

1. If $x=r\cos\theta$, $y=r\sin\theta$, $z=z$. Then value of $\frac{\partial(x,y,z)}{\partial(r,\theta,z)} = ?$

(1) $r^2\sin\theta$

(2) r

(3) $r^2\cos\theta$

(4) None

2. If $u= x(1-y)$ and $v= xy$. Then $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = ?$

(1) 1

(2) x

(3) y

(4) None

3. If $u= x^2+y^2+z^2$, $v=y$, $w=z$. Then $\frac{\partial(u,v,w)}{\partial(x,y,z)} = ?$

(1) x

(2) $2x$

(3) y

(4) None

4. The functions $u= u(x,y)$ and $v= v(x,y)$ are said to be functionally dependent iff

$$\frac{\partial(u,v)}{\partial(x,y)} = ?$$

(1) 0

(2) 1

(3) ∞

(4) None

5. The functions $u = \sin^{-1}x + \sin^{-1}y$, $v = x\sqrt{1-y^2} + y\sqrt{1-x^2}$ are functionally dependent, then relation b/w u & $v = ?$

- (1) $u = \sin^{-1}v$ (2) $u = \sin v$
 (3) $u = \cos^{-1}v$ (4) None

6. Express $\int_0^2 \sqrt{x}(4-x^2)^{-\frac{1}{4}} dx$ in terms of beta function = ?

- (1) $\beta\left(\frac{1}{4}, \frac{1}{4}\right)$ (2) $\beta\left(\frac{3}{4}, \frac{3}{4}\right)$
 (3) $\beta\left(\frac{1}{4}, \frac{3}{4}\right)$ (4) None

7. The value of $\int_0^\infty \frac{x^{m-1} - x^{n-1}}{(1+x)^{m+n}} dx = ?$

- (1) 0 (2) 1
 (3) 2 (4) None

8. The value of $\Gamma\left(\frac{7}{2}\right) = ?$

- (1) $\frac{\sqrt{\pi}}{8}$ (2) $\frac{15\sqrt{\pi}}{8}$
 (3) $\frac{7\sqrt{\pi}}{8}$ (4) None

9. The value of $\int_0^{\frac{\pi}{2}} \sin^p x \cos^q x \, dx$ in terms of beta function?

(1) $\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(2) $\frac{1}{2}\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(3) $\beta(p, q)$

(4) None

10. The value of $\frac{\Gamma\left(n + \frac{1}{2}\right)\Gamma(n+1)}{\Gamma(2n+1)} = ?$

(1) $\frac{\sqrt{\pi}}{2^{2n}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\sqrt{\pi}$

(4) None

11. The value of $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} \, d\theta = ?$

(1) $\frac{\pi}{\sqrt{2}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\frac{\pi}{2}$

(4) None

12. The value of $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} \, dx \, dy = ?$

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{\sqrt{2}}$

(3) $\frac{\sqrt{\pi}}{2}$

(4) None

13. What is the value of $\frac{\beta(m+1, n)}{\beta(m, n)} = ?$

(1) $\frac{n}{m+n}$

(2) $\frac{1}{m+n}$

(3) $\frac{m}{m+n}$

(4) None

14. The value of $\iint_{x^2+y^2 \leq 1} dx dy = ?$

(1) π

(2) 2π

(3) π^2

(4) None

15. The value of $\iiint_{x^2+y^2+z^2 \leq 1} (x^2 + y^2 + z^2) dx dy dz = ?$

(1) 4π

(2) $\frac{4\pi}{5}$

(3) 2π

(4) None

16. The value of Dirichlet Integral $\iiint_{u+v+w \leq 1} (abc) du dv dw = ?$

(1) abc

(2) $\frac{abc}{2}$

(3) $\frac{abc}{6}$

(4) None

17. The volume of ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 = ?$

(1) $\frac{4}{3}\pi a^3$

(2) $\frac{4}{3}\pi b^3$

(3) $\frac{4}{3}\pi abc$

(4) None

18. By changing order of Integration, the value of $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx = ?$

(1) $\frac{\pi}{4}$

(2) $\frac{\pi}{16}$

(3) $\frac{\pi}{2}$

(4) None

19. The value of $\cos(n\pi + \alpha) = ?$

(1) $\cos \alpha$

(2) $(-1)^n \cos \alpha$

(3) $\sin \alpha$

(4) None

20. In fourier expansion of $f(x) = |x|$, $-\pi \leq x \leq \pi$, the value of $b_n = ?$

(1) π

(2) 0

(3) $\pi/2$

(4) None

21. The value of the series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$

(1) $\frac{\pi^2}{8}$

(2) $\frac{\pi^2}{12}$

(3) $\frac{\pi^2}{6}$

(4) None

22. What is the Pt. of discontinuity in the fourier series of $f(x) = \begin{cases} -1 & \text{if } -\pi \leq x < 0 \\ 1 & \text{if } 0 \leq x \leq \pi \end{cases} = ?$

(1) $-\pi$

(2) π

(3) 0

(4) None

23. IF $f(n) = x$ is Half Range Cosine series in $0 < x < 2$. Then the value of $b_n = ?$

(1) 1

(2) 0

(3) 2

(4) None

24. In the fourier series of $f(n) = x^2 - 2$, $-2 \leq n \leq 2$. The value of $b_n = ?$

(1) 4

(2) 7

(3) 0

(4) None

25. In the fourier series of $f(x) = \begin{cases} x - [x] - \frac{1}{2}, & \text{if } x \text{ is not integer} \\ 0, & \text{otherwise} \end{cases}$ in the interval

$\left[-\frac{1}{2}, \frac{1}{2}\right]$, Then the value of $f\left(\frac{1}{2}\right) = ?$

(1) 0

(2) 1

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

(4) None

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26. What is the image of the Pt. $2+3i$ on the sphere $(x-0)^2 + (y-0)^2 + \left(z-\frac{1}{2}\right)^2 = \frac{1}{4}$
=?

(1) $\left(\frac{2}{14}, \frac{3}{14}, \frac{4}{14}\right)$

(2) $\left(\frac{-2}{14}, \frac{3}{14}, \frac{4}{14}\right)$

(3) $\left(\frac{2}{14}, \frac{-3}{14}, \frac{4}{14}\right)$

(4) None

27. What is the Pt. on the complex plane corresponds to the Pt. $\left(\frac{1}{3}, \frac{-2}{3}, \frac{2}{3}\right)$ on Reimann sphere $x^2+y^2+z^2=1$?

(1) $1-2i$

(2) $1+2i$

(3) $2+i$

(4) None

28. Evaluate $\lim_{z \rightarrow i} \frac{z^{10} + 1}{z^6 + 1} = ?$

(1) $\frac{2}{3}$

(2) $\frac{5}{3}$

(3) $\frac{4}{3}$

(4) None

29. If $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}; & z \neq 0 \\ 0; & z = 0 \end{cases}$ then what is the value of $f'(0) = ?$

(1) 0

(2) does not exist

(3) 1

(4) None

30. If $f(z) = u + iv$ is analytic with constant modulus. Then the value of $\frac{\partial u}{\partial x} = ?$

- (1) 1 (2) 2
(3) 0 (4) None

31. The function $v = \frac{y}{x^2 + y^2}$ is = ?

- (1) Harmonic (2) Not Harmonic
(3) Not exist (4) None

32. What is the image of $|z - 3i| = 3$ under the mapping $w = \frac{1}{z} = ?$ where $w = u + iv$

- (1) $6v + 1 = 0$ (2) $6v^2 + 1 = 0$
(3) $6u + 1 = 0$ (4) None

33. What are fixed pts of the Mobius Transformation $w = \frac{3iz + 1}{z + i}$?

- (1) i, i (2) $i, -i$
(3) $-i, -i$ (4) None

34. What is nature of Mobius Transformation $w = \frac{3z - 4}{z - 1}$?

- (1) Parabolic (2) Hyperbolic
(3) Both (1) and (2) (4) None

35. The cross-ratio of $(0,1,i,-1)= ?$

(1) 1

(2) i

(3) -i

(4) None

36. What is bilinear Transformation which maps the pts $z_1=2, z_2=i, z_3=-2$ into $w_1=1, w_2=i$ and $w_3=-1$?

(1) $w = \frac{z+2i}{z-6}$

(2) $w = \frac{3z+2i}{1z-6}$

(3) $w = \frac{uz}{z+3}$

(4) None

37. What is Mobius Transformation which maps the pts $z_1=\infty, z_2=i$ and $z_3=0$ into pts $w_1=0, w_2=0$ and $w_3=\infty$?

(1) $w = \frac{1}{z}$

(2) $w = \frac{-1}{z}$

(3) $w = \frac{1}{z+1}$

(4) None

38. Given the Transformation $z = \sqrt{w}$ where $w=u+iv$ if $u=k$ (constant), Then it represents?

(1) Hyperbola

(2) Rectangular Hyperbola

(3) Parabola

(4) None

39. The condition that the Transformation $w=z^2$ transforms the circle $|z-a|=k$ in z -plane to a line in the w -plane is?

- (1) $a \neq k$ (2) $a = k$
 (3) $\frac{a}{k} = 5$ (4) None

40. What are fixed pts of the Mobius Transformation $w = \frac{(2+i)z-2}{z+i} = ?$

- (1) $z = 1 \pm i$ (2) $z = -1 \pm i$
 (3) $-1, -2$ (4) None

41. The image of $x^2+y^2-4y+2=0$ under the mapping $w = \frac{z-i}{iz-1}$ is $7u^2+7v^2+2v-1=0$. Then its centre and radius= ?

- (1) $(0, \frac{-1}{7}), \frac{2\sqrt{2}}{7}$ (2) $(\frac{1}{7}, 0), \frac{2\sqrt{2}}{7}$
 (3) $(\frac{1}{7}, 1), \frac{\sqrt{2}}{7}$ (4) None

42. If $f(z) = u+iv$ where $u = x^3-3xy^2$. Then $f(z) = ?$

- (1) $-z^3+c$ (2) z^3+c
 (3) z^3+z^2+c (4) None

43. If $u=u(x,y)$ satisfies the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ Then u is called

- (1) Harmonic (2) Harmonic Conjugate
(3) Conjugate (4) None

44. The value of $\Gamma\left(\frac{-3}{2}\right) = ?$

- (1) $\frac{\sqrt{\pi}}{3}$ (2) $\frac{4\sqrt{\pi}}{3}$
(3) $\frac{2\sqrt{\pi}}{3}$ (4) None

45. What is image of the Pt. $1+i$ on the sphere of radius 1 and centre $(0,0,0) = ?$

- (1) $\left(\frac{2}{3}, \frac{2}{3}, \frac{1}{3}\right)$ (2) $\left(\frac{-2}{3}, \frac{2}{3}, \frac{1}{3}\right)$
(3) $\left(\frac{2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$ (4) None

46. In the Fourier expansion of the function $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & \text{if } -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi} & \text{if } 0 \leq x \leq \pi \end{cases}$. Then the value of $b_n = ?$

- (1) 1 (2) 0
(3) $\frac{1}{2}$ (4) None

47. Evaluate $\int_0^1 \int_x^{2-x} xy dy dx = ?$

(1) $\frac{9}{24}$

(2) $\frac{10}{23}$

(3) $\frac{9}{23}$

(4) None

48. What is the area bounded by Parabolas $y^2=ux$ and $x^2=uy$?

(1) $\frac{48}{9}$

(2) $\frac{48}{5}$

(3) $\frac{48}{11}$

(4) None

49. What is the value of $\beta(7,6) = ?$

(1) $\frac{1}{5544}$

(2) $\frac{1}{5044}$

(3) $\frac{1}{4545}$

(4) None

50. The value of $\int_0^3 \frac{dx}{\sqrt{3x-x^2}} = ?$

(1) π

(2) $-\pi$

(3) $\pi/2$

(4) None

1. The image of $x^2+y^2-4y+2=0$ under the mapping $w = \frac{z-i}{iz-1}$ is $7u^2+7v^2+2v-1=0$.

Then its centre and radius= ?

- (1) $\left(0, \frac{-1}{7}\right), \frac{2\sqrt{2}}{7}$ (2) $\left(\frac{1}{7}, 0\right), \frac{2\sqrt{2}}{7}$
 (3) $\left(\frac{1}{7}, 1\right), \frac{\sqrt{2}}{7}$ (4) None

2. If $f(z) = u + iv$ where $u = x^3 - 3xy^2$. Then $f(z) = ?$

- (1) $-z^3 + c$ (2) $z^3 + c$
 (3) $z^3 + z^2 + c$ (4) None

3. If $u = u(x, y)$ satisfies the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ Then u is called

- (1) Harmonic (2) Harmonic Conjugate
 (3) Conjugate (4) None

4. The value of $\Gamma\left(\frac{-3}{2}\right) = ?$

- (1) $\frac{\sqrt{\pi}}{3}$ (2) $\frac{4\sqrt{\pi}}{3}$
 (3) $\frac{2\sqrt{\pi}}{3}$ (4) None

2

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5. What is image of the Pt. $1+i$ on the sphere of radius 1 and centre $(0,0,0)$ = ?

(1) $\left(\frac{2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(2) $\left(\frac{-2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(3) $\left(\frac{2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$

(4) None

6. In the Fourier expansion of the function $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & \text{if } -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi} & \text{if } 0 \leq x \leq \pi \end{cases}$. Then the value of b_n = ?

(1) 1

(2) 0

(3) $\frac{1}{2}$

(4) None

7. Evaluate $\int_0^1 \int_x^{2-x} xy dy dx = ?$

(1) $\frac{9}{24}$

(2) $\frac{10}{23}$

(3) $\frac{9}{23}$

(4) None

8. What is the area bounded by Parabolas $y^2=ux$ and $x^2=uy$?

(1) $\frac{48}{9}$

(2) $\frac{48}{5}$

(3) $\frac{48}{11}$

(4) None

9. What is the value of $\beta(7,6)= ?$

(1) $\frac{1}{5544}$

(2) $\frac{1}{5044}$

(3) $\frac{1}{4545}$

(4) None

10. The value of $\int_0^3 \frac{dx}{\sqrt{3x-x^2}} = ?$

(1) π

(2) $-\pi$

(3) $\pi/2$

(4) None

11. If $x=r\cos\theta$, $y=r\sin\theta$, $z=z$. Then value of $\frac{\partial(x,y,z)}{\partial(r,\theta,z)} = ?$

(1) $r^2\sin\theta$

(2) r

(3) $r^2\cos\theta$

(4) None

12. If $u= x(1-y)$ and $v= xy$. Then $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = ?$

(1) 1

(2) x

(3) y

(4) None

13. If $u = x^2 + y^2 + z^2$, $v = y$, $w = z$. Then $\frac{\partial(u, v, w)}{\partial(x, y, z)} = ?$

(1) x

(2) $2x$

(3) y

(4) None

14. The functions $u = u(x, y)$ and $v = v(x, y)$ are said to be functionally dependent iff

$$\frac{\partial(u, v)}{\partial(x, y)} = ?$$

(1) 0

(2) 1

(3) ∞

(4) None

15. The functions $u = \sin^{-1}x + \sin^{-1}y$, $v = x\sqrt{1-y^2} + y\sqrt{1-x^2}$ are functionally dependent, then relation b/w u & $v = ?$

(1) $u = \sin^{-1}v$

(2) $u = \sin v$

(3) $u = \cos^{-1}v$

(4) None

16. Express $\int_0^2 \sqrt{x}(4-x^2)^{-\frac{1}{4}} dx$ in terms of beta function = ?

(1) $\beta\left(\frac{1}{4}, \frac{1}{4}\right)$

(2) $\beta\left(\frac{3}{4}, \frac{3}{4}\right)$

(3) $\beta\left(\frac{1}{4}, \frac{3}{4}\right)$

(4) None

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17. The value of $\int_0^\infty \frac{x^{m-1} - x^{n-1}}{(1+x)^{m+n}} dx = ?$

(1) 0

(2) 1

(3) 2

(4) None

18. The value of $\Gamma\left(\frac{7}{2}\right) = ?$

(1) $\frac{\sqrt{\pi}}{8}$

(2) $\frac{15\sqrt{\pi}}{8}$

(3) $\frac{7\sqrt{\pi}}{8}$

(4) None

19. The value of $\int_0^{\frac{\pi}{2}} \sin^p x \cos^q x dx$ in terms of beta function?

(1) $\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(2) $\frac{1}{2}\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(3) $\beta(p, q)$

(4) None

20. The value of $\frac{\Gamma\left(n + \frac{1}{2}\right)\Gamma(n+1)}{\Gamma(2n+1)} = ?$

(1) $\frac{\sqrt{\pi}}{2^{2n}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\sqrt{\pi}$

(4) None

21. The value of $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} d\theta = ?$

(1) $\frac{\pi}{\sqrt{2}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\frac{\pi}{2}$

(4) None

22. The value of $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy = ?$

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{\sqrt{2}}$

(3) $\frac{\sqrt{\pi}}{2}$

(4) None

23. What is the value of $\frac{\beta(m+1, n)}{\beta(m, n)} = ?$

(1) $\frac{n}{m+n}$

(2) $\frac{1}{m+n}$

(3) $\frac{m}{m+n}$

(4) None

24. The value of $\iint_{x^2+y^2 \leq 1} dx dy = ?$

(1) π

(2) 2π

(3) π^2

(4) None

25. The value of $\iiint_{x^2+y^2+z^2 \leq 1} (x^2 + y^2 + z^2) dx dy dz = ?$

- (1) 4π (2) $\frac{4\pi}{5}$
 (3) 2π (4) None

26. The value of Dirichlet Integral $\iiint_{u+v+w \leq 1} (abc) du dv dw = ?$

- (1) abc (2) $\frac{abc}{2}$
 (3) $\frac{abc}{6}$ (4) None

27. The volume of ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 = ?$

- (1) $\frac{4}{3}\pi a^3$ (2) $\frac{4}{3}\pi b^3$
 (3) $\frac{4}{3}\pi abc$ (4) None

28. By changing order of Integration, the value of $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx = ?$

- (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{16}$
 (3) $\frac{\pi}{2}$ (4) None

29. The value of $\cos(n\pi + \alpha) = ?$

- (1) $\cos \alpha$ (2) $(-1)^n \cos \alpha$
(3) $\sin \alpha$ (4) None

30. In fourier expansion of $f(x) = |x|$, $-\pi \leq x \leq \pi$, the value of $b_n = ?$

- (1) π (2) 0
(3) $\pi/2$ (4) None

31. The value of the series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$

- (1) $\frac{\pi^2}{8}$ (2) $\frac{\pi^2}{12}$
(3) $\frac{\pi^2}{6}$ (4) None

32. What is the Pt. of discontinuity in the fourier series of $f(x) = \begin{cases} -1 & \text{if } -\pi \leq x < 0 \\ 1 & \text{if } 0 \leq x \leq \pi \end{cases} = ?$

- (1) $-\pi$ (2) π
(3) 0 (4) None

33. IF $f(x) = x$ is Half Range Cosine series in $0 < x < 2$. Then the value of $b_n = ?$

- (1) 1 (2) 0
(3) 2 (4) None

34. In the fourier series of $f(n) = x^2 - 2$, $-2 \leq n \leq 2$. The value of $b_n = ?$

- (1) 4 (2) 7
(3) 0 (4) None

35. In the fourier series of $f(x) = \begin{cases} x - [x] - \frac{1}{2}, & \text{if } x \text{ is not integer} \\ 0, & \text{otherwise} \end{cases}$ in the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$, Then the value of $f\left(\frac{1}{2}\right) = ?$

- (1) 0 (2) 1
(3) $-\frac{1}{2}$ (4) None

36. What is the image of the Pt. $2+3i$ on the sphere $(x-0)^2 + (y-0)^2 + \left(z-\frac{1}{2}\right)^2 = \frac{1}{4}$ =?

- (1) $\left(\frac{2}{14}, \frac{3}{14}, \frac{4}{14}\right)$ (2) $\left(\frac{-2}{14}, \frac{3}{14}, \frac{4}{14}\right)$
(3) $\left(\frac{2}{14}, \frac{-3}{14}, \frac{4}{14}\right)$ (4) None

37. What is the Pt. on the complex plane corresponds to the Pt. $\left(\frac{1}{3}, \frac{-2}{3}, \frac{2}{3}\right)$ on Reimann sphere $x^2 + y^2 + z^2 = 1$?

- (1) $1-2i$ (2) $1+2i$
(3) $2+i$ (4) None

38. Evaluate $\lim_{z \rightarrow i} \frac{z^{10} + 1}{z^6 + 1} = ?$

(1) $\frac{2}{3}$

(2) $\frac{5}{3}$

(3) $\frac{4}{3}$

(4) None

39. If $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, & z \neq 0 \\ 0; & z = 0 \end{cases}$ then what is the value of $f'(0) = ?$

(1) 0

(2) does not exist

(3) 1

(4) None

40. If $f(z) = u + iv$ is analytic with constant modulus. Then the value of $\frac{\partial u}{\partial x} = ?$

(1) 1

(2) 2

(3) 0

(4) None

41. The function $v = \frac{y}{x^2 + y^2}$ is = ?

(1) Harmonic

(2) Not Harmonic

(3) Not exist

(4) None

42. What is the image of $|z - 3i| = 3$ under the mapping $w = \frac{1}{z} = ?$ where $w = u + iv$

(1) $6v + 1 = 0$

(2) $6v^2 + 1 = 0$

(3) $6u + 1 = 0$

(4) None

43. What are fixed pts of the Mobius Transformation $w = \frac{3iz + 1}{z + i}$?

(1) i, i

(2) $i, -i$

(3) $-i, -i$

(4) None

44. What is nature of Mobius Transformation $w = \frac{3z-4}{z-1}$?

(1) Parabolic

(2) Hyperbolic

(3) Both (1) and (2)

(4) None

45. The cross-ratio of $(0, 1, i, -1) = ?$

(1) 1

(2) i

(3) $-i$

(4) None

46. What is bilinear Transformation which maps the pts $z_1=2, z_2=i, z_3=-2$ into

$w_1=1, w_2=i$ and $w_3=-1$?

(1) $w = \frac{z + 2i}{z - 6}$

(2) $w = \frac{3z + 2i}{1z - 6}$

(3) $w = \frac{uz}{z + 3}$

(4) None

47. What is Mobius Transformation which maps the pts $z_1=\infty$, $z_2=i$ and $z_3=0$ into

pts $w_1=0$, $w_2=0$ and $w_3=\infty$?

(1) $w = \frac{1}{z}$

(2) $w = \frac{-1}{z}$

(3) $w = \frac{1}{z+1}$

(4) None

48. Given the Transformation $z = \sqrt{w}$ where $w=u+iv$ if $u=k$ (constant), Then it represents?

(1) Hyperbola

(2) Rectangular Hyperbola

(3) Parabola

(4) None

49. The condition that the Transformation $w=z^2$ transforms the circle $|z-a|=k$ in z -plane to a line in the w -plane is?

(1) $a \neq k$

(2) $a = k$

(3) $\frac{a}{k} = 5$

(4) None

50. What are fixed pts of the Mobius Transformation $w = \frac{(2+i)z-2}{z+i} = ?$

(1) $z = 1 \pm i$

(2) $z = -1 \pm i$

(3) $-1, -2$

(4) None

1. The function $v = \frac{y}{x^2 + y^2}$ is = ?
- (1) Harmonic (2) Not Harmonic
- (3) Not exist (4) None
2. What is the image of $|z-3i|=3$ under the mapping $w = \frac{1}{z}$ =? where $w=u+iv$
- (1) $6v+1=0$ (2) $6v^2+1=0$
- (3) $6u+1=0$ (4) None
3. What are fixed pts of the Mobius Transformation $w = \frac{3iz + 1}{z + i}$?
- (1) i, i (2) $i, -i$
- (3) $-i, -i$ (4) None
4. What is nature of Mobius Transformation $w = \frac{3z-4}{z-1}$?
- (1) Parabolic (2) Hyperbolic
- (3) Both (1) and (2) (4) None
5. The cross-ratio of $(0,1,i,-1)$ = ?
- (1) 1 (2) i
- (3) $-i$ (4) None

6. What is bilinear Transformation which maps the pts $z_1=2$, $z_2=i$, $z_3=-2$ into

$w_1=1$, $w_2=i$ and $w_3=-1$?

(1) $w = \frac{z+2i}{z-6}$

(2) $w = \frac{3z+2i}{1z-6}$

(3) $w = \frac{uz}{z+3}$

(4) None

7. What is Mobius Transformation which maps the pts $z_1=\infty$, $z_2=i$ and $z_3=0$ into

pts $w_1=0$, $w_2=0$ and $w_3=\infty$?

(1) $w = \frac{1}{z}$

(2) $w = \frac{-1}{z}$

(3) $w = \frac{1}{z+1}$

(4) None

8. Given the Transformation $z = \sqrt{w}$ where $w=u+iv$ if $u=k$ (constant), Then it represents?

(1) Hyperbola

(2) Rectangular Hyperbola

(3) Parabola

(4) None

9. The condition that the Transformation $w=z^2$ transforms the circle $|z-a|=k$ in z-plane to a line in the w-plane if?

(1) $a \neq k$

(2) $a = k$

(3) $\frac{a}{k} = 5$

(4) None

10. What are fixed pts of the Mobius Transformation $w = \frac{(2+i)z-2}{z+i} = ?$

(1) $z = 1 \pm i$

(2) $z = -1 \pm i$

(3) $-1, -2$

(4) None

11. The image of $x^2 + y^2 - 4y + 2 = 0$ under the mapping $w = \frac{z-i}{iz-1}$ is $7u^2 + 7v^2 + 2v - 1 = 0$.

Then its centre and radius = ?

(1) $\left(0, \frac{-1}{7}\right), \frac{2\sqrt{2}}{7}$

(2) $\left(\frac{1}{7}, 0\right), \frac{2\sqrt{2}}{7}$

(3) $\left(\frac{1}{7}, 1\right), \frac{\sqrt{2}}{7}$

(4) None

12. If $f(z) = u + iv$ where $u = x^3 - 3xy^2$. Then $f(z) = ?$

(1) $-z^3 + c$

(2) $z^3 + c$

(3) $z^3 + z^2 + c$

(4) None

13. If $u = u(x, y)$ satisfies the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ Then u is called

(1) Harmonic

(2) Harmonic Conjugate

(3) Conjugate

(4) None

14. The value of $\Gamma\left(\frac{-3}{2}\right) = ?$

(1) $\frac{\sqrt{\pi}}{3}$

(2) $\frac{4\sqrt{\pi}}{3}$

(3) $\frac{2\sqrt{\pi}}{3}$

(4) None

15. What is image of the Pt. $1+i$ on the sphere of radius 1 and centre $(0,0,0) = ?$

(1) $\left(\frac{2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(2) $\left(\frac{-2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(3) $\left(\frac{2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$

(4) None

16. In the Fourier expansion of the function $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & \text{if } -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi} & \text{if } 0 \leq x \leq \pi \end{cases}$. Then the value of $b_n = ?$

(1) 1

(2) 0

(3) $\frac{1}{2}$

(4) None

17. Evaluate $\int_0^1 \int_x^{2-x} xy dy dx = ?$

(1) $\frac{9}{24}$

(2) $\frac{10}{23}$

(3) $\frac{9}{23}$

(4) None

18. What is the area bounded by Parabolas $y^2=ux$ and $x^2=uy$?

(1) $\frac{48}{9}$

(2) $\frac{48}{5}$

(3) $\frac{48}{11}$

(4) None

19. What is the value of $\beta(7,6)= ?$

(1) $\frac{1}{5544}$

(2) $\frac{1}{5044}$

(3) $\frac{1}{4545}$

(4) None

20. The value of $\int_0^3 \frac{dx}{\sqrt{3x-x^2}} = ?$

(1) π

(2) $-\pi$

(3) $\pi/2$

(4) None

21. If $x=r\cos\theta$, $y=r\sin\theta$, $z=z$. Then value of $\frac{\partial(x,y,z)}{\partial(r,\theta,z)} = ?$

(1) $r^2\sin\theta$

(2) r

(3) $r^2\cos\theta$

(4) None

22. If $u = x(1-y)$ and $v = xy$. Then $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = ?$

(1) 1

(2) x

(3) y

(4) None

23. If $u = x^2 + y^2 + z^2$, $v = y$, $w = z$. Then $\frac{\partial(u,v,w)}{\partial(x,y,z)} = ?$

(1) x

(2) 2x

(3) y

(4) None

24. The functions $u = u(x,y)$ and $v = v(x,y)$ are said to be functionally dependent iff

$$\frac{\partial(u,v)}{\partial(x,y)} = ?$$

(1) 0

(2) 1

(3) ∞

(4) None

25. The functions $u = \sin^{-1}x + \sin^{-1}y$, $v = x\sqrt{1-y^2} + y\sqrt{1-x^2}$ are functionally dependent, then relation b/w u & $v = ?$

(1) $u = \sin^{-1}v$

(2) $u = \sin v$

(3) $u = \cos^{-1}v$

(4) None

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26. Express $\int_0^2 \sqrt{x}(4-x^2)^{\frac{-1}{4}} dx$ in terms of beta function = ?

(1) $\beta\left(\frac{1}{4}, \frac{1}{4}\right)$

(2) $\beta\left(\frac{3}{4}, \frac{3}{4}\right)$

(3) $\beta\left(\frac{1}{4}, \frac{3}{4}\right)$

(4) None

27. The value of $\int_0^\infty \frac{x^{m-1} - x^{n-1}}{(1+x)^{m+n}} dx = ?$

(1) 0

(2) 1

(3) 2

(4) None

28. The value of $\Gamma\left(\frac{7}{2}\right) = ?$

(1) $\frac{\sqrt{\pi}}{8}$

(2) $\frac{15\sqrt{\pi}}{8}$

(3) $\frac{7\sqrt{\pi}}{8}$

(4) None

29. The value of $\int_0^{\frac{\pi}{2}} \sin^p x \cos^q x dx$ in terms of beta function?

(1) $\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(2) $\frac{1}{2} \beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(3) $\beta(p, q)$

(4) None

30. The value of $\frac{\Gamma(n + \frac{1}{2})\Gamma(n + 1)}{\Gamma(2n + 1)} = ?$

(1) $\frac{\sqrt{\pi}}{2^{2n}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\sqrt{\pi}$

(4) None

31. The value of $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} d\theta = ?$

(1) $\frac{\pi}{\sqrt{2}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\frac{\pi}{2}$

(4) None

32. The value of $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy = ?$

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{\sqrt{2}}$

(3) $\frac{\sqrt{\pi}}{2}$

(4) None

33. What is the value of $\frac{\beta(m+1, n)}{\beta(m, n)} = ?$

(1) $\frac{n}{m+n}$

(2) $\frac{1}{m+n}$

(3) $\frac{m}{m+n}$

(4) None

34. The value of $\iint_{x^2+y^2 \leq 1} dx dy = ?$

(1) π

(2) 2π

(3) π^2

(4) None

35. The value of $\iiint_{x^2+y^2+z^2 \leq 1} (x^2 + y^2 + z^2) dx dy dz = ?$

(1) 4π

(2) $\frac{4\pi}{5}$

(3) 2π

(4) None

36. The value of Dirichlet Integral $\iiint_{u+v+w \leq 1} (abc) du dv dw = ?$

(1) abc

(2) $\frac{abc}{2}$

(3) $\frac{abc}{6}$

(4) None

37. The volume of ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 = ?$

(1) $\frac{4}{3}\pi a^3$

(2) $\frac{4}{3}\pi b^3$

(3) $\frac{4}{3}\pi abc$

(4) None

38. By changing order of Integration, the value of $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx = ?$

(1) $\frac{\pi}{4}$

(2) $\frac{\pi}{16}$

(3) $\frac{\pi}{2}$

(4) None

39. The value of $\cos(n\pi + \alpha) = ?$

(1) $\cos \alpha$

(2) $(-1)^n \cos \alpha$

(3) $\sin \alpha$

(4) None

40. In fourier expansion of $f(x) = |x|$, $-\pi \leq x \leq \pi$, the value of $b_n = ?$

(1) π

(2) 0

(3) $\pi/2$

(4) None

41. The value of the series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$

(1) $\frac{\pi^2}{8}$

(2) $\frac{\pi^2}{12}$

(3) $\frac{\pi^2}{6}$

(4) None

42. What is the Pt. of discontinuity in the fourier series of $f(x) = \begin{cases} -1 & \text{if } -\pi \leq x < 0 \\ 1 & \text{if } 0 \leq x \leq \pi \end{cases} = ?$

(1) $-\pi$

(2) π

(3) 0

(4) None

43. IF $f(x) = x$ is Half Range Cosine series in $0 < x < 2$. Then the value of $b_n = ?$

- (1) 1 (2) 0
(3) 2 (4) None

44. In the fourier series of $f(x) = x^2 - 2$, $-2 \leq x \leq 2$. The value of $b_n = ?$

- (1) 4 (2) 7
(3) 0 (4) None

45. In the fourier series of $f(x) = \begin{cases} x - [x] - \frac{1}{2}, & \text{if } x \text{ is not integer} \\ 0, & \text{otherwise} \end{cases}$ in the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$, Then the value of $f\left(\frac{1}{2}\right) = ?$

- (1) 0 (2) 1
(3) $-\frac{1}{2}$ (4) None

46. What is the image of the Pt. $2+3i$ on the sphere $(x-0)^2 + (y-0)^2 + \left(z-\frac{1}{2}\right)^2 = \frac{1}{4}$
=?

- (1) $\left(\frac{2}{14}, \frac{3}{14}, \frac{4}{14}\right)$ (2) $\left(\frac{-2}{14}, \frac{3}{14}, \frac{4}{14}\right)$
(3) $\left(\frac{2}{14}, \frac{-3}{14}, \frac{4}{14}\right)$ (4) None

47. What is the Pt. on the complex plane corresponds to the Pt. $\left(\frac{1}{3}, \frac{-2}{3}, \frac{2}{3}\right)$ on Riemann sphere $x^2+y^2+z^2=1$?

(1) $1-2i$

(2) $1+2i$

(3) $2+i$

(4) None

48. Evaluate $\lim_{z \rightarrow i} \frac{z^{10} + 1}{z^6 + 1} = ?$

(1) $\frac{2}{3}$

(2) $\frac{5}{3}$

(3) $\frac{4}{3}$

(4) None

49. If $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}; & z \neq 0 \\ 0; & z = 0 \end{cases}$ then what is the value of $f'(0) = ?$

(1) 0

(2) does not exist

(3) 1

(4) None

50. If $f(z) = u + iv$ is analytic with constant modulus. Then the value of $\frac{\partial u}{\partial x} = ?$

(1) 1

(2) 2

(3) 0

(4) None

1. The value of the series $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots$
 - (1) $\frac{\pi^2}{8}$
 - (2) $\frac{\pi^2}{12}$
 - (3) $\frac{\pi^2}{6}$
 - (4) None
2. What is the Pt. of discontinuity in the fourier series of $f(x) = \begin{cases} -1 & \text{if } -\pi \leq x < 0 \\ 1 & \text{if } 0 \leq x \leq \pi \end{cases} = ?$
 - (1) $-\pi$
 - (2) π
 - (3) 0
 - (4) None
3. IF $f(n) = x$ is Half Range Cosine series in $0 < x < 2$. Then the value of $b_n = ?$
 - (1) 1
 - (2) 0
 - (3) 2
 - (4) None
4. In the fourier series of $f(n) = x^2 - 2$, $-2 \leq n \leq 2$. The value of $b_n = ?$
 - (1) 4
 - (2) 7
 - (3) 0
 - (4) None
5. In the fourier series of $f(x) = \begin{cases} x - [x] - \frac{1}{2}, & \text{if } x \text{ is not integer} \\ 0, & \text{otherwise} \end{cases}$ in the interval $\left[-\frac{1}{2}, \frac{1}{2}\right]$, Then the value of $f\left(\frac{1}{2}\right) = ?$
 - (1) 0
 - (2) 1
 - (3) $-\frac{1}{2}$
 - (4) None

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6. What is the image of the Pt. $2+3i$ on the sphere $(x-0)^2 + (y-0)^2 + \left(z-\frac{1}{2}\right)^2 = \frac{1}{4}$ =?

(1) $\left(\frac{2}{14}, \frac{3}{14}, \frac{4}{14}\right)$

(2) $\left(\frac{-2}{14}, \frac{3}{14}, \frac{4}{14}\right)$

(3) $\left(\frac{2}{14}, \frac{-3}{14}, \frac{4}{14}\right)$

(4) None

7. What is the Pt. on the complex plane corresponds to the Pt. $\left(\frac{1}{3}, \frac{-2}{3}, \frac{2}{3}\right)$ on Riemann sphere $x^2+y^2+z^2=1$?

(1) $1-2i$

(2) $1+2i$

(3) $2+i$

(4) None

8. Evaluate $\lim_{z \rightarrow i} \frac{z^{10} + 1}{z^6 + 1} = ?$

(1) $\frac{2}{3}$

(2) $\frac{5}{3}$

(3) $\frac{4}{3}$

(4) None

9. If $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}; & z \neq 0 \\ 0; & z = 0 \end{cases}$ then what is the value of $f'(0) = ?$

(1) 0

(2) does not exist

(3) 1

(4) None

10. If $f(z) = u + iv$ is analytic with constant modulus. Then the value of $\frac{\partial u}{\partial x} = ?$

(1) 1

(2) 2

(3) 0

(4) None

11. The function $v = \frac{y}{x^2 + y^2}$ is = ?

(1) Harmonic

(2) Not Harmonic

(3) Not exist

(4) None

12. What is the image of $|z - 3i| = 3$ under the mapping $w = \frac{1}{z} = ?$ where $w = u + iv$

(1) $6v + 1 = 0$

(2) $6v^2 + 1 = 0$

(3) $6u + 1 = 0$

(4) None

13. What are fixed pts of the Mobius Transformation $w = \frac{3iz + 1}{z + i}$?

(1) i, i

(2) $i, -i$

(3) $-i, -i$

(4) None

14. What is nature of Mobius Transformation $w = \frac{3z-4}{z-1}$?

- (1) Parabolic (2) Hyperbolic
(3) Both (1) and (2) (4) None

15. The cross-ratio of $(0,1,i,-1) = ?$

- (1) 1 (2) i
(3) -i (4) None

16. What is bilinear Transformation which maps the pts $z_1=2, z_2=i, z_3=-2$ into

$w_1=1, w_2=i$ and $w_3=-1$?

- (1) $w = \frac{z+2i}{z-6}$ (2) $w = \frac{3z+2i}{1z-6}$
(3) $w = \frac{uz}{z+3}$ (4) None

17. What is Mobius Transformation which maps the pts $z_1=\infty, z_2=i$ and $z_3=0$ into

pts $w_1=0, w_2=0$ and $w_3=\infty$?

- (1) $w = \frac{1}{z}$ (2) $w = \frac{-1}{z}$
(3) $w = \frac{1}{z+1}$ (4) None

18. Given the Transformation $z = \sqrt{w}$ where $w = u + iv$ if $u = k$ (constant), Then it represents?

- (1) Hyperbola (2) Rectangular Hyperbola
(3) Parabola (4) None

19. The condition that the Transformation $w = z^2$ transforms the circle $|z - a| = k$ in z -plane to a line in the w -plane is?

- (1) $a \neq k$ (2) $a = k$
(3) $\frac{a}{k} = 5$ (4) None

20. What are fixed pts of the Mobius Transformation $w = \frac{(2 + i)z - 2}{z + i} = ?$

- (1) $z = 1 \pm i$ (2) $z = -1 \pm i$
(3) $-1, -2$ (4) None

21. The image of $x^2 + y^2 - 4y + 2 = 0$ under the mapping $w = \frac{z - i}{iz - 1}$ is $7u^2 + 7v^2 + 2v - 1 = 0$.

Then its centre and radius = ?

- (1) $(0, \frac{-1}{7}), \frac{2\sqrt{2}}{7}$ (2) $(\frac{1}{7}, 0), \frac{2\sqrt{2}}{7}$
(3) $(\frac{1}{7}, 1), \frac{\sqrt{2}}{7}$ (4) None

22. If $f(z) = u + iv$ where $u = x^3 - 3xy^2$. Then $f(z) = ?$

(1) $-z^3 + c$

(2) $z^3 + c$

(3) $z^3 + z^2 + c$

(4) None

23. If $u = u(x, y)$ satisfies the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ Then u is called

(1) Harmonic

(2) Harmonic Conjugate

(3) Conjugate

(4) None

24. The value of $\Gamma\left(\frac{-3}{2}\right) = ?$

(1) $\frac{\sqrt{\pi}}{3}$

(2) $\frac{4\sqrt{\pi}}{3}$

(3) $\frac{2\sqrt{\pi}}{3}$

(4) None

25. What is image of the Pt. $1 + i$ on the sphere of radius 1 and centre $(0, 0, 0) = ?$

(1) $\left(\frac{2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(2) $\left(\frac{-2}{3}, \frac{2}{3}, \frac{1}{3}\right)$

(3) $\left(\frac{2}{3}, \frac{2}{3}, \frac{-1}{3}\right)$

(4) None

26. In the Fourier expansion of the function $f(x) = \begin{cases} 1 + \frac{2x}{\pi} & \text{if } -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi} & \text{if } 0 \leq x \leq \pi \end{cases}$. Then the value of $b_n = ?$

(1) 1

(2) 0

(3) $\frac{1}{2}$

(4) None

27. Evaluate $\int_0^1 \int_x^{2-x} xy dy dx = ?$

(1) $\frac{9}{24}$

(2) $\frac{10}{23}$

(3) $\frac{9}{23}$

(4) None

28. What is the area bounded by Parabolas $y^2=ux$ and $x^2=uy$?

(1) $\frac{48}{9}$

(2) $\frac{48}{5}$

(3) $\frac{48}{11}$

(4) None

29. What is the value of $\beta(7,6) = ?$

(1) $\frac{1}{5544}$

(2) $\frac{1}{5044}$

(3) $\frac{1}{4545}$

(4) None

30. The value of $\int_0^3 \frac{dx}{\sqrt{3x-x^2}} = ?$

- (1) π (2) $-\pi$
 (3) $\pi/2$ (4) None

31. If $x=r\cos\theta$, $y=r\sin\theta$, $z=z$. Then value of $\frac{\partial(x,y,z)}{\partial(r,\theta,z)} = ?$

- (1) $r^2\sin\theta$ (2) r
 (3) $r^2\cos\theta$ (4) None

32. If $u= x(1-y)$ and $v= xy$. Then $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = ?$

- (1) 1 (2) x
 (3) y (4) None

33. If $u= x^2+y^2+z^2$, $v=y$, $w=z$. Then $\frac{\partial(u,v,w)}{\partial(x,y,z)} = ?$

- (1) x (2) $2x$
 (3) y (4) None

34. The functions $u= u(x,y)$ and $v= v(x,y)$ are said to be functionally dependent iff

$$\frac{\partial(u,v)}{\partial(x,y)} = ?$$

- (1) 0 (2) 1
 (3) ∞ (4) None

35. The functions $u = \sin^{-1}x + \sin^{-1}y$, $v = x\sqrt{1-y^2} + y\sqrt{1-x^2}$ are functionally dependent, then relation b/w u & $v = ?$

(1) $u = \sin^{-1}v$

(2) $u = \sin v$

(3) $u = \cos^{-1}v$

(4) None

36. Express $\int_0^2 \sqrt{x}(4-x^2)^{-\frac{1}{4}} dx$ in terms of beta function = ?

(1) $\beta\left(\frac{1}{4}, \frac{1}{4}\right)$

(2) $\beta\left(\frac{3}{4}, \frac{3}{4}\right)$

(3) $\beta\left(\frac{1}{4}, \frac{3}{4}\right)$

(4) None

37. The value of $\int_0^\infty \frac{x^{m-1} - x^{n-1}}{(1+x)^{m+n}} dx = ?$

(1) 0

(2) 1

(3) 2

(4) None

38. The value of $\Gamma\left(\frac{7}{2}\right) = ?$

(1) $\frac{\sqrt{\pi}}{8}$

(2) $\frac{15\sqrt{\pi}}{8}$

(3) $\frac{7\sqrt{\pi}}{8}$

(4) None

39. The value of $\int_0^{\frac{\pi}{2}} \sin^p x \cos^q x \, dx$ in terms of beta function?

(1) $\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(2) $\frac{1}{2}\beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$

(3) $\beta(p, q)$

(4) None

40. The value of $\frac{\Gamma\left(n + \frac{1}{2}\right)\Gamma(n+1)}{\Gamma(2n+1)} = ?$

(1) $\frac{\sqrt{\pi}}{2^{2n}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\sqrt{\pi}$

(4) None

41. The value of $\int_0^{\frac{\pi}{2}} \sqrt{\tan \theta} \, d\theta = ?$

(1) $\frac{\pi}{\sqrt{2}}$

(2) $\frac{\sqrt{\pi}}{2}$

(3) $\frac{\pi}{2}$

(4) None

42. The value of $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} \, dx \, dy = ?$

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{\sqrt{2}}$

(3) $\frac{\sqrt{\pi}}{2}$

(4) None

43. What is the value of $\frac{\beta(m+1, n)}{\beta(m, n)} = ?$

(1) $\frac{n}{m+n}$

(2) $\frac{1}{m+n}$

(3) $\frac{m}{m+n}$

(4) None

44. The value of $\iint_{x^2+y^2 \leq 1} dx dy = ?$

(1) π

(2) 2π

(3) π^2

(4) None

45. The value of $\iiint_{x^2+y^2+z^2 \leq 1} (x^2 + y^2 + z^2) dx dy dz = ?$

(1) 4π

(2) $\frac{4\pi}{5}$

(3) 2π

(4) None

46. The value of Dirichlet Integral $\iiint_{u+v+w \leq 1} (abc) du dv dw = ?$

(1) abc

(2) $\frac{abc}{2}$

(3) $\frac{abc}{6}$

(4) None

47. The volume of ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 = ?$

- (1) $\frac{4}{3}\pi a^3$ (2) $\frac{4}{3}\pi b^3$
(3) $\frac{4}{3}\pi abc$ (4) None

48. By changing order of Integration, the value of $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dy dx = ?$

- (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{16}$
(3) $\frac{\pi}{2}$ (4) None

49. The value of $\cos(n\pi + \alpha) = ?$

- (1) $\cos \alpha$ (2) $(-1)^n \cos \alpha$
(3) $\sin \alpha$ (4) None

50. In fourier expansion of $f(x) = |x|$, $-\pi \leq x \leq \pi$, the value of $b_n = ?$

- (1) π (2) 0
(3) $\pi/2$ (4) None

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Subject Real & Complex Analysis

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1	2	3	4	5	6	7	8	9	10
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21	22	23	24	25	26	27	28	29	30
3	3	2	3	1	1	1	2	2	3
31	32	33	34	35	36	37	38	39	40
1	1	1	1	2	2	2	2	1	1
41	42	43	44	45	46	47	48	49	50
1	2	1	2	1	2	1	2	1	1

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21	22	23	24	25	26	27	28	29	30
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41 3	42 3	43 2	44 3	45 1	46 1	47 1	48 2	49 2	50 3

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41 1	42 3	43 3	44 1	45 2	46 3	47 3	48 2	49 2	50 2

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