



**SUMMER- 19 EXAMINATION**

Subject Name: Applied Mathematics

Model Answer

Subject Code:

**22224**

**Important Instructions to Examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q.N.	Answers	Marking Scheme
1.		<b>Solve any FIVE of the following:</b>	<b>10</b>
	a)	If $f(x) = x^3 - 5x^2 - 4x + 20$ show that $f(0) = -2f(3)$	<b>02</b>
	Ans	$f(x) = x^3 - 5x^2 - 4x + 20$ $\therefore f(0) = (0)^3 - 5(0)^2 - 4(0) + 20 = 20$ $\therefore f(3) = (3)^3 - 5(3)^2 - 4(3) + 20$ $= -10$ $\therefore -2f(3) = -2 \times -10 = 20 = f(0)$	$\frac{1}{2}$ $\frac{1}{2}$ 1
b)	State whether the function $f(x) = x^3 - 3x + \sin x + x \cos x$ , is odd or even.	<b>02</b>	
Ans	$f(x) = x^3 - 3x + \sin x + x \cos x$ $\therefore f(-x) = (-x)^3 - 3(-x) + \sin(-x) + (-x)\cos(-x)$ $= -x^3 + 3x - \sin x - x \cos x$ $= -(x^3 - 3x + \sin x + x \cos x)$ $= -f(x)$ $\therefore$ Given function is odd.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
c)	If $y = \sin x \cdot \cos 2x$ , find $\frac{dy}{dx}$	<b>02</b>	
Ans	$y = \sin x \cdot \cos 2x$		

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1.	c)	$\therefore \frac{dy}{dx} = \sin x(-\sin 2x) \times 2 + \cos 2x \cos x$ $= -2 \sin x \sin 2x + \cos 2x \cos x$	02
	d)	Evaluate: $\int \cos^2 x dx$	02
	Ans	$\int \cos^2 x dx = \int \frac{1 + \cos 2x}{2} dx$ $= \frac{1}{2} \int (1 + \cos 2x) dx$ $= \frac{1}{2} \left( x + \frac{\sin 2x}{2} \right) + c$	1
	e)	Evaluate: $\int \frac{1}{3x+5} dx$	02
	Ans	$\int \frac{1}{3x+5} dx$ $= \frac{1}{3} \log(3x+5) + c$	02
f)	Find the area between the the line $y = 2x$ , $x$ -axis and ordinates $x = 1$ to $x = 3$ .	02	
Ans	$\text{Area } A = \int_a^b y dx$ $= \int_1^3 2x dx$ $= 2 \left[ \frac{x^2}{2} \right]_1^3 \quad \text{or} \quad [x^2]_1^3$ $= 2 \left[ \frac{9}{2} - \frac{1}{2} \right] \quad \text{or} \quad [3^2 - 1^2]$ $= 8$	1/2 1/2 1/2 1/2	
g)	Find approximate root of the equation $x^2 + x - 3 = 0$ in $(1, 2)$ by using Bisection method. (Use two iterations)	02	



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1.	g)Ans	<p>Let <math>f(x) = x^2 + x - 3</math>  <math>f(1) = -1</math>  <math>f(2) = 3</math>  <math>\therefore</math> the root is in <math>(1, 2)</math>  <math>x_1 = \frac{a+b}{2} = \frac{1+2}{2} = 1.5</math>  <math>f(1.5) = 0.75 &gt; 0</math>  <math>x_2 = \frac{x_1+a}{2} = \frac{1.5+1}{2} = 1.25</math>  OR  Let <math>f(x) = x^2 + x - 3</math>  <math>f(1) = -1, f(2) = 3 \therefore</math> the root is in <math>(1, 2)</math></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Iteration</th> <th>a</th> <th>b</th> <th><math>x = \frac{a+b}{2}</math></th> <th><math>f(x)</math></th> </tr> </thead> <tbody> <tr> <td>I</td> <td>1</td> <td>2</td> <td>1.5</td> <td>0.75</td> </tr> <tr> <td>II</td> <td>1</td> <td>1.5</td> <td>1.25</td> <td></td> </tr> </tbody> </table>	Iteration	a	b	$x = \frac{a+b}{2}$	$f(x)$	I	1	2	1.5	0.75	II	1	1.5	1.25		<p><math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>1\frac{1}{2}</math></p>
Iteration	a	b	$x = \frac{a+b}{2}$	$f(x)$														
I	1	2	1.5	0.75														
II	1	1.5	1.25															
2.		<p>Solve any <b>THREE</b> of the following :</p> <p>a) Find <math>\frac{dy}{dx}</math> if <math>x^3 + xy^2 = y^3 + yx^2</math></p> <p>Ans <math>x^3 + xy^2 = y^3 + yx^2</math>  <math>x(x^2 + y^2) = y(y^2 + x^2)</math>  <math>x = y</math>  <math>\frac{dy}{dx} = 1</math>  OR  <math>x^3 + xy^2 = y^3 + yx^2</math>  <math>3x^2 + 2xy \frac{dy}{dx} + y^2 = 3y^2 \frac{dy}{dx} + 2xy + x^2 \frac{dy}{dx}</math>  <math>\frac{dy}{dx} (2xy - 3y^2 - x^2) = 2xy - 3x^2 - y^2</math></p>	<p>12 04 1 1 2 2 1</p>															

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2.	a)	$\frac{dy}{dx} = \frac{2xy - 3x^2 - y^2}{2xy - 3y^2 - x^2}$	1
	b)	Find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ if $x = a \cos^3 \theta$ , $y = b \sin^3 \theta$	04
	Ans	$x = a \cos^3 \theta$ $\therefore \frac{dx}{d\theta} = 3a \cos^2 \theta (-\sin \theta)$ $= -3a \cos^2 \theta \sin \theta$ $y = b \sin^3 \theta$ $\therefore \frac{dy}{d\theta} = 3b \sin^2 \theta \cos \theta$ $= 3b \sin^2 \theta \cos \theta$ $\therefore \frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}}$ $= \frac{3b \sin^2 \theta \cos \theta}{-3a \cos^2 \theta \sin \theta}$ $= -\frac{b}{a} \tan \theta$ $\text{at } \theta = \frac{\pi}{4}$ $\frac{dy}{dx} = -\frac{b}{a} \tan \frac{\pi}{4}$ $= -\frac{b}{a}$	1 1 1
c)	A manufacture can sell $x$ items per week at price $(23 - 0.001x)$ rupees each. It cost $(5x + 2000)$ rupees to produce $x$ items Find the number items to be produced eper week for maximum profit.	04	
Ans	<p>Let number of item be <math>x</math></p> <p>Selling price = <math>(23 - 0.001x)x</math></p> $= 23x - 0.001x^2$	$\frac{1}{2}$	

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2.	c)	<p>Cost price = <math>(5x + 2000)</math>            profit = selling price – cost price  <math>\therefore p = 23x - 0.001x^2 - (5x + 2000)</math>  <math>= 23x - 0.001x^2 - 5x - 2000</math>  <math>= 18x - 0.001x^2 - 2000</math>  <math>\frac{dp}{dx} = 18 - 0.002x</math>  <math>\frac{d^2p}{dx^2} = -0.002</math>  <math>\therefore</math> profit is maximum            Let  <math>18 - 0.002x = 0</math>  <math>x = \frac{18}{0.002} = 9000</math></p>	<p><math>\frac{1}{2}</math>  <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math>  1</p>
	d)	<p>Find the radius of curvature of the curve <math>y = e^x</math> at the point where it crosses the Y-axis.</p>	<b>04</b>
	Ans	<p><math>y = e^x</math>  <math>\frac{dy}{dx} = e^x</math>  <math>\frac{d^2y}{dx^2} = e^x</math>            curve crosses Y-axis <math>\therefore x = 0</math>  <math>\frac{dy}{dx} = e^0 = 1</math>  <math>\frac{d^2y}{dx^2} = e^0 = 1</math>  <math display="block">\rho = \frac{\left(1 + \left(\frac{dy}{dx}\right)^2\right)^{\frac{3}{2}}}{\frac{d^2y}{dx^2}}</math> <math display="block">= \frac{(1+1^2)^{\frac{3}{2}}}{1} = 2^{\frac{3}{2}} = 2.828</math></p>	<p>1  1  <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math>  1</p>





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3.	b)Ans	$y = x^x + 5^x + x^5 + 5^5$ $\text{Let } u = x^x$ $\log u = \log x^x$ $\log u = x \log x$ $\frac{1}{u} \frac{du}{dx} = x \cdot \frac{1}{x} + \log x \cdot 1$ $\frac{du}{dx} = u(1 + \log x) = x^x(1 + \log x)$ $\therefore \frac{dy}{dx} = x^x(1 + \log x) + 5^x \log 5 + 5x^4$	<p>1/2</p> <p>1</p> <p>1/2</p> <p>2</p>
	c) Ans	<p>If <math>x^3 \cdot y^2 = (x+y)^5</math>, show that <math>\frac{dy}{dx} = \frac{y}{x}</math></p> $x^3 \cdot y^2 = (x+y)^5$ $\log(x^3 \cdot y^2) = \log(x+y)^5$ $\log x^3 + \log y^2 = 5 \log(x+y)$ $3 \log x + 2 \log y = 5 \log(x+y)$ $3 \frac{1}{x} + 2 \frac{1}{y} \frac{dy}{dx} = 5 \frac{1}{x+y} \left(1 + \frac{dy}{dx}\right)$ $\frac{3}{x} + \frac{2}{y} \frac{dy}{dx} = \frac{5}{x+y} + \frac{5}{x+y} \frac{dy}{dx}$ $\frac{2}{y} \frac{dy}{dx} - \frac{5}{x+y} \frac{dy}{dx} = \frac{5}{x+y} - \frac{3}{x}$ $\frac{dy}{dx} \left( \frac{2}{y} - \frac{5}{x+y} \right) = \frac{5x - 3x - 3y}{x(x+y)}$ $\frac{dy}{dx} \left( \frac{2x + 2y - 5y}{y(x+y)} \right) = \frac{5x - 3x - 3y}{x(x+y)}$ $\frac{dy}{dx} \left( \frac{2x - 3y}{y} \right) = \frac{2x - 3y}{x}$ $\frac{dy}{dx} = \frac{y}{x}$	<p>04</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p> <p>1/2</p> <p>1</p>

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3.	d)	<p>Evaluate: <math>\int \frac{e^x(x+1)}{\sin^2(xe^x)} dx.</math></p> <p>Ans <math>\int \frac{e^x(x+1)}{\sin^2(xe^x)} dx</math></p> <p>put <math>xe^x = t</math></p> <p><math>(xe^x + e^x \cdot 1) dx = dt</math></p> <p><math>e^x(x+1) dx = dt</math></p> <p><math>= \int \frac{dt}{\sin^2 t}</math></p> <p><math>= \int \operatorname{cosec}^2 t dt</math></p> <p><math>= -\cot t + c</math></p> <p><math>= -\cot(xe^x) + c</math></p>	<p>04</p> <p>2</p> <p>1/2</p> <p>1</p> <p>1/2</p>
4		<p>Solve any <b>THREE</b> of the following:</p> <p>a) Evaluate: <math>\int \frac{x-3}{x^3-3x^2-16x+48} dx</math></p> <p><math>\int \frac{x-3}{x^3-3x^2-16x+48} dx</math></p> <p><math>= \int \frac{x-3}{(x-3)(x-4)(x+4)} dx</math></p> <p><math>= \int \frac{dx}{(x-4)(x+4)}</math></p> <p>Consider <math>\frac{1}{(x-4)(x+4)} = \frac{A}{x-4} + \frac{B}{x+4}</math></p> <p><math>1 = A(x+4) + B(x-4)</math></p> <p>put <math>x = 4</math> <math>A = \frac{1}{8}</math>,</p> <p>put <math>x = -4</math> <math>B = -\frac{1}{8}</math></p>	<p>04</p> <p>1/2</p> <p>1/2</p> <p>1/2</p>

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4.	a)	$\therefore \int \frac{dx}{(x-4)(x+4)}$ $= \int \left( \frac{\frac{1}{8}}{x-4} + \frac{-\frac{1}{8}}{x+4} \right) dx$ $= \frac{1}{8} (\log(x-4) - \log(x+4)) + c$	2
	b)	<p>Evaluate : <math>\int \frac{1}{2+3\cos x} dx</math></p> <p>Ans <math>\int \frac{1}{2+3\cos x} dx</math></p> <p>Put <math>\tan \frac{x}{2} = t</math> <math>\cos x = \frac{1-t^2}{1+t^2}</math>, <math>dx = \frac{2dt}{1+t^2}</math></p> $\therefore \int \frac{dx}{2+3\cos x} = \int \frac{1}{2+3\left(\frac{1-t^2}{1+t^2}\right)} \cdot \frac{2dt}{1+t^2}$ $= 2 \int \frac{1}{5-t^2} dt$ $= 2 \int \frac{1}{(\sqrt{5})^2 - t^2} dt$ $= 2 \times \frac{1}{2\sqrt{5}} \log \left( \frac{\sqrt{5}+t}{\sqrt{5}-t} \right) + c$ $= \frac{1}{\sqrt{5}} \log \left( \frac{\sqrt{5} + \tan \frac{x}{2}}{\sqrt{5} - \tan \frac{x}{2}} \right) + c$	04  1  1  ½  1  ½
	c)	<p>Evalute: <math>\int e^x \cdot \sin 4x dx</math></p> <p>Ans <math>\int e^x \cdot \sin 4x dx</math></p>	04



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4.	c)	$= \sin 4x \int e^x dx - \int \left( \int e^x dx \frac{d}{dx} \sin 4x \right) dx$ $= \sin 4x e^x - \int \cos 4x \cdot 4 \cdot e^x dx$ $= \sin 4x e^x - 4 \left[ \cos 4x \int e^x dx - \int \left( \int e^x dx \cdot \frac{d}{dx} \cos 4x \right) dx \right]$ $= \sin 4x e^x - 4 \left[ \cos 4x e^x - \int (-\sin 4x \cdot 4 \cdot e^x) dx \right]$ $= \sin 4x e^x - 4 \left[ \cos 4x e^x + 4 \int \sin 4x \cdot e^x dx \right]$ $= \sin 4x e^x - 4 \cos 4x e^x - 16I$ $I + 16I = \sin 4x e^x - 4 \cos 4x e^x$ $17I = \sin 4x e^x - 4 \cos 4x e^x$ $I = \frac{1}{17} (\sin 4x e^x - 4 \cos 4x e^x)$	<p>1</p> <p>½</p> <p>1</p> <p>½</p> <p>½</p> <p>½</p>
	d)	<p>Ans Evaluate: <math>\int \frac{e^x}{(e^x - 1)(e^x + 1)} dx</math></p> $\int \frac{e^x}{(e^x - 1)(e^x + 1)} dx$ <p>put <math>e^x = t</math> <math>e^x dx = dt</math></p> $\int \frac{e^x}{(e^x - 1)(e^x + 1)} dx = \int \frac{dt}{(t-1)(t+1)}$ <p>consider <math>\frac{1}{(t-1)(t+1)} = \frac{A}{t-1} + \frac{B}{t+1}</math></p> $1 = A(t+1) + B(t-1)$ <p>put <math>t = 1, A = \frac{1}{2}</math></p> <p>put <math>t = -1, B = -\frac{1}{2}</math></p>	<p>04</p> <p>1</p> <p>½</p> <p>½</p>

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4.	d)	$\frac{1}{(t-1)(t+1)} = \frac{1}{2} \frac{1}{t-1} + \frac{-1}{2} \frac{1}{t+1}$ $\int \frac{dt}{(t-1)(t+1)} = \int \left( \frac{1}{2} \frac{1}{t-1} + \frac{-1}{2} \frac{1}{t+1} \right) dt$ $= \frac{1}{2} \log(t-1) - \frac{1}{2} \log(t+1) + c$ $= \frac{1}{2} \log(e^x - 1) - \frac{1}{2} \log(e^x + 1) + c$	1 ½
	e)	<p>Evaluate: <math>\int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\tan x}} dx</math></p> <p>Ans <math>I = \int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\tan x}} dx</math></p> $= \int_0^{\frac{\pi}{2}} \frac{1}{1 + \frac{\sqrt{\sin x}}{\sqrt{\cos x}}} dx$ $I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx \text{-----(1)}$ <p>by property</p> $\therefore I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\cos\left(\frac{\pi}{2} - x\right)}}{\sqrt{\cos\left(\frac{\pi}{2} - x\right)} + \sqrt{\sin\left(\frac{\pi}{2} - x\right)}} dx$ $= \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx \text{-----(2)}$ <p>add (1) and (2)</p> $2I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x} + \sqrt{\cos x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$	04 ½ 1 1 ½

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4.	e)	$2I = \int_0^{\frac{\pi}{2}} 1 dx$ $\therefore 2I = [x]_0^{\frac{\pi}{2}}$ $= \frac{\pi}{2} - 0$ $I = \frac{\pi}{4}$ <p>OR</p> $I = \int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\tan x}} dx \text{----- (1)}$ <p>by property</p> $I = \int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\tan\left(\frac{\pi}{2} - x\right)}} dx$ $I = \int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\cot x}} dx$ $\therefore I = \int_0^{\frac{\pi}{2}} \frac{1}{1 + \sqrt{\frac{1}{\tan x}}} dx$ $= \int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + 1} dx \text{----- (2)}$ <p>add (1) and (2)</p> $2I = \int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x} + 1}{\sqrt{\tan x} + 1} dx$ $2I = \int_0^{\frac{\pi}{2}} 1 dx$ $\therefore 2I = [x]_0^{\frac{\pi}{2}}$ $= \frac{\pi}{2} - 0$ $I = \frac{\pi}{4}$	<p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p>

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5.	Ans	$y = A.e^x + B.e^{-x}$ $\therefore \frac{dy}{dx} = A.e^x - B.e^{-x}$ $\therefore \frac{d^2y}{dx^2} = A.e^x + B.e^{-x}$ $\therefore \frac{d^2y}{dx^2} = y$ $\therefore \frac{d^2y}{dx^2} - y = 0$	1 1 1
	(ii)	Solve $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$	03
	Ans	$\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$ $\therefore \text{Comparing with } \frac{dy}{dx} + Py = Q$ $P = \cot x, \quad Q = \operatorname{cosec} x$ $\text{Integrating factor } IF = e^{\int \cot x dx}$ $= e^{\log(\sin x)}$ $= \sin x$ $\therefore y \cdot IF = \int Q \cdot IF dx + c$ $\therefore y \sin x = \int \operatorname{cosec} x \cdot \sin x dx$ $\therefore y \sin x = \int 1 dx$ $\therefore y \sin x = x + c$	
c)	The velocity of a particle is given by $\frac{dx}{dt} = 3t^2 - 6t + 8$ . Find distance covered in 2 seconds given that $x = 0$ at $t = 0$	06	
Ans	$\frac{dx}{dt} = 3t^2 - 6t + 8$ $\therefore dx = (3t^2 - 6t + 8) dt$ $\therefore \int dx = \int (3t^2 - 6t + 8) dt$		

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Q. No.	Sub Q.N.	Answers	Marking Scheme
6.	b)Ans	$\begin{array}{r} 6x - y - z = 19 \\ 3x + 4y + z = 26 \\ + \underline{\hspace{2cm}} \\ 9x + 3y = 45 \\ 3x + y = 15 \\ \\ 12x + 4y = 60 \\ 37x - 4y = 136 \\ + \underline{\hspace{2cm}} \\ 49x = 196 \\ \therefore x = 4 \\ y = 3 \\ z = 2 \end{array}$ <p><i>Note: In the above solution, first x is eliminated and then z is eliminated to find the value of y first. If in case the problem is solved by elimination of another unknown i. e., either first y or z, appropriate marks to be given as per above scheme of marking.</i></p>	<p>1+1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
	c) Ans	<p>Using Newton-Raphson method to find the approximate value of <math>\sqrt[3]{100}</math> (perform 4 iterations)</p> <p>Let <math>x = \sqrt[3]{100}</math></p> <p><math>\therefore x^3 - 100 = 0</math></p> <p><math>f(x) = x^3 - 100</math></p> <p><math>f(4) = -36 &lt; 0</math></p> <p><math>f(5) = 25 &gt; 0</math></p> <p><math>f'(x) = 3x^2</math></p> <p>Initial root <math>x_0 = 5</math></p> <p><math>\therefore f'(5) = 75</math></p> <p><math>x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 5 - \frac{f(5)}{f'(5)} = 4.6667</math></p> <p><math>x_2 = 4.6667 - \frac{f(4.6667)}{f'(4.6667)} = 4.6417</math></p>	<p><b>06</b></p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p> <p>1</p>



SUMMER- 19 EXAMINATION

Subject Name: Applied Mathematics

Model Answer

Subject Code:

22224

Q. No.	Sub Q.N.	Answers	Marking Scheme
6.	c)	$x_3 = 4.6417 - \frac{f(4.6417)}{f'(4.6417)} = 4.6416$ $x_4 = 4.6416 - \frac{f(4.6416)}{f'(4.6416)} = 4.6416$ <p>OR</p> <p>Let <math>f(x) = x^3 - 100</math></p> <p><math>f(4) = -36 &lt; 0</math>    <math>f(5) = 25 &gt; 0</math></p> <p><math>f'(x) = 3x^2</math></p> <p>Initial root <math>x_0 = 5</math></p> $x_i = x - \frac{f(x)}{f'(x)} = x - \frac{x^3 - 100}{3x^2}$ $= \frac{3x^3 - x^3 + 100}{3x^2}$ $= \frac{2x^3 + 100}{3x^2}$ <p><math>x_1 = 4.6667</math></p> <p><math>x_2 = 4.6417</math></p> <p><math>x_3 = 4.6416</math></p> <p><math>x_4 = 4.6416</math></p>	<p>1</p> <p>1</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>2</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p>
		<p><b><u>Important Note</u></b></p> <p><i>In the solution of the question paper, wherever possible all the possible alternative methods of solution are given for the sake of convenience. Still student may follow a method other than the given herein. In such case, first see whether the method falls within the scope of the curriculum, and then only give appropriate marks in accordance with the scheme of marking.</i></p>	