MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

UNIT TEST PAPER NO. 5 (CALCULUS)

Select The Correct Answer

1. If $\lim_{x \to 0} \frac{x^n \sin^n x}{x^n - \sin^n x}$ is non-zero finite, then n equals :

A. 1

B. 2

C. 3

D. n

Answer: B

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2. $\lim_{x->0} \frac{(1+x)^{\frac{1}{x}} - e + \frac{ex}{2}}{x^2}$

A. $\frac{11}{24}e$

B. $-\frac{11e}{24}$

C. $\frac{e}{24}$

D. None of these.

Answer: C

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3. $\int x^2 \sec x^3 dx$

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4. If the tangent at $(1, 1)$ on $y^2 = x(2 - x)^2$ meets the curve again at P, then find coordinates of P.

A. (4, 4)

B. $(-1, 2)$

C. $\left(\frac{9}{4}, \frac{3}{8}\right)$

D. None of these.

Answer: C

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5. $\int x^x(1 + \log x)dx$ equals :

A. $x^x \log e^x + c$

B. $e^{x^x} + c$

C. $x^x + c$

D. None of these.

Answer: C

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6. The value of $\int \frac{\cos^3 x + \cos^5}{\sin^2 x + \sin^5 x} dx$

A. $\sin x - 6 \tan^{-1}(\sin x) + c$

B. $\sin x - 2(\sin x)^{-1} + c$

C. $\sin x - 2(\sin x)^{-1} - 6 \tan^{-1}(\sin x) + c$

D. $\sin x - 2(\sin x)^{-1} + 5 \tan^{-1}(\sin x) + c.$

Answer: C

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7. $\lim_{n \to \infty} \frac{(n!)^{1/n}}{n}$ equals :

A. e

B. e^{-1}

C. 1

D. None of these.

Answer: B

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8. The value of the integral $\int_0^1 e^{x^2} dx$ lies in the integral

A. $< e$

B. $> e$

C. < 1

D. None of these.

Answer: A

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9. Evaluate the integral:

$$\int e^x (\sin x + \cos x) dx$$

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10. The value of $\lim_{x \to 1^+} \frac{\int_1^x |t-1| dt}{\sin(x-1)}$ is

A. 0

B. 1

C. -1

D. None of these.

Answer: A

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11. The domain of the derivative of the function:

$$f(x) = \begin{cases} \tan^{-1} x & |x| \leq 1 \\ \frac{1}{2}(|x|-1) & |x| > 1 \end{cases}$$

A. $R - \{0\}$

B. $R - \{1\}$

C. $R - \{-1\}$

D. $R - \{-1, 1\}$.

Answer: D

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12. If $f(x) = x^n, n\varepsilon N,$ then the value of $f(1) - \frac{f'(1)}{1!} + \frac{f(1)}{2!} - \left(f'''\right)\frac{1}{3!} + \ldots + (-1)^n \frac{f^n(1)}{n!}$ is

A. 2^{n-1}

B. 0

C. 1

D. 2^n.

Answer: B

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13. Find which function does not obey Mean Value Theorem in $[0, 1]$:

A. $f(x) = \begin{matrix} \frac{1}{2} - x, x < \frac{1}{2} \\ \left(\frac{1}{2} - x\right)^2, x \geq \frac{1}{2} \end{matrix}$

B. $f(x) = \begin{cases} \frac{\sin x}{x}, x \neq 0 \\ 1, x = 0 \end{cases}$

C. $f(x) = x|x|$

D. $f(x) = |x|$

Answer: A

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14. Let $f(x) = \begin{cases} x+2, -1 \leq x < 0 \\ 1, x = 0 \\ \frac{x}{2}, 0 < x \leq 1 \end{cases}$.

Then on $[-1, 1]$, this function has :

A. a minimum

B. a maximum

C. either a maximum or a minimum

D. neither a maximum nor a minimum.

Answer: D

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15. $\int \frac{dx}{x(x^n+1)}$ is equal to

A. $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)+c$

B. $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right)+c$

C. $\log\left(\frac{x^n}{x^n+1}\right)+c$

D. None of these.

Answer: A

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16. If $l^r(x)$ means $\log\log\log.....\ x$ being repeated r times, then $\int\left[(xl(x)l^2(x)l^3(x)....\ l^r(x)\right]^{-1}dx$ is equal to :

A. $l^r(x)+c$

B. $l^{r+1}(x)+c$

C. $\frac{l^{r+1}(x)}{r+1}+c$

D. None of these.

Answer: B

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17. If $f(x) = \frac{x+2}{2x+3}$, then $\int \sqrt{\frac{f(x)}{x^2}}dx$ equals :

$\frac{1}{\sqrt{2}} g\left(\frac{1+\sqrt{2f(x)}}{1-\sqrt{2f(x)}}\right) - \sqrt{\frac{2}{3}} h\left(\frac{\sqrt{3f(x)}+\sqrt{2}}{\sqrt{3f(x)}-\sqrt{2}}\right) + c$, where :

A. $g(x) = \log|x|, h(x) = \tan^{-1} x$

B. $g(x) = h(x) = \tan^{-1} x$

C. $g(x) = \tan^{-1} x, h(x) = \log|x|$

D. $g(x) = \log|x|, h(x) = \log|x|$

Answer: D

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18. If $\int \frac{\sin x}{\sin(x-a)} dx = Ax + B \log \sin(x-\alpha) + C$, then the value of (A,B) , is

A. $(\sin\alpha, \cos\alpha)$

B. $(\cos\alpha, \sin\alpha)$

C. $(-\sin\alpha, \cos\alpha)$

D. $(-\cos\alpha, \sin\alpha)$

Answer: B

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19. The integral $\int_{-\frac{1}{2}}^{\frac{1}{2}} \left([x] + \log\left(\frac{1+x}{1-x}\right)\right). dx$ equals

A. $-\frac{1}{2}$

B. 0

C. 1

D. $2\ln\left(\frac{1}{2}\right)$.

Answer: A

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20. If $\int_0^x f(t)dt = x + \int_x^1 tf(t)dt,$ then the value of $f(1)$, is

A. $\frac{1}{2}$

B. 0

C. 1

D. $-\frac{1}{2}$

Answer: A

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21. $\lim_{n \to 0} \frac{1}{n} \left(\int_{y}^{c} e^{\sin^2 t} dt - \int_{x+y}^{x} \sin^2 t dt \right)$ is equal to (c being constant) :

A. $e^{\sin^2 y}$

B. $\sin 2y e^{\sin^2 y}$

C. 0

D. None of these.

Answer: C

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22. The function $\left|x^2 - 3x + 2\right| + \cos|x|$ is not differentiableat $x =$

A. -1

B. 0

C. 1

D. 2

Answer: C

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23. A cylindrical gas container is closed at the top and open at the bottom. If the iron plate of the top is 5/4 times as thick as the plate forming the cylindrical sides, the ratio of the radius to the height of the cylinder using minimum material for the same capacity is 3:4 (b) 5:6 (c) 4:5 (d) none of these

A. $\frac{2}{3}$

B. $\frac{1}{2}$

C. $\frac{4}{5}$

D. $\frac{1}{3}$

Answer: C

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24.

$$If f(x)\sin x\cos x dx = \frac{1}{2(b^2-a^2)}\ln f(x) + c, then f(x) is equa < o$$

$$\frac{1}{a^2\sin^2 x + b^2\cos^2 x} \quad \text{(b)} \quad \frac{1}{a^2\sin^2 x - b^2\cos^2 x}$$

$$\frac{1}{a^2\cos^2 x + b^2\cos^2 x} \quad \text{(d)} \quad \frac{1}{a^2\cos^2 x - b^2\cos^2 x}$$

A. $\frac{1}{a^2\sin^2 x + b^2\cos^2 x}$

B. $\frac{1}{a^2\sin^2 x - b^2\cos^2 x}$

C. $\frac{1}{a^2\cos^2 x + b^2\sin^2 x}$

D. None of these.

Answer: A

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25. $\lim_{n \to \infty} \sum_{k=1}^{n} \frac{k^{1/a}\left\{n^{a-\frac{1}{a}} + K^{a-\frac{1}{a}}\right\}}{n^{a+1}} =$

A. 1

B. 2

C. 3

D. None of these.

Answer: A

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