

Complete, fold and seal
(see note 1 below)

76%

SURNAME: TIMBERLAKE

FORENAME(S): JORDAN

Candidate's Exam Number: _____

**Total Books
Handed In:**

Programme Title: _____

Year/Level/Stage: _____

Examination Paper Title: _____

Examination Paper Ref No.: _____ Desk Letter/Number: _____

Date: 15 / 11 / 20__ Time: _____ am/pm Room Name or No.: 005

Room Name or No.: 605

Instructions to Candidates:

Summary of Marks

1. Please give the information requested above and enter your name in the space provided at the top right of this page. If your answers are to be marked under a scheme whereby the examiners will not know your identity, fold over and seal down the top right-hand corner of the page (using the gummed label provided) in order to conceal your name.
2. Commence each answer on a fresh page.
3. Do all rough work in the answer book and cross through it.
4. No part of this booklet is to be torn out.
5. Supplementary answer books if used must:-
 - (a) bear the candidate's name (concealed, where appropriate), reference number and paper title;
 - (b) be numbered consecutively;
 - (c) be fastened together by the tags available from the invigilator.
6. Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the exam room.
7. Your answers must be legibly written **IN INK**.
The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.

Question Numbers Answered	1st Examiner	2nd Examiner (optional)	3rd Examiner (optional)
Q 2	29		
Q 3	32		
TOTAL	61		
RESULT			

Examination Answer Book

Examination & Exam Answer

Table 1
Table 2

Table 3

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Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Table 10

Table 11

Table 12

Summary of Data

Examination in the Field

The first part of the examination is a written test. This test is designed to assess the candidate's knowledge of the subject matter. The test is divided into two sections: a multiple-choice section and a short-answer section. The multiple-choice section consists of 20 questions, and the short-answer section consists of 10 questions. The total score for the written test is 100 marks.

The second part of the examination is a practical test. This test is designed to assess the candidate's ability to apply their knowledge in a practical setting. The practical test is divided into two sections: a field test and a laboratory test. The field test consists of 10 questions, and the laboratory test consists of 10 questions. The total score for the practical test is 100 marks.

The third part of the examination is a viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the viva voce test is 100 marks.

The fourth part of the examination is a project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the project test is 100 marks.

The fifth part of the examination is a final test. This test is designed to assess the candidate's overall knowledge and understanding of the subject matter. The final test is divided into two sections: a multiple-choice section and a short-answer section. The multiple-choice section consists of 20 questions, and the short-answer section consists of 10 questions. The total score for the final test is 100 marks.

The sixth part of the examination is a final project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The final project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the final project test is 100 marks.

The seventh part of the examination is a final viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The final viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the final viva voce test is 100 marks.

The eighth part of the examination is a final project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The final project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the final project test is 100 marks.

The ninth part of the examination is a final viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The final viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the final viva voce test is 100 marks.

The tenth part of the examination is a final project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The final project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the final project test is 100 marks.

The eleventh part of the examination is a final viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The final viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the final viva voce test is 100 marks.

The twelfth part of the examination is a final project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The final project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the final project test is 100 marks.

The thirteenth part of the examination is a final viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The final viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the final viva voce test is 100 marks.

The fourteenth part of the examination is a final project test. This test is designed to assess the candidate's ability to undertake a project and to present their findings. The final project test is divided into two sections: a written report and a presentation. The written report consists of 10 questions, and the presentation consists of 10 questions. The total score for the final project test is 100 marks.

The fifteenth part of the examination is a final viva voce test. This test is designed to assess the candidate's ability to communicate their knowledge and to answer questions in a clear and concise manner. The final viva voce test is divided into two sections: a general section and a specific section. The general section consists of 10 questions, and the specific section consists of 10 questions. The total score for the final viva voce test is 100 marks.

Q2

Factorise the following Completely

i $4 - q^2 = (q+2)(q-2)$ ✓ 4 1 1

ii $3ab + 4cd - cb - 12ad$
 $(3a-c)(b-4d)$ ✓ 3 4 4
 $3ab + 4cd - cb - 12ad$

iii $p^2 - 2p - 63$
 $(p+7)(p-9)$ ✓ 7 9 3

iv $q^2 - 4qr$
 $(q-4)(q+4r)$ ✗ 1 4 2 2

b solve following for x giving Ans to 2DP

i $(2x-1)(3x+5) = (6x-5)(x-9)$

multiply Brkts

$6x^2 + 10x - 3x - 5 = 6x^2 - 54x + 45$ ✗
 collect like terms

$$12x - 5 = 6x^2 - 54x + 45$$

$$66x - 40 = 6x^2 + 40$$

$$\sqrt{66x - 40} = 6x + \sqrt{40}$$

$$8.12x - 6x = 6.325$$
 ✗

$$2.12x = 6.325$$

b i

$$\therefore x = \frac{6.325}{2.12} = \underline{\underline{2.98}} \quad \times$$

ii

$$\frac{x-4}{5} = \frac{2x-1}{3}$$

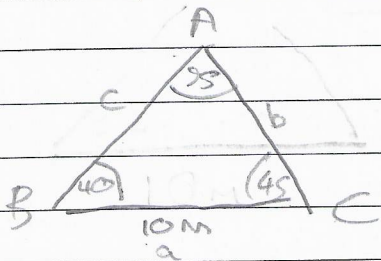
$$3(x-4) = 5(2x-1)$$

$$3x - 12 = 10x - 5$$

$$-7x = 7$$

$$x = -1$$

c



$$A = 180 - 85 = 95^\circ$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$b = AC \quad c = AB$$

$$\frac{10}{\sin 95} = \frac{AC}{\sin 40} = \frac{AB}{\sin 45}$$

$$\frac{10}{0.996} \times 0.643 = AC = \underline{\underline{6.46 \text{ M}}} \quad \checkmark$$

$$\frac{10}{0.996} \times 0.707 = AB = \underline{\underline{7.10 \text{ M}}} \quad \checkmark$$

d
i Solve
 $4 \sin x = -3 \quad 0 < x \leq 360^\circ$

$$\sin^{-1}(-3/4)$$

$$\begin{array}{c|c} S & A \\ \hline T & C \end{array}$$

$$\sin^{-1} 3/4$$

 note 48.6°

where $\sin \text{ neg} = \text{Quads T + C}$

$$\therefore 180 + 48.6 = \underline{\underline{228.6^\circ}} \quad \checkmark$$

$$360 - 48.6 = \underline{\underline{311.4^\circ}} \quad \checkmark$$

3

ii $\cos x = -0.5$ note $\cos x = 0.5$
 0.99

where $\cos \text{ neg} = \text{Quads S + T}$

$$\begin{array}{c|c} S & A \\ \hline T & C \end{array}$$

$$\therefore 180 + 0.99 = \underline{\underline{180.99^\circ}} \quad \times$$

$$180 - 0.99 = \underline{\underline{179.01^\circ}} \quad \times$$

e use Product Rule

i $y = x^3 e^{2x}$

$$u = x^3$$

$$\frac{dv}{dx} = 2e^{2x}$$

$$v = e^{2x}$$

$$\frac{du}{dx} = 3x^2$$

$$\frac{dy}{dx} = x^3(2e^{2x}) + e^{2x}(3x^2)$$

ii $y = \sin 5x \cos 3x$

$$u = \sin 5x$$

$$\frac{dv}{dx} = -3\sin 3x$$

$$v = \cos 3x$$

$$\frac{du}{dx} = 5\cos 5x$$

$$\frac{dy}{dx} = \sin 5x(-3\sin 3x) + \cos 3x(5\cos 5x)$$

f. use Partial diff to find 4x second order s)

$$z = 2x^3y - 7y^3x + \sin x \cos y$$

First order

$$\textcircled{1} \frac{\partial z}{\partial y} = 2x^3 - 21y^2x + \sin x(-\sin y)$$

$$\textcircled{2} \frac{\partial z}{\partial x} = 6x^2y - 7y^3 + \cos x \cos y$$

Second order $\textcircled{1}$

$$\frac{\partial^2 z}{\partial y^2} = -42yx + \sin x(-\cos y)$$

$$\frac{\partial^2 z}{\partial x \partial y} = 6x^2 - 21y^2 + \cos x(-\sin y)$$

F
cont

Second order (2)

$$\frac{\partial^2 z}{\partial x^2} = 12xy + (-\sin x)\cos y$$

$$\frac{\partial^2 z}{\partial y \partial x} = 6x^2 - 21y^2 + \cos x(-\sin y)$$

1 1/2

(24)

Q3
a

Simultaneous eqn

$$7x + 4y = 46 \quad \times 6$$

$$8x + 6y = 57 \quad \times 4$$

$$42x + 24y = 276$$

$$32x + 24y = 228$$

$$10x = 48$$

$$y = ?$$

$$x = \frac{48}{10} = 4.8 \text{ To one DP}$$

$$= 5 \text{ To one SF}$$

4

b solve using quad form

$$3x^2 + 5x - 2 = 0$$

$$a = 3$$

$$b = 5$$

$$c = -2$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-5 \pm \sqrt{5^2 - 4(3)(-2)}}{2(3)}$$

$$\frac{-5 \pm \sqrt{25 + 24}}{6}$$

✓

$$\frac{-5 \pm \sqrt{49}}{6}$$

$$+x = \frac{1}{3} \text{ or } 0.33$$

$$-x = -2.00$$

5

C solve following Quads by factorising

i $x^2 + 11x + 30 = 0$

$$(x+5)(x+6)$$

$$\text{if } x+5=0 \quad x = \underline{\underline{-5}}$$

$$\text{if } x+6=0 \quad x = \underline{\underline{-6}}$$

3

ii $x^2 - 11x = 0$

$$x(x-11) = 0$$

$$\text{if } x = \underline{\underline{0}}$$

$$\text{if } x-11=0 \text{ then } x = \underline{\underline{11}}$$

3

iii $x^2 - 4 = 0$

$$x^2 - 2^2 = 0$$

$$(x+2)(x-2) = 0$$

$$\text{if } x+2=0 \text{ then } x = \underline{\underline{-2}}$$

$$\text{if } x-2=0 \text{ then } x = \underline{\underline{2}}$$

3

d

i

$$y = 6x^2 (x^3 - 2x^2 + 5x - 1)$$

$$= 6x^5 - 12x^4 + 30x^3 - 6x^2$$

$$\frac{dy}{dx} = 30x^4 - 48x^3 + 48x - 12x$$

2

ii

$$y = \frac{7}{x^2} - \frac{4}{x} + 8$$

$$= 7x^{-2} - 4x^{-1} + 8$$

1

$$\frac{dy}{dx} = 14x^{-3} + 4x^{-2}$$

2

iii

$$y = \frac{\sin x}{\cos x}$$

$$= \sin x (\cos x)^{-1}$$

$$\frac{dy}{dx} = \cos x (-\sin x)^{-1}$$

e

i

Func of Func rule to determine $\frac{dy}{dx}$

$$y = (2x^2 - 5x + 1)^7$$

$$\frac{dy}{dx} = 7(2x^2 - 5x + 1)^6 (4x - 5)$$

2

Question No.

ii

$$e^{x^2+4}$$

$$\frac{dy}{dx} = (x^2+4)e^{x^2+4} (x^2+4e^{x^2+4})$$

X

iii

$$\cos 2x^3$$

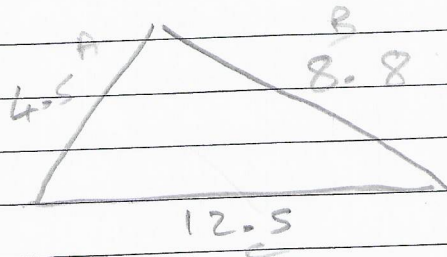
$$\frac{dy}{dx} = 3(\cos 2x)^2 (-2 \sin 2x)$$

✓

2

F

Find Area



$$\sqrt{s(s-a)(s-b)(s-c)} \quad \text{where } s = \frac{a+b+c}{2}$$

$$s = \frac{4.5 + 8.8 + 12.5}{2} = \frac{25.8}{2}$$

$$s = 12.9$$

$$\text{Area} = \sqrt{12.9(12.9-4.5)(12.9-8.8)(12.9-12.5)}$$

$$= \sqrt{12.9(8.4)(4.1)(0.4)}$$

$$= \sqrt{177.71}$$

✓

5

$$\text{Area} = 13.331 \text{ cm}^2$$

(32)

Question No.

Examiner Only

Question No.

Examiner On

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