Objective Questions TYBSC Maths I Sem V

1. Reversing the order of integration of $\int_0^1 \int_{x^2}^{x} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{-y}^{\sqrt{y}} f(x,y)dxdy$ (b) $\int_0^1 \int_{y}^{\sqrt{y}} f(x,y)dxdy$ (c) $\int_0^1 \int_{y}^{-\sqrt{y}} f(x,y)dxdy$ (d) None of these

2. Reversing the order of integration of $\int_0^1 \int_{x}^{\sqrt{x}} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{y^2}^{y} f(x,y)dxdy$ (b) $\int_0^1 \int_{-y^2}^{y} f(x,y)dxdy$ (c) $\int_0^2 \int_{y^2}^{y} f(x,y)dxdy$ (d) None of these

3. Reversing the order of integration of $\int_0^1 \int_{0}^{x} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{-y}^{y} f(x,y)dxdy$ (b) $\int_0^1 \int_{y}^{1} f(x,y)dxdy$ (c) $\int_0^1 \int_{0}^{y} f(x,y)dxdy$ (d) None of these

4. Reversing the order of integration of $\int_0^1 \int_{\sqrt{x}}^{x^2} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{y^2}^{\sqrt{y}} f(x,y)dxdy$ (b) $\int_0^1 \int_{0}^{y^2} f(x,y)dxdy$ (c) $\int_0^1 \int_{y}^{y^2} f(x,y)dxdy$ (d) None of these

5. Reversing the order of integration of $\int_0^1 \int_{e^x}^{e} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{1}^{logy} f(x,y)dxdy$ (b) $\int_0^1 \int_{y}^{logy} f(x,y)dxdy$ (c) $\int_1^e \int_{0}^{logy} f(x,y)dxdy$ (d) None of these

6. Reversing the order of integration of $\int_0^1 \int_{0}^{1-x} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{y-1}^{1} f(x,y)dxdy$ (b) $\int_0^1 \int_{0}^{1-y} f(x,y)dxdy$ (c) $\int_0^1 \int_{y-1}^{y+1} f(x,y)dxdy$ (d) None of these

7. Reversing the order of integration of $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (b) $\int_{-1}^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (c) $\int_{-1}^1 \int_{0}^{\sqrt{1-y^2}} f(x,y)dxdy$ (d) None of these

8. Reversing the order of integration of $\int_1^e \int_{0}^{logx} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{e^y}^{e} f(x,y)dxdy$ (b) $\int_0^1 \int_{0}^{2} f(x,y)dxdy$ (c) $\int_0^1 \int_{0}^{logy} f(x,y)dxdy$ (d) None of these

9. Reversing the order of integration of $\int_0^{\frac{1}{\sqrt{2}}} \int_{x}^{\sqrt{1-x^2}} f(x,y)dydx$ we get

   (a) $\int_0^1 \int_{y}^{e} f(x,y)dxdy$ (b) $\int_0^1 \int_{0}^{y} f(x,y)dxdy$ (c) $\int_0^1 \int_{y}^{y^2} f(x,y)dxdy$ (d) None of these

10. Reversing the order of integration of $\int_0^1 \int_{0}^{2} f(x,y)dydx$ we get

    (a) $\int_0^1 \int_{1}^{2} f(x,y)dxdy$ (b) $\int_0^2 \int_{0}^{1} f(x,y)dxdy$ (c) $\int_0^1 \int_{0}^{2} f(x,y)dxdy$ (d) None of these

11. Reversing the order of integration of $\int_0^1 \int_{0}^{\sqrt{1-x^2}} f(x,y)dydx$ we get

    (a) $\int_{-1}^1 \int_{0}^{\sqrt{1-y^2}} f(x,y)dxdy$ (b) $\int_0^1 \int_{1}^{\sqrt{1-y^2}} f(x,y)dxdy$ (c) $\int_0^1 \int_{0}^{\sqrt{1-y^2}} f(x,y)dxdy$ (d) None of these

12. Reversing the order of integration of $\int_{-1}^1 \int_{0}^{\sqrt{1-x^2}} f(x,y)dydx$ we get

    (a) $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (b) $\int_{-1}^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (c) $\int_0^1 \int_{0}^{\sqrt{1-y^2}} f(x,y)dxdy$ (d) None of these

13. Reversing the order of integration of $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ we get

(a) $\int_0^1 \int_0^{\sqrt{1-y^2}} f(x,y)dxdy$ (b) $\int_{-1}^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (c) $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ (d) None of these

14. Reversing the order of integration of $\int_0^1 \int_y^{\sqrt{y}} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_0^x f(x,y)dydx$ (b) $\int_0^1 \int_{x^2}^x f(x,y)dydx$ (c) $\int_0^1 \int_1^x f(x,y)dydx$ (d) None of these

15. Reversing the order of integration of $\int_0^1 \int_{y^2}^y f(x,y)dxdy$ we get

(a) $\int_0^1 \int_x^{\sqrt{x}} f(x,y)dydx$ (b) $\int_0^1 \int_0^{\sqrt{x}} f(x,y)dydx$ (c) $\int_0^1 \int_{\sqrt{x}}^x f(x,y)dydx$ (d) None of these

16. Reversing the order of integration of $\int_0^1 \int_y^1 f(x,y)dxdy$ we get

(a) $\int_0^1 \int_x^1 f(x,y)dydx$ (b) $\int_0^1 \int_0^x f(x,y)dydx$ (c) $\int_0^1 \int_1^x f(x,y)dydx$ (d) None of these

17. Reversing the order of integration of $\int_0^1 \int_{y^2}^{\sqrt{y}} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_{\sqrt{x}}^{x^2} f(x,y)dydx$ (b) $\int_0^1 \int_0^{\sqrt{x}} f(x,y)dydx$ (c) $\int_0^1 \int_{\sqrt{x}}^x f(x,y)dydx$ (d) None of these

18. Reversing the order of integration of $\int_1^e \int_0^{logy} f(x,y)dxdy$we get

(a) $\int_0^1 \int_0^{logx} f(x,y)dydx$ (b) $\int_0^1 \int_x^e f(x,y)dydx$ (c) $\int_0^1 \int_{e^x}^e f(x,y)dydx$ (d) None of these

19. Reversing the order of integration of $\int_0^1 \int_0^{1-y} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_{1+x}^{2+x} f(x,y)dydx$ (b) $\int_0^1 \int_0^{1-x} f(x,y)dydx$ (c) $\int_0^1 \int_{1-x}^{1+x} f(x,y)dydx$ (d) None of these

20. Reversing the order of integration of $\int_{-1}^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (b) $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (c) $\int_{-1}^0 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (d) None of these

21. Reversing the order of integration of $\int_0^1 \int_{e^y}^e f(x,y)dxdy$ we get

(a) $\int_1^e \int_0^{logx} f(x,y)dydx$ (b) $\int_0^1 \int_1^x f(x,y)dydx$ (c) $\int_0^1 \int_e^{logx} f(x,y)dydx$ (d) None of these

22. Reversing the order of integration of $\int_0^{\frac{1}{\sqrt{2}}} \int_y^{\sqrt{1-y^2}} f(x,y)dxdy$ we get

(a) $\int_0^{\frac{1}{\sqrt{2}}} \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (b) $\int_0^{\frac{1}{\sqrt{2}}} \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (c) $\int_0^{\frac{1}{\sqrt{2}}} \int_x^{\sqrt{1-x^2}} f(x,y)dydx$ (d) None of these

23. Reversing the order of integration of $\int_0^2 \int_0^1 f(x,y)dxdy$we get

(a) $\int_0^1 \int_1^2 f(x,y)dydx$ (b) $\int_0^1 \int_0^2 f(x,y)dydx$ (c) $\int_0^2 \int_0^1 f(x,y)dydx$ (d) None of these

24. Reversing the order of integration of $\int_0^1 \int_0^{\sqrt{1-y^2}} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (b) $\int_0^1 \int_x^{\sqrt{1-x^2}} f(x,y)dydx$ (c) $\int_0^1 \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (d) None of these

25. Reversing the order of integration of $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$we get

(a) $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (b) $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (c) $\int_0^1 \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (d) None of these

26. Reversing the order of integration of $\int_0^1 \int_{-\sqrt{1-y^2}}^{\sqrt{1-y^2}} f(x,y)dxdy$ we get

(a) $\int_0^1 \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (b) $\int_{-1}^1 \int_0^{\sqrt{1-x^2}} f(x,y)dydx$ (c) $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} f(x,y)dydx$ (d) None of these

27. $\int_0^1 \int_0^x xdydx$ = ?

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) None of these

28. $\int_1^e \int_0^{logx} dydx$ = ?

(a) -1 (b) 1 (c) 0 (d) None of these

29. $\int_0^1 \int_0^{1-y} dxdy$ = ?

(a) $\frac{1}{3}$ (b) $\frac{1}{5}$ (c) $\frac{1}{2}$ (d) None of these

30. $\int_0^1 \int_y^1 xdxdy$ = ?

(a) $\frac{1}{4}$ (b) $\frac{1}{12}$ (c) $\frac{1}{3}$ (d) None of these

31. $\int_0^1 \int_{e^y}^e dxdy$ = ?

(a) 1 (b) 2 (c) 0 (d) 3

32. $\int_0^1 \int_{x^2}^x xdydx$ = ?

(a) $\frac{1}{12}$ (b) $\frac{2}{7}$ (c) $\frac{1}{8}$ (d) None of these

33. $\int_0^1 \int_{\sqrt{x}}^{x^2} dydx$ = ?

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{8}$ (d) None of these

34. $\int_0^1 \int_0^4 \int_0^2 x\, dydxdz$ = ?

(a) 14 (b) 15 (c) 16 (d) None of these

35. $\int_0^1 \int_{y^2}^{\sqrt{y}} f(x,y)dxdy$ = ?

(a) $\frac{1}{3}$ (b) $\frac{1}{5}$ (c) $\frac{1}{4}$ (d) None of these

36. $\int_0^1 \int_1^2 \int_0^2 x\, dxdyd\, z$ = ?

(a) 2 (b) 1 (c) 3 (d) None of these

37. $\int_0^1 \int_0^{1-x} dydx$ = ?

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) None of these

38. $\int_0^1 \int_y^{\sqrt{y}} xdxdy$ = ?

(a) $\frac{1}{2}$ (b) $\frac{1}{6}$ (c) $\frac{1}{12}$ (d) None of these

39. $\int_1^4 \int_0^5 \int_0^1 z^2\, dzdxd\, y$ = ?

(a) 1 (b)5 (c) 6 (d) None of these

40. $\int_0^1 \int_0^4 \int_0^x 1\, dydxdz$ = ?

(a) 8 (b) 16 (c) 4 (d) None of these

41. The area enclosed by the lines y=x, x=2 and x axis is

(a) 1 (b) 2 (c) 4 (d) None of these

42. The area enclosed by the line y=x , the circle $x^2 + y^2 = 1$ and the y axis in the first quadrant is

(a) $\frac{\pi}{16}$ (b) $\frac{\pi}{8}$ (c) $\frac{\pi}{4}$ (d) None of these

43. The area enclosed by the parabolas $y = x^2$ and $x = y^2$ is

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) None of these

44. The area enclosed by the line x+y=1 and the coordinate axis is
(a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) None of these

45. The area enclosed by the line x=1,y=logx and the x axis is
(a) 1 (b) e (c) e+1 (d) None of these

46. The area enclosed by the lines x=2 y=1 and the coordinate axis is
(a) 1 (b) 2 (c) 3 (d) None of these

47. The area enclosed by the line y= e ,the curve $y = e^x$ and the y axis is
(a) 1 (b) 2 (c) 3 (d) None of these

48. The area enclosed by the line y=x and the parabola $y^2 = x$ is
(a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{1}{6}$ (d) None of these

49. The area enclosed by the line y=x and the parabola $x^2 = y$ is
(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{6}$ (d) None of these

50. The area enclosed by the line y=x , the circle $x^2 + y^2 = 1$ and the x axis in the first quadrant is
(a) $\frac{\pi}{16}$ (b) $\frac{\pi}{8}$ (c) $\frac{\pi}{4}$ (d) None of these

51. The area enclosed by the lines y=x, y=2 and the y axis is
(a) 1 (b) 2 (c) 4 (d) None of these

52. The double integral $\int\int_S f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ x^2 + y^2 = 1, y = x, and\ the\ x\ axis\ where\ f(x,y) = x$, expressed as an iterated integral in polar coordinates is
(a) $\int_0^{\pi}\int_0^1 r^2 \sin\theta\, drd\theta$ (b) $\int_0^{\pi}\int_0^1 r^2 \sin\theta\, drd\theta$ (c) $\int_0^{\frac{\pi}{4}}\int_0^1 r^2 \cos\theta\, drd\theta$ (d) none of these

53. The double integral $\int\int_S f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ x^2 + y^2 = 1, y = x, and\ the\ y\ axis\ where\ f(x,y) = x\ where$, expressed as an iterated integral in polar coordinates is
(a) $\int_0^{\pi}\int_0^1 r^2\, sin\theta drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r^2\, sin\theta drd\theta$ **(c)** $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_0^1 r^2\, sin\theta drd\theta$ (d) none of these

54. The double integral $\int\int_S f(x,y)\,dxdy$ where $S\ is\ the\ region\ in\ the\ first\ quadrant\ enclosed\ by\ x^2 + y^2 = 1, and\ by\ the\ coordinate\ axis\ where\ f(x,y) = 2$, expressed as an iterated integral in polar coordinates is
(a) $\int_0^{\pi}\int_0^1 2r\, drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r\, drd\theta$ **(c)** $\int_0^{\frac{\pi}{2}}\int_0^1 2r\, drd\theta$ (d) none of these

55. The double integral $\int\int_S f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ x^2 + y^2 = 1, the\ y\ axis\ on\ the\ right\ side\ of\ the\ y\ axis\ where\ f(x,y) = 1$, expressed as an iterated integral in polar coordinates is
(a) $\int_0^{\pi}\int_0^1 r\, drd\theta$ (b) $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}}\int_0^1 r\, drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 r\, drd\theta$ (d) none of these

56. The double integral $\int\int_S f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ x^2 + y^2 = 1, the\ x\ axis\ above\ the\ x\ axis\ where\ f(x,y) = x$, expressed as an iterated integral in polar coordinates is
(a) $\int_0^{\pi}\int_0^1 r^2\, cos\theta drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r^2\, sin\theta drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 r^2\, sin\theta drd\theta$ (d) none of these

57. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1, where\ f(x,y)=1$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{2\pi}\int_0^1 r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 r\,drd\theta$ (d) none of these

58. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ between\ the\ circles\ \ x^2+y^2=1, x^2+y^2=4\ where\ f(x,y)=1$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{2\pi}\int_1^2 r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_1^2 r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_1^2 r\,drd\theta$ (d) none of these

59. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ between\ the\ circles\ \ x^2+y^2=1, x^2+y^2=4\ \ that\ lying\ above\ the\ x\ axis\ where\ f(x,y)=1$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_1^2 r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_1^2 r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_1^2 r\,drd\theta$ (d) none of these

60. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2=y\ and\ y=x, where\ f(x,y)=2$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_o^{sec\theta} 2r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^{cosec\theta cot\theta} 2r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^{cot\theta} 2r\,drd\theta$ (d) none of these

61. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ between\ thr\ circles\ \ x^2+y^2=1, x^2+y^2=9\ where\ f(x,y)=2$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{2\pi}\int_1^3 2r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^3 2r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_1^3 2r\,drd\theta$ (d) none of these

62. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1, where\ f(x,y)=2$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 2r\,drd\theta$ (b) $\int_0^{2\pi}\int_0^1 2r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 r\,drd\theta$ (d) none of these

63. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1,$
$the\ x\ axis\ above\ the\ x\ axiswhere\ f(x,y)=3$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 3r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 3r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 2r\,drd\theta$ (d) none of these

64. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1, and\ the\ y\ axis\ to\ the\ right\ \ of\ y\ axis\ where\ f(x,y)=5$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 5r\,drd\theta$ (b) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\int_0^1 5r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 5r\,drd\theta$ (d) none of these

65. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ in\ the\ first\ quadrant\ by\ \ x^2+y^2=1, and\ by\ the\ coordinate\ axis\ where\ f(x,y)=1$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 r\,drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r\,drd\theta$ (c) $\int_0^{\frac{\pi}{2}}\int_0^1 r\,drd\theta$ (d) none of these

66. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1, y=x, and\ the\ y\ axis\ where\ f(x,y)=y$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 r^2\ cos\theta drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^1 r^2\ cos\theta drd\theta$ (c) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_0^1 r^2\ cos\theta drd\theta$ (d) none of these

67. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x^2+y^2=1, y=x, and\ the\ x\ axis\ where\ f(x,y)=y$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 r^2\sin\theta\,drd\theta$ (b) $\int_0^{\pi}\int_0^1 r^2\sin\theta\,drd\theta$ (c) $\int_0^{\frac{\pi}{4}}\int_0^1 r^2\sin\theta\,drd\theta$ (d) none of these

68. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x=1\ , y=x\ and\ by\ the\ x\ axis, where\ f(x,y)=x$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 r^2\,cos\theta drd\theta$ (b) $\int_0^{\frac{\pi}{4}}\int_0^{sec\theta} r^2\,cos\theta drd\theta$ (c) $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\int_0^1 r^2\,cos\theta drd\theta$ (d) none of these

69. The speherical polar coordinates of the point (1, 0, 0) are

(a) (0, 0, 1) (b) (0, 1, 0) (c) (1, 0, 0) (d) none of these

70. The speherical polar coordinates of the point (0, 1, 0) are

(a) $(1, \frac{\pi}{2}, 0)$ (b) (0, 1, 0) (c) (1, 0, 0) (d) none of these

71. The cyllindrical coordinates of (1, 1, 1) are

(a) $(\sqrt{2}, \frac{\pi}{4}, 1)$ (b) (0, 1, 0) (c) (1, 0, 0) (d) none of these

72. The cyllindrical coordinates of (0, 1, 1) are

(a) $(\sqrt{2}, \frac{\pi}{4}, 1)$ (b) $(1, \frac{\pi}{2}, 1)$ (c) (1, 0, 0) (d) none of these

73. The double integral $\int\int_S \ f(x,y)\,dxdy$ where $S\ is\ the\ region\ enclosed\ by\ \ x=1\ , y=x\ and\ by\ the\ x\ axis, where\ f(x,y)=y$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{\pi}\int_0^1 r^2\sin\theta\,drd\theta$ (b) $\int_0^{\pi}\int_0^1 r^2\sin\theta\,drd\theta$ (c) $\int_0^{\frac{\pi}{4}}\int_0^{sec\theta} r^2\sin\theta\,drd\theta$ (d) none of these

74. A parametric equation of the segment joining (0, 0) to (1, 1) is

(a) α(t)= (t , t) where t ϵ [0 , 1] (b) α(t)= (2t , t) where t ϵ [0 , 1]

(c) α(t)= (t , sint) where t ϵ [0 , 1] (d) none of these

75. A parametric equation of the segment joining (0, 0) to (1, 2) is

(a) α(t)= (t , t) where t ϵ [0 , 1] (b) α(t)= (t , 2t) where t ϵ [0 , 1]

(c) α(t)= (t , t) where t ϵ [0 , 1] (d) none of these

76. A parametric equation of the segment joining (0, 0) to (0, 1) is

(a) α(t)= (0, t) where t ϵ [0 , 1] (b) α(t)= (t , t) where t ϵ [0 , 1]

(c) α(t)= (t , t) where t ϵ [0 , 1] (d) none of these

77. A parametric equation of the segment joining (0, 0, 0)) to (1, 2, 1)) is

(a) α(t)= (t , t, t) where t ϵ [0 , 1] (b) α(t)= (t , 2t , t) where t ϵ [0 , 1]

(c) α(t)= (t , t, 2t) where t ϵ [0 , 1] (d) none of these

78. A parametric equation of the segment joining (0, 0, 0) to (3, 1, 1) is

(a) α(t)= (t , t, t) where t ϵ [0 , 1] (b) α(t)= (3t , t, 2t) where t ϵ [0 , 1]

(c) α(t)= (3t , t, t) where t ϵ [0 , 1] (d) none of these

79. A parametric equation of the curve $y^2=x$ joining (0, 0) to (1, 1) is

(a) $\alpha(t)=(t^2, t)$ where $t \in [0, 1]$ (b) $\alpha(t)=(t, t^2)$ where $t \in [0, 1]$

(c) $\alpha(t)=(t, t)$ where $t \in [0, 1]$ (d) none of these

80. A parametric equation of the curve $x^2=y$ joining (0, 0) to (1, 1) is

(a) $\alpha(t)=(t^2, t)$ where $t \in [0, 1]$ (b) $\alpha(t)=(t, t^2)$ where $t \in [0, 1]$

(c) $\alpha(t)=(t, t)$ where $t \in [0, 1]$ (d) none of these

81. A parametric equation of the curve $x^2 + y^2 = 1$ joining (1, 0) to (0, 1) in the counter-clockwise path is

(a) $\alpha(t)=(\cos t, \sin t)$ where $t \in [0, 1]$ (b) $\alpha(t)=(\cos t, \sin t)$ where $t \in [0, \frac{\pi}{4}]$

(c) $\alpha(t)=(t, t)$ where $t \in [0, 1]$ (d) none of these

82. A parametric equation of the curve $x^2 + y^2 = 1$ joining (1, 0) to (0, 1) in the counter-clockwise path is

(a) $\alpha(t)=(t, t)$ where $t \in [0, 1]$ (b) $\alpha(t)=(\sin t, \cos t)$ where $t \in [0, \pi]$

(c) $\alpha(t)=(\cos t, \sin t)$ where $t \in [0, \pi]$ (d) none of these

83. A parametric equation of the curve $x^2 + y^2 = 1$ joining (0, -1) to (0, 1) in the counter-clockwise path is

(a) $\alpha(t)=(\cos t, \sin t)$ where $t \in [\frac{-\pi}{2}, \frac{\pi}{2}]$ (b) $\alpha(t)=(\sin t, \cos t)$ where $t \in [0, \frac{\pi}{2}]$

(c) $\alpha(t)=(t, t)$ where $t \in [0, 1]$ (d) none of these

84. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}+\bar{k}$ when a particle is moved along the straight- line segment from (0, 0, 0) to (1, 1, 0) is

(a) 1 (b) 2 (c) 3 (d) None of these

85. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}+\bar{k}$ when a particle is moved along the straight- line segment from (0, 0, 0) to (1, 2, 0) is

(a) 1 (b) 2 (c) 3 (d) None of these

86. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}+\bar{k}$ when a particle is moved along the straight- line segment from (0, 0, 0) to (0, 1, 0) is

(a) 1 (b) 2 (c) 3 (d) None of these

87. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}+\bar{k}$when a particle is moved along the straight- line segment from (0, 0, 0) to (1, 0, 0) is

(a) 2 (b) 3 (c) 4 (d) None of these

88. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}-\bar{k}$ when a particle is moved along the straight- line segment from (0, 0, 0) to (1, 2, 1) is

(a) 1 (b) 2 (c) 3 (d) None of these

89. The work done by $F(x, y,z)= \bar{\imath}+\bar{\jmath}-\bar{k}$ when a particle is moved along the straight- line segment from (0, 0, 0) to (3, 1, 1) is

(a) 1 (b) 2 (c) 3 (d) None of these

90. The line integral $\int_C f \, d\alpha$ where $f(x, y) = x$ and $\alpha(t)=(\cos t, \sin t)$ $t\in[-\pi/2, \pi/2]$ is

(a) 0 (b) 1 (c) 2 (d) None of these

91. The line integral $\int_C f \, d\alpha$ where $f(x, y) = y$ and $\alpha(t)=(\cos t, \sin t)$ $t\in[-\pi/2, \pi/2]$ is

(a) 0 (b) 1 (c) 2 (d) None of these

92. The line integral $\int_C f\, d\alpha$ where f(x, y) = y and α(t)= (cost, sint) t∈[0, π] is

(a) 0 (b) 1 (c) 2 (d) None of these

93. The line integral $\int_C f\, d\alpha$ where f(x, y) = x and α(t)= (cost, sint) t∈[0, π] is

(a) 0 (b) 1 (c) 2 (d) None of these

94. The line integral $\int_C f\, d\alpha$ where f(x, y) = y and α(t)= (cost, sint) t∈[0, π/2] is

(a) 0 (b) 1 (c) 2 (d) None of these

95. The line integral $\int_C f\, d\alpha$ where f(x, y) = x and α(t)=(cost, sint) t∈[0, π/2] is

(a) 0 (b) 1 (c) 2 (d) None of these

96. Assuming the Green's theorem conditions are satisfied ,which of the following line integrals gives area enclosed by the simple closed curve C.

(a) $\oint_C \frac{-y}{2}dx + \frac{x}{2}dy$ (b) $\oint_C xdx + ydy$ (c) $\oint_C ydx + xdy$ (d) none of these

97. Assuming the Green's theorem conditions are satisfied ,which of the following line integrals gives area enclosed by the simple closed curve C.

(a) $\oint_C 5xdx + 4ydy$ (b) $\oint_C -4xdx + 5ydy$ (c) $\oint_C -4ydx + 5xdy$ (d) none of these

98. If F(x, y) = (y, x) is conservative vector field then the $\int_C F.d\alpha$ along any smooth path α joining (2, 1) to (3, 2) is

(a) 1 (b) 4 (c) 14 (d) none of these

99. If F(x, y) = (2xy , x^2) is conservative vector field then the $\int_C F.d\alpha$ along any smooth path α joining (2, 1) to (3, 2) is

(a) 1 (b) 4 (c) 14 (d) none of these

100. If F(x, y) = (1 , 0) is conservative vector field then the $\int_C F.d\alpha$ along any smooth path α joining (2, 1) to (3, 2) is

(a) 1 (b) 4 (c) 14 (d) none of these

101. If F(x, y) = (0 , 1) is conservative vector field then the $\int_C F.d\alpha$ along any smooth path α joining (2, 1) to (3, 2) is

(a) 1 (b) 4 (c) 14 (d) none of these

102. Assuming the Green's theorem conditions are satisfied ,which of the following line integrals gives area enclosed by the simple closed curve C.

(a) $\oint_C \frac{x}{2}dy$ (b) $\oint_C -ydy$ (c) $\oint_C -ydx$ (d) none of these

103. Assuming the Green's theorem conditions are satisfied ,which of the following line integrals gives area enclosed by the simple closed curve C.

(a) $\oint_C x^2dx + y^2dy$ (b) $\oint_C (y^2 + x)dx + (x + 2xy)dy$ (c) $\oint_C ydx + (x + y^2)dy$ (d) none of these

104. Assuming the Green's theorem is satisfying

105. An expression for $\int_0^1 \int_{-\sqrt{x}}^{\sqrt{x}} f(x,y)dydx$ in which the order of integration is reversed is

(a) $\int_{-1}^{1} \int_{-y^2}^{y^2} f(x,y)dxdy.$ (b) $\int_{-1}^{1} \int_{y^2}^{1} f(x,y)dxdy.$

(c) a sum of two integrals. (d) None of these.

106. $I = \int_0^1 \int_{1-x}^{1+x} xy \ dydx$. Then I is

(a) Undefined (b) $\int_0^1 \int_0^y xy \ dxdy$. (c) 0 (d) None of these.

107. $I = \int_0^1 \int_{x^2}^{x} \ xf(y) \ dydx$ where f is continuous function defined on [0, 1]. Then I is

(a) $\frac{1}{2}\int_0^1 (y - y^2) \ f(y)dy$ (b) independent of $f(y)$.

(c) $\frac{1}{2}\int_0^1 (y^2 - y) \ f(y)dy$ (d) $f(x)$

108. The value of the double integral $\int_{-1}^1 \int_0^1 e^{x^2} \sin y \ dxdy$ is equal to

(a) $2\cos 1 \ \int_0^1 e^{x^2} \ dx$. (b) $-2\cos 1 \ \int_0^1 e^{x^2} \ dx$ (c) 0 (d) does not exist.

109. The double integral $\int_0^1 \int_0^x x \ dydx$ reduces to

(a) $\frac{1}{2}\int_0^1 (1 - y)dy$ (b) $\int_0^1 \int_0^y x \ dxdy$ (c) $\int_0^1 \int_y^1 x \ dxdy$ (d) $\frac{1}{2}\int_0^1 x \ dx$

110. If $f(x, y) = k, k$ constant and $R = [a, b] \times [c, d]$ then $\int \int_R \ k \ dA$ equals

(a) $k(b - a)(d - c)$ (b) $k(c - a)(d - b)$ (c) $k(b - c)(d - a)$ (d) data insufficient

111. Let $D = \{(x, y): x^2 + y^2 \le r\}$ and $f(x, y) = x^2 + y$. Then $\int \int_D \ f dA$ lies in between

(a) $-16\pi \ and \ 4\pi$ (b) $-2 \ and \ 2$ (c) $-8\pi \ and \ 24\pi$ (d) $-4\pi \ and \ 8\pi$

112. The iterated integral $\int_0^2 \int_{x^2}^{2x} (x^2 + y^2) \ dydx$ represents

(a) The area of the region in the xy-plane bounded by the line $y = 2x$ and the parabola $y = x^2$

(b) Volume of the solid that lies under the paraboloid $z = x^2 + y^2$ and above the region in the xy-plane bounded by the line $x = y/2$ and $x = \sqrt{y}$

(c) Volume of the solid the lies under the paraboloid $z = x^2 + y^2$ and above the region in the xy-plane bounded by $y^2 = x$ and $x = \sqrt{y}$

(d) None of the above.

113. The volume of the region bounded by $z = x + y, z = 6, x = 0, y = 0, z = 0$ is

(a) 36 cubic units (b) 30 cubic units (c) 2/6 cubic units (d) None of these.

114. The volume of the solid given by $x^2 + y^2 \le 1$ and $tan^{-1}\frac{y}{x} \le z \le 2\pi$ is

(a) π (b) π^2 (c) 1 (d) None of these.

115. Let V be the volume of the solid that lies under the paraboloid $z = x^2 + y^2$ and above the region in the xy-plane bounded by the line $y = 2x$ and the parabola $y = x^2$.

Let $A = \int_0^2 \int_{x^2}^{2x} (x^2 + y^2) \ dydx$, $B = \int_0^4 \int_{y/2}^{\sqrt{y}} \int_0^{x^2+y^2} dzdxdy$. Then

(a) $V = A$ but $V \ne B$ (b) $V = A = B$ (C) $V \ne A$ but $V = B$ (d) $V \ne A, V \ne B$

116. $\iint_R \ y\sin(xy)dxdy$ where $R = [1,2] \times [0, \pi]$ equals

(a) π (b) 2π (c) 0 (d) 1

117. If $f: [0,1] \to \mathbb{R}$ is continuous then $\iint_S \ f(y)e^x dxdy, \ S = [0, 1] \times [0, 1] \ equals$

(a) $(e - 1)\int_0^1 f(y)dy$ (b) $e\int_0^1 f(y)dy$ (c) $\left(\frac{e^2}{2} - e\right)\int_0^1 f(y)dy$ (d) None of these.

118. $\iint_S \ e^{x/y} dxdy \ where \ S = \{(x, y) \in \ \mathbb{R}^2: 1 \le y \le 2, y \le x \le y^3\}$ equals

(a) $\frac{e^2}{2} - \frac{e}{2}$ (b) $\frac{e^4}{2} - \frac{e^2}{2}$ (c) $\frac{e^2-1}{2}$ (d) None of these.

119. $\iint_S \; e^{\sin x \cos y} dxdy \;\; where \; S = \{(x, y) \in \; \mathbb{R}^2 : x^2 + y^2 \leq 4\}$ lies between

(a) $4\pi e^2$and $4\pi e^3$ (b) e^π and $e^{2\pi}$ (c) $\frac{4\pi}{e}$ and $4\pi e$ (d) None of these.

120. f is continuous on [0,1] and $\int_0^1 f(x)dx = 0$, then $\int_0^1 \int_0^x f(x)f(y)dydx$

(a) Depends on $f(y)$ (b) $\frac{1}{2}$ (c) 0 (d) cannot be evaluated.

121. $\iint_S \; (x - 3y^2)dxdy$ where $S = [0,2] \times [1,2]$ equals

(a) 12 (b) -12 (c) 6 (d) 0

122. Let $A(x) = \int_0^2 f(x, y)dy$ and $B(y) = \int_0^1 f(x, y)dx$ where $f(x, y) = \; x^2y^3$, then

(a) $A(x) = 3x^2, B(y) = y^4/4$ (b) $A(x) = x^4, B(y) = y^3$

(c) $A(x) = 4x^2, B(y) = y^3/3$ (d) None of the above.

123. The value of the integral $\iint_R \; \sqrt{x^2 + y^2} \;\; dx \; dy$ where R= $\{(x, y) \in \; \mathbb{R}^2 : x \leq x^2 + y^2 \leq 2x\}$is

(a) 0 (b) 7/9 (c) 14/9 (d) 28/9

124. If $R = [0,1] \times [0,1]$, then $\iint_R \; e^{-x^2-y^2}dxdy$ lies between

(a) -1 and 0 (b) 0 and $\frac{1}{e^2}$ (c) $1/e$ and 1 (d) None of these.

125. f is continuous on $[0, 1]$ and $\int_0^1 f(x)dx = 0$, then $\int_0^1 \int_0^x f(x)f(y)dydx$ is

(a) depends on $f(y)$ (b) $\frac{1}{2}$ (c) 0 (d) cannot be evaluated

126. $f(x, y) = \begin{cases} 2 & 1 \leq x < 3 & 0 \leq y \leq 2 \\ 3 & 3 \leq x \leq 4 & 0 \leq y \leq 2 \end{cases}$ then,

(a) f is not integrable on $[1, 4] \times [0, 2]$

(b) $\int_0^2 \int_1^4 \; f = 5.$

(c) $\int_0^2 \int_1^4 \; f = 14.$

(d) None of these.

127. Let $f(x, y) = \sin\left(\frac{1}{x+y}\right), g(x, y) = \frac{1}{x+y}$ and $D = \{(x, y) : x^2 + y^2 \leq 1\}$.

Then which of the following statement is true.

(a) f and g are Riemann integrable over D.

(b) f is Riemann integrable over D, but g is not Riemann integrable over D.

(c) g is Riemann integrable over D, but f is not Riemann integrable over D.

(d) Both f and g are not Riemann integrable over D.

128. $f(x, y) = \begin{cases} 0 \;\; if \; x, y \;\; \in \mathbb{Q} \cap R \\ 3 \;\; if \; otherwise \end{cases}$ where $R = [0, 1] \times [0, 1]$. Then

(a) f is continuous at $(0, 0)$ (b) $\lim_{(x,y)\to(0,0)} f(x, y)$does not exist

(c) f is integrable over R (d) f is not integrable over R

129. If $f(a) = \int_a^{a^2} \frac{\sin ax}{x} \; dx$ then $f'(a)$ is

(a) $\int_a^{a^2} \frac{a\cos ax}{x}\, dx$ (b) $\int_a^{a^2} \cos ax\, dx$

(c) $\int_a^{a^2} \cos ax\, dx + 2\sin a^3 - \frac{\sin a^2}{a}$. (d) None of the above

130. If $g(x) = \int_0^1 \frac{\sin xy}{y}\, dy$ on any interval $[a, b]$ not containing zero then $g'(x)$ equals

(a) $\frac{\cos x}{x}$ (b) $\frac{\sin x}{x}$ (c) $\frac{\cos y}{y}$ (d) None of the above.

131. $f(x, y) = \begin{cases} \frac{sinx}{x} & x \neq 0 \\ 0 & otherwise \end{cases}$

(a) $\iint_R\ f$ = 1

(b) $\iint_R\ f$ = cos 1- 1

(c) $\iint_R\ f$ = 1- cos 1

(d) None of these.

132. The triple integral $\int\int\int_V\ dV$ where V is he region bounded by the paraboloid $y = x^2 + z^2$ and the plane $y = 4$ can be expressed as an iterated integral in the order $dydzdx$ as

(a) $2\ \int_0^2 \int_0^{\sqrt{4-x^2}} \int_{x^2+z^2}^4 dydzdx$ (b) $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{x^2+z^2}^4 dydzdx$

(c) $2\ \int_0^2 \int_0^{\sqrt{4-x^2}} \int_{x^2+z^2}^4 dzdydx$ (d) None of these.

133. The triple integral $\int_0^1 \int_0^x \int_0^y xy^2z^3 dxdydz$

(a) $\frac{1}{90}$ (b)$\frac{1}{50}$ (c)$\frac{1}{45}$ (d)$\frac{1}{10}$

134. The value of$\int_0^1 (x+t)^2\, dx$ is

(a) $\frac{(t+1)^3}{3}$(b) $t^2 + t - 1/3$ (c) $t^2 - 2t - 1/3$ (d) None of these.

135. The value of $\int_0^1 \log(xt)dx\ \ is$

(a) $\log(1+t)$ (b) $2\log t$ (c) $\log t$ (d) None of these

136. If $g(x) = \int_0^1 \log(x^2 + y^2)dy \quad x \neq 0$. then $g'(x)$ equals

(a) 0 (b) 1 (c) $2tan^{-1}\frac{1}{x}$ (d) does not exist.

137. D is the closed region in the XY plane bounded by $y = \sqrt{1 - x^2}$ and the x-axis.If R is the region in the $r - \theta$ plane whose image is D under the transformation $x = r\cos\theta,\ y = r\sin\theta$ then R is

(a) $\{(r, \theta)/0 < r < \sqrt{2}, 0 \leq \theta \leq 2\pi\}$ (b) $\{(r, \theta)/0 < r < 1, 0 \leq \theta \leq 2\pi\}$

(c) $\{(r, \theta)/0 < r < 1, 0 \leq \theta \leq \pi/2\}$ (d) $\{(r, \theta)/0 < r < 1, 0 \leq \theta \leq \pi\}$

138. The double integral $\int\int_S\ f(x, y)\, dxdy$ where $S = \{(x, y)/x^2 +\ y^2 \leq 2x\}$, expressed as an iterated integral in polar coordinates is

(a) $\int_0^{2\pi} \int_0^{2\cos\theta} f(r\cos\theta, r\sin\theta)r\ \ drd\theta$ (b) $\int_0^{2\pi} \int_0^{2\cos\theta} f(r\cos\theta, r\sin\theta)\ \ drd\theta$

(c) $\int_0^{\frac{\pi}{2}} \int_0^{2\cos\theta} f(r\cos\theta, r\sin\theta) r \; drd\theta$ (d) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \int_0^{2\cos\theta} f(r\cos\theta, r\sin\theta) r \; drd\theta$

139. $S = \{(x,y)/a^2 \leq x^2 + y^2 \leq b^2\}$ with $0 < a < b$. Then $\int\int_S \; f(x,y)\,dxdy$ expressed in polar coordinates is

(a) $\int_0^{2\pi} \int_b^{a} f(r\cos\theta, r\sin\theta) r \; drd\theta$ (b) $\int_0^{2\pi} \int_a^{b} f(r\cos\theta, r\sin\theta) r \; drd\theta$

(c) $2 \int_a^{b} \int_0^{\pi} f(r\cos\theta, r\sin\theta) r \; d\theta dr$ (d) None of these.

140. The integral $\int_0^2 \int_x^{x\sqrt{3}} f\left(\sqrt{x^2 + y^2}\right) \; dydx$ in polar coordinates is

(a) $\int_0^{\pi/4} \int_0^{2\sec\theta} f(r) r \; drd\theta$ (b) $\int_0^{\pi/3} \int_0^{2\sec\theta} f(r) r \; drd\theta$

(c) $\int_{\pi/4}^{\pi/3} \int_0^{2\sec\theta} f(r) r \; drd\theta$ (d) $\int_{\pi/4}^{\pi/3} \int_0^{2\cos\theta} f(r) r \; drd\theta$

141. The area of the ellipse $4x^2 + 9y^2 = 36$ is

(a) $\int_0^{\pi/2} \int_0^{6/\sqrt{4+5sin^2\theta}} rdrd\theta$ (b) $2\int_0^{\pi/2} \int_0^{6/\sqrt{4+5sin^2\theta}} rdrd\theta$

(c) $4 \int_0^{\pi/2} \int_0^{6/\sqrt{4+5sin^2\theta}} rdrd\theta$ (d) None of these.

142. The volume of the region bounded by $z = x^2 + y^2,\; z = 0, x = -a, y = a$ and $y = -a$ is

(a) $\frac{4a^4}{3}$ (b) $\frac{8a^4}{3}$ (c) $\frac{16a^4}{3}$ (d) None of these.

143. The volume V of the solid above the region $R = \{(r,\theta)/1 \leq r \leq 3,\; 0 \leq \theta \leq \pi/4\}$ and under the surface $z = e^{x^2+y^2}$ is

(a) πe (b) $\pi e(e-1)$ (c) $\frac{\pi}{8}(e^9 - e)$ (d) $\frac{\pi}{8}e$.

144. If D is a plate defined by $1 \leq x \leq 2, 0 \leq y \leq 1$ and the density is ye^{xy}, then mass of the plate is

(a) e (b) $\frac{e^2}{2}$ (c) $\frac{e^2}{2} - e$ (d) $\frac{e^2}{2} - e + \frac{1}{2}$

145. The centroid of the region bounded above by the line $y = 1$ and bounded below by the curve $y = x^2/4$ is

(a) $(0,\; 3/5)$ (b) $(1, 3/5)$ (c) $(2, 3/5)$ (d) $(-1, 3/5)$

146. The centroid of the uniform density rectangle bounded by the co-ordinate axes and the lines $x = a$ and $y = b$ has its centroid at

(a) $(a/4,\;\; b/4)$ (b) $(a/2, b/2)$ (c) $(a/2, b/4)$ (d) None of these.

147. The moment of inertia of a homogeneous disk D, center at origin and radius a with density ρ about the origin is $\frac{\pi\rho a^4}{2}$. Then the moment of inertia of this disk about y-axis is

(a) 0 (b) $\frac{\pi\rho a^4}{2}$ (c) $\frac{\pi\rho a^4}{4}$ (d) $\frac{\pi\rho a^4}{8}$

148. The density ρ of a region D is given by $\rho(x,y) = k, k$ constant. Then the center of mass D

(a) depends on ρ for some value of k (b) depends on ρ for any value of k

(c) does not depends on ρ (d) is located at (0, 0)

149. The volume of the solid bounded by the elliptic paraboloid $x^2 + 2y^2 + z = 16$, the planes $x = 2, y = 2$ and the three co-ordinate planes is given by the expression

(a) $\int_{-4}^{4}\int_{-4}^{4}(16-x^2-2y^2)\,dxdy$ (b) $\int_{-2}^{2}\int_{-2}^{2}(16-x^2-2y^2)\,dxdy$

(c) $\int_{0}^{2}\int_{0}^{2}(16-x^2-2y^2)\,dxdy$ (d) $\int_{0}^{4}\int_{0}^{4}(16-x^2-2y^2)\,dxdy$

150. The iterated triple integral $\int_{-2}^{2}\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}}\int_{\sqrt{x^2+y^2}}^{2}(x^2+y^2)\,dzdydx$ in cylindrical coordinates is

(a) $\int_{0}^{2\pi}\int_{0}^{2}\int_{0}^{r} r^3\,dzdrd\theta$ (b) $\int_{0}^{2\pi}\int_{0}^{2}\int_{r}^{2} r^2\,dzdrd\theta$

(c) $\int_{0}^{2\pi}\int_{0}^{2}\int_{r}^{2} r^3\,dzdrd\theta$ (d) $\int_{0}^{2\pi}\int_{0}^{2}\int_{r}^{2} r\,dzdrd\theta$

151. A region R bounded by the coordinate axes and $x+y=1$ in the first quadrant is the image of a region S lying in the uv plane under the transformation $u=x+y,\ v=x-y$. Then the area of the region S is

(a) 1 (b) 1/2 (c) $\sqrt{2}$ (d) Data insufficient

152. S is the region in the first quadrant bounded by the curve $xy=1,\ xy=2, y=x, y=4x$. If $u=xy, v=\ y/x$. Then $\iint_S\ f\,(x,\ y)\,dxdy$ becomes

(a) $\int_{1}^{2}\int_{1}^{4}\frac{f\,(u)}{v}\,dvdu$ (b) $\int_{1}^{2}\int_{1}^{4}\frac{f\,(u)}{2v}\,dvdu$

(c) $\log 2\ \int_{1}^{2} f(v)\,dv.$ (d) $\log 2\ \int_{1}^{2} f(u)\,du.$

153. $S=\{(x,y)/|x|+|y|\le 1\}$. If $u=x+y, v=-x+y, then\ \iint_S f(x+y)dxdy$ equals.

(a) $\int_{-1}^{1}\int_{-1}^{1} f(u)dvdu$ (b) $\int_{-1}^{1}\int_{-1}^{1}\frac{f(u)}{4}dvdu$

(c) $4\int_{0}^{1}\int_{0}^{1} f(u)dvdu$ (d) $\int_{-1}^{1} f(u)du$

154. The expression for mass of a solid inside the cylinder $x^2+y^2=a^2$ and between the planes $z=0$ and $z=h$ in the first octant with density x is

(a) $\int_{0}^{h}\int_{0}^{a}\int_{0}^{\sqrt{a^2-y^2}} y\ dxdydz$ (b) $\int_{0}^{h}\int_{0}^{a}\int_{0}^{\sqrt{a^2-y^2}} x\ dxdydz$

(c) $\int_{0}^{h}\int_{0}^{a}\int_{0}^{\sqrt{a^2-y^2}} x^2\ dxdydz$ (d) $\int_{0}^{h}\int_{0}^{a}\int_{0}^{\sqrt{a^2-y^2}} y^2\ dxdydz$

155. The expression for moment of inertia about the z-axis of homogeneous tetrahedron bounded by the planes $z=x+y, x=0, y=0, z=1$ with volume density μ is

(a) $\mu\int_{0}^{1}\int_{0}^{1-y}\int_{x+y}^{1}(x^2+y^2)\,dzdxdy$ (b) $\mu\int_{0}^{1}\int_{0}^{1-y}\int_{x+y}^{1} dzdxdy$

(c) $\mu\int_{0}^{1}\int_{0}^{1-y}\int_{x+y}^{1} z^2\,dzdxdy$ (d) None of the above.

156. The integral expression for each mass of the solid in the first octant bounded by the cylinder $x^2+y^2=1$ and the plane $y=z, x-0$ and $z=0$ with density $\rho(x,y,z)=1+x+y+z$ is

(a) $\int_{0}^{1}\int_{0}^{\sqrt{1-y^2}}\int_{0}^{x}(1+x+y+z)\,dzdxdy$ (b) $\int_{0}^{1}\int_{0}^{\sqrt{1-x^2}}\int_{0}^{y}(1+x+z)\,dzdxdy$

(c) $\int_{0}^{1}\int_{0}^{\sqrt{1-y^2}}\int_{0}^{1}(1+x+y+z)\,dzdxdy$ (d) None of the above.

157. The moment of inertia relative to the xz plane of a three dimensional region D with density ρ at each point is

(a) $\iiint_D\ x^2\rho\ dV$ (b) $\iiint_D\ x\rho\ dV$

(c) $\iiint_D \ y^2 \rho \ dV$ (d) $\iiint_D \ y\rho \ dV$

158. The moment of inertia relative to the z-axis of a three dimensional region D with constant density 1 in spherical co-ordinates is

(a) $\iiint_D \ \rho^2 \ sin^3 \phi \ d\rho d\phi d\theta$ (b) $\iiint_D \ \rho^4 \ sin^3 \phi \ d\rho d\phi d\theta$

(c) $\iiint_D \ \rho^3 \ sin^3 \phi \ d\rho d\phi d\theta$ (d) $\iiint_D \ \rho^4 \ sin^2 \phi \ d\rho d\phi d\theta$

159. The moment of inertia of a three dimensional region D with constant density 1 in cylindrical co-ordinates is

(a) $\iiint_D \ z \ dzdrd\theta$ (b) $\iiint_D \ rz \ dzdrd\theta$ (c) $\iiint_D \ rz^2 \ dzdrd\theta$ (d) $\iiint_D \ r \ drdzd\theta$

160. If D is the sphere $x^2+y^2+z^2 \le 9$ then $\iiint_D \ dV$ is equal to

(a) $6^3\pi$ (b) 18π (c) $6^2\pi$ (d) $6^4\pi$

161. If D is the unit sphere $x^2+y^2+z^2 \le 1$ then $\iiint_D \ z \ dV$ is equal to

(a) 0 (b) $\frac{2}{3}\pi$ (c) $\frac{4}{3}\pi$ (d) None of these

162. The volume of the portion of the solid cylinder $x^2+y^2 \le 2$ bounded above by the surface $z = x^2+y^2$ and below by the xy plane is

(a) π (b) 2π (c) 8π (d) 4π

163. $f : IR \rightarrow IR^2 , (f\ (t) = \left(\frac{1-t^2}{1+t^2}, \frac{2t}{1+t^2}\right)$. The image of [0, 1] is

a) One full circle. b) an arc of a circle.

c) an arc of a parabola d) none of the these

164. $f : IR \rightarrow IR^2 , (f\ (t) = (e^t + e^{-t} ,\ e^t - e^{-t})$. The image of [0, 1] is an

a) an arc of a circle. b) an arc of a parabola

c) An arc of a hyperbola d) none of these.

165. $I = \int \bar{F}\ dr\ whhere\ \bar{F} = (xy, yz, zx)\ \ from\ (0,0,0)\ to\ (1,1,1)$. Then I is

a) 0. b)1. c) $1/2$. d) none of these.

166. The value of the line integral $\int_C (x^2+y^2)\, d\bar{r}$ where C is the arc $x^2+y^2=1$ from (0, 1) to (1, 0) in clockwise direction is

a) $\pi/2$. b) $-\pi/2$ c) π d) none of these.

167. The Cartesian representation of the curve having parametric equation $x = 3+5\ \sin\ t, y = 1+2\cos t\ ; 0 \le t \le 2\pi\ is$

a) $\frac{x^2}{25} + \frac{y^2}{4} = 1.$ b) $\frac{x^2}{9} + \frac{y^2}{1} = 1.$

c) $\frac{(x-5)^2}{3} + \frac{(y-2)^2}{1} = 1.$ d) $\frac{(x-3)^2}{25} + \frac{(y-1)^2}{4} = 1.$

168. A parameterization α of a circle of radius 2 centered at the origin in the X Z plane is given by

a) $\propto: [\,0, 2\pi\,] \rightarrow IR^3, \propto(t) = (2\, cost\ t\ , 2\sin t\ , 0\ )$

b) $\propto: [\,0, 2\pi\,] \rightarrow IR^3, \propto(t) = (2\, cost\ t\ , 2\sin t\ , 1\ )$

c) $\propto: [\,\pi, 3\pi\,] \rightarrow IR^3, \propto(t) = (2\, cost\ t, 0\ , 2\sin t)$

d) $\propto: [\,0, 2\pi\,] \rightarrow IR^3, \propto(t) = (0, 2\,cost\ t, 2\sin t)$

169. The parametric equations x = 2 + 3t^3 y = 4 + 7t^3 elements.
a) The curve $y = x^3, 0 \le x \le 1$.
b) The curve $y^3 = x, 0 \le x \le 1$.
c) The curve $x^3 - y^3 = 2, 0 \le x \le 1$.
d) line having intercept on both the axes.

170. The parametric equations $x = \cos(\cos t), y = \sin(\cos t), t \in [\,0, \pi]$ describes.
a. one full circle
b. an arc of a circle in first quadrant
c. one half circle above the XY-plane
d. an arc of a circle in the first and fourth quadrant

171. The equation$x = \cos t, y = cost, 0 \le t \le \pi$ parameterizes
a) an arc of a circle. b) an arc of a parabola
c) a line segment d) a branch of a hyperbola.

172. $I = \int_C \frac{-y\ dx + x\ dy}{(x^2 + y^2)^m}$ $where\ C: x^2 + y^2 = r^2$. Then I is
a) 0. b) 2π. C) $\frac{2\pi}{r^{2m}}$ d) $\frac{2A}{r^{2m}}$; where A is area of the circle.

173. $F(x, y) = (x^2y^5, ax^by^c)$ is conservative in the plane then
a) $a = \frac{1}{3}, b = 1, c = 6$ b) $a = 5/3, b = 3, c = 4$.
c) b & c exist but a does not exist. d) $a = 1, b = 2, c = 5$.

174. $F(x, y, z) = (2xy + y^2, x^2 + 2xy + z, y + e^{xz})$ then
a) there exist a function $\phi(x, y, z)$ such that $F = \nabla\phi$
b) there does not exist a function $\phi(x, y, z)$ such that $F = \nabla\phi$
c) $\phi(x, y, z) = 2x^2y + 2xy^2 + 2y^2, F = \nabla\phi$
d) $\phi(x, y, z) = x^2y + xy^2 + \frac{e^{xz}}{x} + yz, F = \nabla\phi$

175. The line integral $\int_c \bar{F} \cdot \overline{dr}$; $\bar{F} = \frac{-y\,\hat{\imath} + x\hat{\jmath}}{x^2 + y^2}$ and $C: x^2 + y^2 = a^2$.
a) depends on a.
b) does not exist as Green's Theorem is not applicable.
c) is a constant independent of a.
d) none of the above.

176. $I = \oint_c y\,dx + 2x\ dy$ where C is a closed curve of the region $x^2 + y^2 \le a^2$ Then I is
a) a^2 b) $\pi\ a^2$ c) 0. d) None of these.

177. $\oint_c P\,dx + Q\,dy = 0$ around every C is a closed path C in a simply continued region R then
a) $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$ if P and Q are C^1 function.
b) $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$ always.
c) $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$.

d) Nothing can be said about $\frac{\partial P}{\partial y}$ and $\frac{\partial Q}{\partial x}$.

178. $I = \oint_c (x + y)\hat{\imath} + (x - y)\hat{\jmath}$, Where C is the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ then I is
a) $\pi\ ab$ b) 0. c) $\pi(a + b)$ d) ab.

179. $I = \int_c ydx + xdy$ where C is the path $\left(t^9, sin^9(\pi/2)\right)$; $0 \le t \le 1$ Then I is
a) 1 b) 0. c) –1. d) π.

180. $\nabla f(x, y, z) = 2xyze^{x^2}\hat{\imath} + ze^{x^2}\hat{\jmath} + ye^{x^2}\hat{k}$ and $f(0,0,0) = 5.$ Then $f(1,1,1)$.
a) 5. b) e. c) $e + 5$. d) $3e$

181. $\int_c ydx + xdy$ along every closed curve C is
a) 2π b) π c) $\pi/2$ d) None of these.

182. $P = \log(x^2 + 1) - 2xe^{-y}, Q = x^2e^{-y} - \log(y^2 + 1)$. Then
a) $\int_{C_1} Pdx + Qdy = \int_{C_2} Pdx + Qdy$ for any two curves C_1 & C_2 with same end points.
b) $\int_{C_1} Pdx + Qdy = \int_{C_2} Pdx + Qdy$ for any two curves C_1 & C_2 by Green's theorem.
c) $\int_{C_1} Pdx + Qdy \neq \int_{C_2} Pdx + Qdy$ for any two curves C_1 & C_2.
d) None of these.

183. The equation $x = u^2 - v^2, y = 2uv, z = u^2 + v^2$ represents
a) a cone. b) a sphere. c) a circle. d) a Cylinder .

184. The equation $x = r\cos\theta,\ \ y = r\sin\theta,\ \ z = 4 - r^2$ represents.
a) a cylinder. b) a sphere. c) a paraboloid. d) none of these.

185. For the cylinder $x = 3\cos t,\ \ y = y, z = 3\sin t$ at the point $\left(3/\sqrt{2}, 1, 3\ /\sqrt{2}\right)$.
a) there is an unique unit normal vector.
b) there are two unit normal vectors.
c) there is no unit normal vector.
d) there are infinitely many unit normal vectors.

186. The equations $x = u + v, y = u - v, z = u^2 + v^2; 0 \le u \le 1, 0 \le v \le 1.$
a) a cone. b) a sphere. c) a paraboloid d) a Cylinder.

187. The equation $x = 5\cos\theta, y = 5\sin\theta, \mathrm{z} = 7; 0 \le \theta \le 2\pi$ represents.
a) a straight line segment. b) a plane. c) a circle d) a Cylinder.

188. The surface integral of $F(x, y) = -yi + x\hat{\jmath}$ on S where S is the disc in the XY plane with radius 2 oriented upwards and at the origin is
a) 1. b) –1. c) 0. d) None of these.

189. The surface area of the triangle with vertices (1, 0, 0), (0, 1, 0) and (0, 0, 1) is

a) $\sqrt{3}$. b) $\frac{\sqrt{3}}{2}$. c) $2\sqrt{3}$. d) $1/2$.

190. The surface integral of $F(x,y,z) = x^2\hat{\imath} + y^2\hat{\jmath} - z\hat{k}$ on the triangle with vertices (0, 0, 0), (0, 2, 0) and (0, 0, 3) is
a) 1. b) –1. c) 0. d) $1/2$

191. The surface area of the sphere $(x-a)^2 + (y-b)^2 + (z-c)^2 = r^2$ is denoted by A. Then,
a) A depends on a, b, c and r. b) A depends only on a, b, c.
c) a depends only on r. d) None of these.

192. The equation $x = u + 2v, y = 2u - 3v, z = 3u + 4v$ describes.
a) a general plane. b) a plane passing through the origin.
c) a line in $\mathbb{R}^3$ d) none of these.

193. The magnitude of the fundamental vector product $\frac{\partial \bar{r}}{\partial u} \times \frac{\partial \bar{r}}{\partial v}$ for surface $\bar{r}(u,v) = (u+v)\hat{\imath} + (u-v)\ i + 4k$ is
(a) $\sqrt{4+v^2}$ (b) $\sqrt{4+128}v^2$ (c) $\sqrt{4v^2+1}$ (d) None of these.

194. The parametric representation of cylinder $x^2 + y^2 = 4,\ 0 \le z \le 1$ is given by
a) $x = 2\cos u,\ \ y = 2\sin v,\ \ z = u^2 + v^2,\ \ 0 \le u \le 2\pi,\ \ 0 \le v \le \pi.$
b) $x = 2\cos u,\ \ y = 2\sin u,\ \ z = u,\ \ 0 \le u \le 2\pi.$
c) $x = 2\cos u,\ \ y = 2\sin u,\ \ z = z,\ \ 0 \le u \le 2\pi,\ \ 0 \le z \le 1.$
d) None of the above.

195. The parameterization $x = \cosh u \cos v,\ \ y = \cosh u \sin v,\ \ z = \sin hu,$ where $0 \le v \le 2\pi, -\infty < u < \infty$ represents
a) an ellipsoid b) a hyperboloid of one sheet
c) a cylinder d) None of these.

196. The fundamental vector product for the cone
$x = r\cos\theta,\ \ y = r\sin\theta,\ \ z = r,\ \ 0 \le \theta \le 2\pi,\ \ 0 \le r \le 1$ is
a) $(-r\cos\theta,\ -r\sin\theta,\ r)$ b) $(r\cos\theta,\ r\sin\theta,\ r)$
c) $(-r\cos\theta,\ r\sin\theta,\ r)$ d) $(r\cos\theta,\ -r\sin\theta,\ r)$

197. The area of surface of revolution of the curve $y = f(x)$ parameterized by
$x = u, y = f(u)\cos v,\ \ z = f(u)\sin v,\ \ a \le u \le b,\ \ 0 \le v \le 2\pi$ is
a) $\int\ |f(u)|\sqrt{1+(f'(u))^2}\ du$
b) $2\pi\int\ |f(u)|\sqrt{1+(f'(u))^2}\ du$
c) $\frac{1}{2\pi}\int_a^b f(u)\sqrt{1+(f'(u))^2}\ du$
d) None of these.

198. $\iint_S\ x dS$ where S is the triangle with vertices (1, 0, 0), (0, 1, 0), (0, 0, 1) is

a) $\sqrt{3}$ b) $\frac{\sqrt{3}}{6}$ c) $\frac{\sqrt{3}}{2}$ d) None of these.

199. The flux of the vector field $\bar{r} = \widehat{x\imath} + \widehat{y\,\imath} + \widehat{zk}$ across the unit sphere $x^2 + y^2 + z^2 = 1$ equals

a) $\frac{4}{3}\pi$ b) $\frac{2}{3}\pi$ c) $\frac{1}{3}\pi$ d) None of these.

200. Let $\bar{F} = P(x,y,z)\hat{\imath} + Q(x,y,z)\hat{\jmath} + R(x,y,z)\hat{k}$, where P, Q, R are continuously differentiable and S is the surface given by $z = g(x,y), (x,y) \in D$, then $\iint_S F.\ \hat{n}\,dS$ is given by

a) $\iint_D \left(P\frac{\partial g}{\partial x} + Q\frac{\partial g}{\partial y} + R\right)dxdy$ b) $\iint_D \left(-P\frac{\partial g}{\partial x} - Q\frac{\partial g}{\partial y} + R\right)dxdy$

c) $\iint_D \left(P\frac{\partial g}{\partial x} + Q\frac{\partial g}{\partial y} - R\right)dxdy$ d) None of these.

201. The centre of mass of a uniform hemispherical surface of radius a having parametric representation $\bar{r}(u,v) = a\cos u\cos v\,\hat{\imath} + a\sin u\cos v\,\hat{\jmath} + a\sin v\ \bar{k}$, $(u,v) \in [0,2\pi] \times [0,\pi/2]$ is given by

a) $\left(\frac{a}{2},\frac{a}{2},\frac{a}{2}\right)$ b) $\left(0,0,\frac{a}{2}\right)$ c) $(0,0,0)$ d) None of these.

202. The parameterized surface $\bar{r}\ (u,v)$ given by
$x = x_0 + a_1u + b_1v,\ y = y_0 + a_2u + b_2v, z = z_0 + a_3u + b_3v$ represents
(where $x_0, y_0, z_0, a_1, a_2, a_3, b_1, b_2, b_3$ are constants)

a) A sphere with centre (x_0, y_0, z_0) b) a cylinder
c) an ellipsoid d) a plane

203. Let $\bar{F}(x,y,z) = ye^z\hat{\imath} + xe^z\hat{\jmath} + xye^z\hat{k}$ and S be the surface of unit sphere with outward normal $\hat{n}$. Then $\iint_S (\nabla \times \bar{F}).\hat{n}$ equals

(a) 4π (b) 12π (c) 16π (d) 0

204. Let $\bar{F}(x,y,z) = \widehat{z\imath} - \widehat{x\jmath} - \widehat{yk}$ and C be the triangle with vertices $(0,0,0), (0,2,0)$ and (0, 0, 2). Then $\int_C \bar{F}.d\bar{r}$ equals

(a) 1 (b) -1 (c) -2 (d) 2

205. Let S denote an oriented smooth surface bounded by a closed curve C traversed counterclockwise. Let $\bar{r} = \widehat{x\imath} + \widehat{y\jmath} + \widehat{yk}$. If $\bar{A}$ is a constant vector and $\hat{n}$ be the unit outward normal to S. then $\oint_C (\bar{A} \times \bar{r}).dr$ equals

(a) $\iint_S curl\,\bar{r}.\hat{n}dS$ (b) 0 (c) $2\iint_S \bar{A}.\hat{n}dS$ (d) None of these.

206. If S is a sphere and $\bar{F}$ is a vector field having continuous partial derivatives on an open region containing S, then $\iint_S curl\,\bar{F}.\hat{n}dS$ where $\hat{n}$ is unit outward normal

(a) Depends on F (b) 4π (c) 2π (d) 0

207. If V is a simple solid region whose boundary surface is S and $\hat{n}$ is a unit outward normal to S. then for a harmonic function $\emptyset$ defined on a region containing S, $\iint_S \ D\emptyset\, \hat{n} dS$ equals

(a) Volume of V (b) surface area of S (c) 0 (d) None of these.

208. If V is a simple solid region in $\mathbb{R}^3$ bounded by a smooth oriented surface S with $\hat{n}$ as outward unit normal. and $\bar{A}$ is a constant vector in $\mathbb{R}^3$, then $\int_S \ \bar{A}.\hat{n} dS$ equals

(a) $\|A\|$ (b) (surface area of S) $\|A\|$ (c) (volume of V) $\|A\|$ (d) 0

209. Let $\hat{n}$ be a unit outward normal to a closed surface S which bounds a homogeneous solid V. then $\iint_S \ (x^2+y^2)\ (xi+yj).\hat{n} dS$ equals

(a) $|V|$, the volume of V (b) $|S|$, the surface area of S

(c) $4I_z$, where I_z denote the moment of inertia about z-axis (d) None of these.

210. The flux of $\bar{F}(x,y,z) = x^3\hat{\imath} + y^3\hat{\jmath} + y^3\hat{k}$ outward through unit sphere S is

(a) 4π (b) $\frac{12\pi}{5}$ (c) $\frac{8\pi}{3}$ (d) None of these.

211. If S_1 and S_2 are smooth oriented surfaces in $\mathbb{R}^3$ having same boundary C and $\bar{F}$ is a vector field on $\mathbb{R}^3$ then $\iint_{S1}(\nabla \times \bar{F}).\hat{n}_1 dS = \iint_{S2}(\nabla \times \bar{F}).\hat{n}_2 dS$ if and only if

(a) $\hat{n}_1 = \hat{n}_2$ (b) $\hat{n}_1 = -\,\hat{n}_2$ (c) $S_1 \cap S_1 = \emptyset$ (d) None of these.

212. Curl $\left(grad\ (x+z)\right)$ is

a) $x^2\ \hat{\imath} + z^2\hat{\jmath}$. b) 0. c) $\vec{0}$ d) none of these.

213. $div\ \left(curl\ (x^2, yz, \sin z)\right)$ is

a) $2x + z + \cos z$ b) 0. c) $\vec{0}$. d) none of these.

213. $F(x,y,z) = (3xz,\ -5yz,\ z^2)$ and curl $(pyz^2, 0, qxyz) = F$. Then value of p and q are

a) -1 & 3 b) 1 & -3 c) -1 & -3 d) 1 & 3.

214. Let C be the circle $x^2+y^2=4, z=-3$ oriented counterclockwise. Let $F=(y, xz^3, -zy^3)$ and $I = \oint_C \ \overline{F}\cdot d\bar{r}$ Then

a) Stoke's theorem is applicable and $I = -112\pi$.
b) Stoke's theorem is applicable to calculate I.
c) Stoke's theorem is not applicable but $I = -112\,\pi$.
d) None of the above.

215. The surface integral $\iint_s \ \nabla \times F.\ \hat{n}\ dS$ where F is continuously differentiable vector field and S is a closed surface is

a) 0 b) depends on F c) depends on S d) none of these.

216. The line integral $\int_C \bar{r} \cdot d\bar{r}$ where C is a simple closed curve is

a) 0 b) 1 c) depends on C d) none of these.

217. $F(x,y,z) = (y+z, x+z, x+y)$ Then

a) curl $F = 0 = div\ F$ b) $div\ F = 3$ and $curl\ F = 0$.
c) $curl\ F = \bar{0}\ and\ div\ F = 0$. d) none of these.

218. $I = \iiint_V (div\ \hat{n})\ dv$ where V is the volume enclosed by a closed surface S. Then I is

a) surface area of S b) volume V c) 0. d) None of these.

219. The surface integral $\iint_S F \cdot \hat{n}\ dS$ where $\bar{F} = \frac{\bar{r}}{r^3}$; $\bar{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$ over the surface of the sphere centered at (1, 1, 1) and radius 3 is

a) 1. b) depends on r c) 0. d) None of these.

220. The surface integral $\iint_S (\hat{r} \cdot \hat{n})\ dS$ over a closed surface S with volume V is

a) V b) $3V$ c) 0. d) None of these.

221. The surface integral $\iint_S ax\hat{\imath} + by\ \hat{\jmath} + czk. dS$ over the surface of a unit sphere enclosing a volume V is

a) $(a+b+c)\ 4\pi$ b) $(a+b+c)V$
c) $(a+b+c)4\pi^2$ d) $\frac{4}{3}\ (a+b+c)$

222. The surface integral $\iint_S (x^2+y^2)\, i + (y^2+z^2) j + (x^2+z^2) k$ where S is the cube $0 \le x \le 1, 0 \le y \le 1, 0 \le z \le 1$ is

a) –3 b) 3 c) 0 d) None of these.

223. If ϕ is a harmonic function and S is the unit sphere, then the surface integral $\iint_S grad\ \phi\ dS$

a) does not exist b) is 1
c) is the volume of the unit sphere d) is 0

224. S is vertical cylinder of height 2, with its base a circle of radius 1 on the xy plane, centered at the origin and S includes the disks that close it off top and bottom, then the surface integer $\iint yj$ equals

a) π b) 2π c) $\pi/2$ d) $\pi/4$

225. The surface integral $\iint_S F.\ dS$ for a constant vector field F and S being a closed surface is

a) a non zero constant b) 0 c) never zero d) None of these

226. A vector field F is tangent to the boundary of a region S in space. Then $\iiint_S div\ FdV$,

a) depends on $\bar{F}$ and S.
b) 0
c) depends only on S
d) Gauss Theorem not applicable.

227. The result $\iint_{S_1} (\nabla \times F) \cdot ndS = \iint_{S_2} (\nabla \times F) \cdot ndS$ where surfaces S_1 and S_2. have common boundary can be prove using
a) Only Gauss theorem and not by Stokes theorem
b) Only Stokes theorem and not by Gauss theorem
c) Neither from Stokes not from Gauss theorem
d) None of the above.