x dx$ CO4-App (8)

Or

(b) (i) Compute $\int_0^{\frac{\pi}{2}} \frac{(\sin x)^{\frac{3}{2}}}{(\cos x)^{\frac{3}{2}} + (\sin x)^{\frac{3}{2}}} dx$ CO4 -App (8)

(ii) If $y = (2 \cos t - \cos 2t)$, $x = (2 \sin t - \sin 2t)$ Find the value of $\frac{d^2 y}{dx^2}$ CO4 -App (8)

at $t = \left(\frac{\pi}{2}\right)$

20. (a) (i) Using the Triple integration, compute the volume of the tetrahedron $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1, x=0, y=0 \text{ \& } z=0$ CO5- App (8)

(ii) Change the order of integration and hence evaluate CO5- App (8)

$$\int_0^a \int_x^a (x^2 + y^2) dy dx$$

Or

(b) (i) Change the order of integration and hence evaluate $\int_0^1 \int_y^{2-y} xy dx dy$. CO5- App (8)

(ii) Evaluate $\iiint \frac{dx dy dz}{\sqrt{a^2 - x^2 - y^2 - z^2}}$ over the first octant of the sphere CO5- App (8)

$$x^2 + y^2 + z^2 = a^2$$