Welcome students, i'm Swati Ghadi from Parvatibai Chowgule College (autonomous), Margao, Goa. In this session we will be covering topics from Engineering geology GED 101 that is offered at the fifth semester for the TYBSC students in geology. In this session we will be doing module 15 the module name is dams and reservoirs- Types of dams. Through the session I will take you through the introduction, the dam related terminologies and the different types of dams. Learning outcomes by the end of the session, you will be able to describe the parts of the dam and you will be able to explain the various types of dams. Introduction a dam may be defined as a solid barrier constructed at a suitable location, across a river valley in view of impounding water flowing through that river. The purpose can be various you can construct a dam for irrigation Purpose, for generation of hydroelectricity, supply for domestic consumption and industrial use, for drought and flood management, for navigation facilities for fisheries and other requirements. Dam related terminologies. A Dam may be described as a civil structure, which blocks the river channel and compels the running water to accumulate into a reservoir. So in this diagram you see a cross section of a dam. The river flow is in this direction.

This part of the dam is referred to as
the upstream side
and this portion is referred to as the
downstream.
Spillways are opening near the top of
the structure,
this allows the surplus water to flow
downstream. This is a spillway,
so whenever the water level increases
beyond this level it will flow out
through the spillways. The spillway apron-
the water flowing through the spillway
can cause
wear and tear of the bedrock, which is
protected
by placing a reinforced concrete slab
on the weak outcrops so this portion
where the water from the spillway is
expected to hit
is referred to as the spillway apron.
Heel this is the part of the dam
that touches the ground on the upstream
side.
The toe is a part of the dam that
touches
the downstream side. Abutments-
these are the sides of the valley on
which the dam
structure rests.
Free board -- this is the difference
between the top of the dam and the
highest storage level.
in this case this is the highest storage
level,
the maximum water level that the dam can
impound
and from here to the top of the
structure,
is referred to as the free board.
Galleries- these are small rooms
that are left within the dam for
checking
operations.
Sluice this is an opening
in the dam near the ground level
useful for clearing the silt that is
getting accumulated

in the reservoir. As you can see because the water
here is stored the sediments
that may be carried along in the water will settle down
in this portion as silt.
If this sediments increase
too much this will affect the efficiency
of the dam. In such cases
they are cleared off using the sluiceway.
The cut-off wall this is an underground
wall-like structure of concrete,
extending from the heel portion
of the dam. It is done to prevent
leakages under the foundation which may exert
uplift pressure on the structure causing
it to destabilize. So basically
there might be chances of some water getting
leaked through the foundation. This part
is the foundation, this will be the
foundation for your dam.
so any leakages that might happen will be prevented
by this cut off wall the wall has to be sufficient enough
to prevent any sort of leakage
directly beneath the structure. Types of Dams:
Dams are normally classified based on different criteria
like the design and the construction material used.
Based on the design, we can have
gravity buttress or arch dam.
This differentiation is done depending upon
where the load of the structure is being transmitted.
In case of gravity and buttress dam it is transmitted directly
to the foundation in case of an arch type of a dam,
it is transmitted to the abutment, that is the
sides of the valley. Based on construction

material:
depending upon the material that is used
dams may be classified as concrete,
rock fill or earth fill dams.
Gravity dams these are heavy and massive
wall like structures of masonry or
concrete,
in which the whole weight acts
vertically down so if you see the
structure,
the entire weight of this structure
is transferred to the foundation of this
structure. The upstream face of a
gravity dam
may be vertical or sometimes inclined
so this face could be either
vertical
or you may have a dam that is having
slightly
inclined upstream face.
Since the entire load is transmitted
onto the smaller
area of the foundation, the formation in
which the foundation is made,
has to be competent and stable.
Example of a gravity dam is the Bhakra
dam
In Himachal Pradesh
Butress Dam: these are concrete
structures
in which there is a sloping deck.
so this is a cross section and what you
see is a sloping
deck.
This deck is supported from behind by
walls that are referred to as buttresses.
so in the plan view if you're looking
from
top okay you will have
these structures. this is the
buttress
this is how they are aligned in the plan
view.
These extend perpendicular to the axis
of the dam.
This is going to be the axis of dam
the buttresses are further strengthened

by cross walls called
'struts' okay, so these walls
support the buttresses
and the buttresses indirectly support
the dam structure.
By such an arrangement facilitates
distribution of loads over a wider area
covered by the buttresses and the struts
unlike the gravity dam.
The gravity dam would occur just like
this
so basically all the load is being
transferred on the small area
but in this case the entire load
of the structure as well as the water is
transferred to
more area extending from the deck up to
the buttresses
therefore these type of dams are
suitable
for even slightly weaker rock
foundations.
Third type is arch dams- these are arch
shaped mostly concrete and always convex
on the upstream side
okay so this is the upstream side that
means the river is flowing in this
direction
this is the downstream side and this is
how
the dam accesses the shape of the
structure
allows transmission of the load onto its
abutments.
That means the weight of this dam and
the water that is being impounded
is transferred onto the abutments.
These are the abutments,
Therefore in this case the abutment rock
formations
and down the valley needs to be
competent and stable.
These are best suited for narrow deep
river cut georges. They can be of two
types
one is constant radius arch dam
wherein the radius of curvature remains

constant throughout
and the other one is variable radius dam.
Here the curvatures are different on
upstream and downstream side
example of an Arch-type dam is Idduki dam in
Kerala.
This is a cross-sectional view of the
dam.
Embankment dams these are generally
non-rigid structures, trapezoidal in
shape
They are made up of available material
such as
earth and rock fragments.
These can be constructed on weak
foundations such as glacial deposits.
The construction could be homogeneous or
may have
compacted core okay so this
is the way you can have a compacted core,
which is made up of impervious materials
such as clay
or concrete. Based on the material used
they may be classified as earth field
dams
or rock filled dams or a mixed type of
dams
So in this first case you have a simple
stone filling dam,
in the second type you have the stone
filling,
in which you have the earth filled
material and then you have
the central core made up of impervious
clay material.
Similarly here you have an additional
transition
zone between the core and the
earth filled material. To summarize, a dam
may be defined as a solid barrier
constructed at suitable locations across
a river valley
with a view of impounding water flowing
through that river.
Dams can be classified based on their
design
as gravity, buttresses or arch type

Based on the construction material dams can be classified
as concrete, rock fill or earth-filled dams.
These are the references that were used for this session.
Thank you for listening.