

فہرہ اخبار تکمیل  
بہار

First Semester (1433/1434)

First Mid-Exam (Badeel), M-106

Programmable Calculators are Not Authorized

Name:	Number:
Name of Teacher:	Group No:

Max Marks: 25

Time: 90 minutes

Marks:

Multiple Choice (1-10)	
Question # 11	
Question # 12	
Question # 13	
Question # 14	
Total	

25

## Multiple Choice

Q.No:	1	2	3	4	5	6	7	8	9	10
{a, b, c, d}										

Q. No: 1  $\sum_{k=1}^5 \frac{(\frac{k}{e} + 1)(2 + \frac{k}{\pi})^k}{42} e$  is equal to:

- (a)  $\simeq 1.0013$       (b)  $\simeq 2.0013$       (c)  $\simeq 0.0013$       (d) non of these

Q. No: 2 If  $f(x) = \log_{10}(\log_{10} x^2)$ , then  $f'(x)$  is equal to:  $\frac{1}{\log_{10} x^2} \cdot \frac{1}{x^2} \cdot 2x \ln 10 \cdot \frac{1}{\log_{10} x}$

- (a)  $\frac{\ln(10)}{x \ln(x)}$       (b)  $\frac{x}{\ln(x) \ln(10)}$       (c)  $\frac{1}{x \ln(x) \ln(10)}$       (d) non of these

Q. No: 3 The domain of  $\ln(\ln(x) - e)$ , is equal to:

- (a)  $(e, +\infty)$       (b)  $(0, +\infty)$       (c)  $(-\infty, +\infty)$       (d) non of these

Q. No: 4 If  $\int [\ln|x|]^2 \frac{g(x)}{\pi} dx = \frac{\pi}{3} [\ln|x|]^3$  then  $g(x)$  is equal to:

- (a)  $\pi^2 \ln|x|$       (b)  $\frac{\pi^2}{x}$       (c)  $\frac{\pi^2}{\ln(x)}$       (d) non of these

Q. No: 5 The average value of  $f(x) = \exp(\frac{\pi}{e-1})(2x+1)^2$  on the interval  $[1, 2]$  is:

- (a)  $\frac{50}{3} \exp(\frac{\pi}{e-1})$       (b)  $\frac{49}{3} e^{\pi e}$       (c)  $39 \exp(\frac{\pi}{e-1})$       (d) non of these

Q. No: 6 The intergral  $\int \frac{\cos(\cosh x)}{\sinh(x)} dx$  is equal to:  $\int \cos(\cosh x) \frac{1}{\sinh(x)}$

- (a)  $\sin(\ln x) + c$       (b)  $-\sin(\ln x) + c$       (c)  $\cos(\ln x) + c$       (d) non of these

Q. No: 7  $\int \frac{5^{\tan x}}{\cos^2(x)} dx$  is equal to:  $\int 5^{\tan x} \cdot \frac{1}{\cos^2(x)}$

- (a)  $\frac{1}{\ln(5)} 5^{\tan x} + c$       (b)  $\frac{1}{\ln(5)} 5^x + c$       (c)  $\frac{1}{\ln(5)} 5 \tan(x) + c$       (d) non of these

Q. No: 8  $\frac{d}{dx} \left[ \int_{-1}^{\sinh(x^{2e})} \sin(2t) dt \right]$  is equal to:

- (a)  $\cos(2x^2)$       (b)  $2x \cos(2 \sinh(x^2))$       (c)  $2ex \cosh(x^{2e}) \sin(2 \sinh(x^{2e}))$       (d) non of these

$u = \cosh x$   
 $u' = \sinh x$

Q. No: 9 If  $\int \frac{1}{1+3x^2} dx = f(x) + c$  then  $f(x)$  is equal to:

- (a)  $\frac{1}{3} \tan^{-1}(3x)$  (b)  $\frac{1}{\sqrt{3}} \tan^{-1}(\sqrt{3}x)$  (c)  $\frac{1}{3} \tan^{-1}(\sqrt{3}x)$  (d) non of these

Q. No: 10 If  $f(x) = \ln[\cos(11x)]$  then  $f'(\frac{\pi}{2})$  is equal to:  $\frac{\sin 11x}{\cos 11x}$

- (a) 0 (b) 1 (c)  $\infty$  (d) non of these

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## Full Questions

Question No: 11 Evaluate the integral  $\int \frac{\tan^2(\frac{\sqrt{\pi}}{26}x)}{\sec(\frac{\sqrt{\pi}}{26}x)} dx$ . [3]



$$\int_a^b f(x) = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(x_k) \Delta x$$

Question No: 12 Use the Riemann sums to find the integral  $\int_1^3 (x^3 + 3) dx$ .

$$\Delta x = \frac{3-1}{n} = \frac{2}{n}$$

$$x_k = 1 + k \Delta x$$

$$= 1 + \frac{2k}{n}$$

$$f(x_k) = x_k^3 + 3$$

$$= \left(1 + \frac{2k}{n}\right)^3 + 3$$

$$= \left(1 + \frac{2k}{n}\right) \left(1 + 2 \cdot \frac{2k}{n} + 2 \cdot \frac{2k^2}{n^2}\right)$$

$$= 1 + 2nk + 2nk + \frac{2^2 k^2}{n} + \frac{4k^3}{n} + \frac{4k^3}{n}$$

$$= 1 + 2nk + 2nk + \frac{4k^2}{n} + \frac{4k^3}{n}$$

$$= \sum_{k=1}^n \left( 1 + 4nk + 2nk^2 + \frac{4k^2}{n} + \frac{4k^3}{n} \right)$$

$$= n \sum_{k=1}^n 1 + 4n \sum_{k=1}^n k + 2n \sum_{k=1}^n k^2 + \frac{4}{n} \sum_{k=1}^n k^2 + \frac{4}{n} \sum_{k=1}^n k^3$$

$$= n + 4n \cdot \frac{n(n+1)}{2} + 2n \cdot \frac{n(n+1)(2n+1)}{6} + \frac{4}{n} \cdot \frac{n(n+1)(2n+1)}{6} + \frac{4}{n} \cdot \frac{n^2(n+1)^2}{4}$$

$$= n + \frac{2n^2(n+1)}{1} + \frac{n^2(n+1)(2n+1)}{3} + \frac{4n(n+1)(2n+1)}{6n} + \frac{n^2(n+1)^2}{n}$$

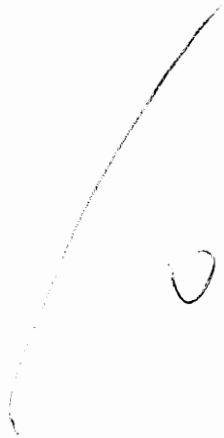
$$= n + 2n^2(n+1) + \frac{n^2(n+1)(2n+1)}{3} + \frac{4n(n+1)(2n+1)}{6n} + \frac{n^2(n+1)^2}{n}$$

$$\lim_{n \rightarrow \infty} = 26$$

$$= \frac{x^4}{4} + 3x \Big|_1^3$$

$$= 26$$

Question No: 13 If  $f(x) = \left(\coth(x)x^{n-4} + \frac{x^{n-5}}{\operatorname{sech}(x)}\right) \log\left(\cosh(x) + e^{\pi \exp\left(\frac{2e}{\pi} x^{n-4} - \frac{2e}{\pi}\right)}\right)$  find  $f'(x)$ . [4]



Question No: 14 Evaluate the integral  $\int \frac{1}{\sqrt{\frac{5x}{e^{e^\pi} - \frac{e^\pi}{5}}}} dx$ . [4]



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