



Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	1810357
2	Title of Examination Paper	Principles of OME Design
3	Module Code	AcAD6008
4	Date and Time of Examination	4 May 2022
5	Examination Venue	1Q 105
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	1
Q2	2.5
Q3	0
Q4	3
Q5	2
Q6	3
Q7	9
Q9	2
Total	22.5

1)

Target type

Soft target - Personnel
Vehicles - Armoured / Non-Armoured
Structures - Building / Bridges / Runway.

Q1
=1Effects

Blast
Fragmentation
Shaped charge
Kinetic Energy
direct energy

Maximising velocity

Explosive fill ✓
Case thickness ✓
Point of detonation / Initiation.
Peak of over Pressure ✓
Case material
Grain size of Explosive / Aluminium based will
burn longer.
weapon system.

2)

Functions of a shaped charge

A shape charge upon detonation will form a jet. the jet is formed through the material that is used and ~~for~~ from the inner most point on the detonation causes this to push through. ✓

Tank defense

a tank can use thicker armour or have a stand off between the armour and the vehicle itself ~~the~~ Bar armour could be used if to disrupt shaped charge threat from RPG's

A design feature that can be used to defeat the armours mentioned ~~above~~ above is to use a multi shaped charge weapon. ✓

Using a multi shaped charge weapon means the first one would be countered by the armour but the second would penetrate. ✓

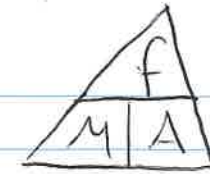
if the tank is attacked from the front it would deflect the attack due to the angled armoured

the most suitable attack mechanism for a tank would be blast, ~~blast~~ or shaped charge or direct energy from above or below.

3)

$$F = M \times A$$

$$A = M / F$$



40 kg

$$\frac{40}{350}$$

1. ~~the~~

$$A = F / M$$

$$A = 40 \div 350 = 8.75 \text{ ms}$$

$$F = 350 \text{ MPa}$$

$$M = 40 \text{ kg}$$

$$A = 0.114$$

2.

~~the~~~~the~~

$$0.025 \text{ kg}$$

$$M = A / f$$

Q3=

0

4

Blast wave effect

A centrally initiated spherical charge will give a uniform Shock wave. (~~same~~ omnidirectional)

Other factors affect blast wave.

- Target
- overpressure
- domain its used in as air domain has a different effect than underwater

adding aluminium to underwater charges

By adding aluminium to underwater charges this increases the burn rate and will increase the impulse pressure wave.

5)

Peak pressure
over pressure ✓
Reflection } Blast

Peak Pressure is the peak of pressure ~~the~~ from the detonation.

overpressure is where the blast is confined to an enclosed area.

Reflective pressure would be where the surface of the ~~str~~ structure reflects the pressure build up from the detonation.

6)

what is meant by the ballistic life of a gun propellant?

Ballistic life of a propellant is ~~how~~ how long the propellant will last before the performance will be affected.

This can also affect the safety as well.

Factors that influence the ballistic life of a gun propellant:

- Storage ✓
- transportation
- ~~the~~ composition of propellant
- how its made / manufactured
- Grain size
- Casing Material.
- Weapon systems.
- Temperatures ✓

7)

a) To attack an aircraft the most suitable mechanism of attack would fragmentation.

~~fragmentation~~ the fragments from this attack would be able ✓ to penetrate or perforate the air craft.

Blast wouldn't be as effective or suitable.

Shaped charges or direct energy munitions also would not be suitable due to the aircraft being a moving target. So the chances of actually hitting ✓ the target would be impossible unless the aircraft was stationary.

if the attack was coming from another aircraft a heat seeker type missile would be suitable as it would pick up the heat signature of the aircraft.

w/ro Cypres - Frag/airburst → regis
blast/airburst

Frag - types - format, continuous rod etc

Examples -

KG - Kinestock

De - AAC (Gallkeg)

Frag - Finestock

CPool - Redtop

Signs of w/roals - 7ry submerse
50 by bloodhound

7

B) A Submarine

effect would be blast. ✓
 could use direct energy or shaped charge ✓
 or long Rod penetrator. ✓

Fragmentation would ~~not~~ be suitable due
 to the underwater effect.

Blast is more effective underwater. this
 would cause overpressure and would
 inflict stress and strain on the target
 submarine by impulse. ✓

Torpedo's ✓ would be used to attack a
 submarine or sea mines. ✓ however sea
 mines use isn't as common nowadays due
 to agreements.

Aluminium ✓ added to underwater (subsurface)
 attack systems will increase the blast
 or impulse pressure.

Q7
 = 9
 (a+b)
 (4+5)

9)

a

liquid propellants. / bio Propellants

• Rocket Motors (Nuclear)

•

•

•

b

~~advantages and disadvantages of liquid vs solid~~

advantages

• Give more thrust due to
 burn rate.

• Easily produced.

•

disadvantages.

• would need a sealed
 container for liquid. ✓

• Can be more volatile than
 solid fuel.

• Storage of liquid fuel

• transportation.

c) Plutonisation

Q9 =
 2

d) advantages of Rubbery Composite

easily made.
can be moulded

Disadvantages of a Rubbery Composite

Smoky ✓
not good for the environment
harmful to personnel.

9b=1

Q9
1070
=2