SOLUTION

SEM- III
Branch- CIVIL
Sub: Engg Geology QP code 27621

SE (CBCGS) EXAM DEC 2017

[Total Marks -80

1. a) Ans: (5)
(i) Asbestos (ii) Galena (iii) Biotite mica — 1 mark for each
(iv) Jasper (v) Bauxite.

1 (b) (i) Ans: (5)
(i) Thermal metamorphism
(ii) Dynamic "
(iii) Dynamothermal "
(iv) Metasomatism. — 1 mark for each.

1. (b) (ii) Parent rock of marble → Limestone.
Parent rock of Quartzite → Sandstone.

1 (b) (iii) Acidic rock → Rocks in which Silica percentage is >66.
Basic rock → Rocks in which Silica percentage is <66.
44 To 52 % — Basic rocks.
52 to 66 % → Intermediate rocks.

1 (b) (iv) Exfoliation
Removal of upperlayer of a rock due to Temperature Variation. This phenomenon of pealing off of curved Shells from rocks under the influence of thermal effect in addition to chemical weathering is termed as exfoliation.

1 (b) (v) Dip is the angle of inclination of bedding plane. and strike is line of intersection of bedding plane with Horizontal. Tree dip is perpendicular to Strike.

1 (c) (5)
i) Recumbent fold.
ii) Isoclinal fold
iii) Perched Water table.
iv) Gneisose Structure.
v) Horst. → 1 mark for each.

2.(a) Different types of textures found in igneous rocks. (10)

i) Equigranular Texture → In which majority of constituent crystals of a rock are broadly equal in size.
They are also of 3 Types euhedral, subhedral & anhedral.

ii) Inequigranular texture → when it shows marked difference in their grain size
They are of Two types porphyritic & poikilitic.

(iii) Directive Texture :— which shows perfect parallelism of crystals indicating the result of flow of magma

(iv) Intergrowth Texture — when Two or more minerals crystalise in a limited space.

(v) Intergranular textures :— when the left spaces between the crystals get filled during the process of rock formation.

(If diagram is not drawn 50 % marks can be deducted)

2(b) Two Landforms formed by erosive action of Wind — (10)

i) Oasis — which is formed due to deflation → 2½

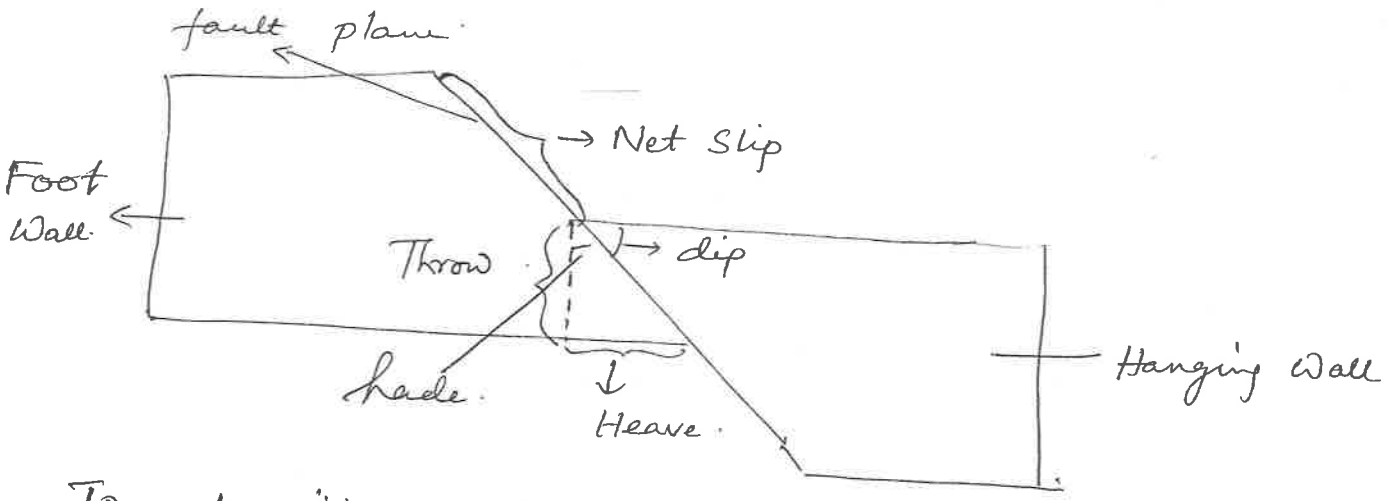
ii) Pedestal rocks / mushroom rock which are → 2½
flat Topped rock masses. The top is the overhang and the stem is the pedestal.

Two Landforms formed due to erosive action of glacier. → 2½ + 2½

i) Cirque, Crag and Tail,
whaleback form. hanging valley and glacial Valley any two of them has to be described.

(If diagram is not drawn, then 50 % marks can be deducted)

3. a) Terminology of fault.



To describe each Term in short. -(4) M

Various Types of faults With Suitable deagram (6) M.

i) Normal fault (Horst, graben)
ii) Reverse fault (Thrust fault)
iii) Strike- Slip fault.

3. b). State the engg consideration of Weathering -(2) M

When foundation are to be carried down to the bed rock, the depth of Weathered cover, the degree of Weathering and the trend of Weathering have very important bearing on the ullimate Safety of the project. It is when bonds between the minerals are weakend or totaly removed, the slope rocks. Lose shearing strength and become prone to failure.

Types of Weathering — (4) M

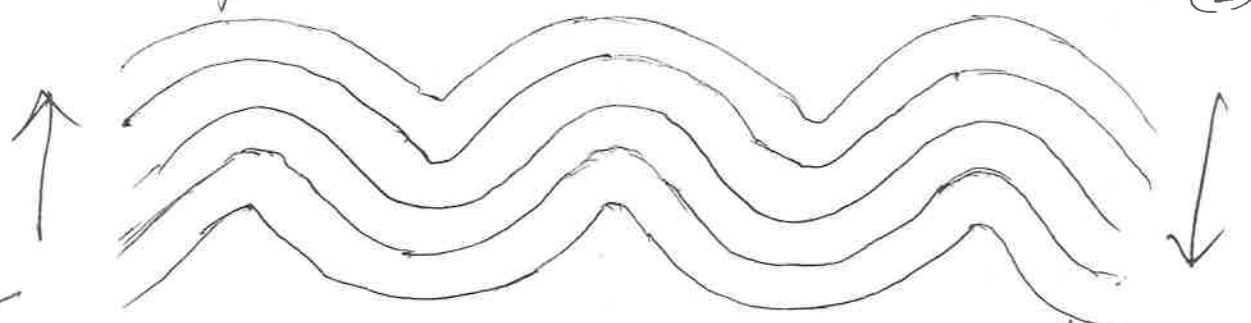
Mechanical Weathering / Physical Weathering
Chemical Weathering / Biological "
Spheroidal Weathering

3.(c) To explain Similar fold & Concentric fold. (2)M

Similar fold

Where the limb part is thinner than axial zone. Thickness is not same

Concentric fold (2)M.



Thickness is throughout the same. As we move upward synclines become gradually sharper. And as we move downward anticline become sharper.

4. (a) Ans.

Volcanic products — In all the state, Solid, Liquid and gas. Pyroclasts like Volcanic block, volcanic bomb, cinder, Lapilli, Volcanic dust, Volcanic sand, volcanic Tuff, agglomerate with brief explanation of each term. (5)M

4(b) Water bearing Qualities of rocks. (5)M

To explain in brief about Aquifer, aquiclude, aquifuge, Aquitard.

4 c) Properties of good building stone (5)M.

Strength Characteristics (Engg properties)

i) Compressive strength ii) Transverse strength

iii) Porosity iv) Density v) Abrasive resistence.

vi) Frost and fire resistence

Geological properties

i) Mineralogical composition ii) Texture & structure

iii) Resistance to weathering (Durability)

General

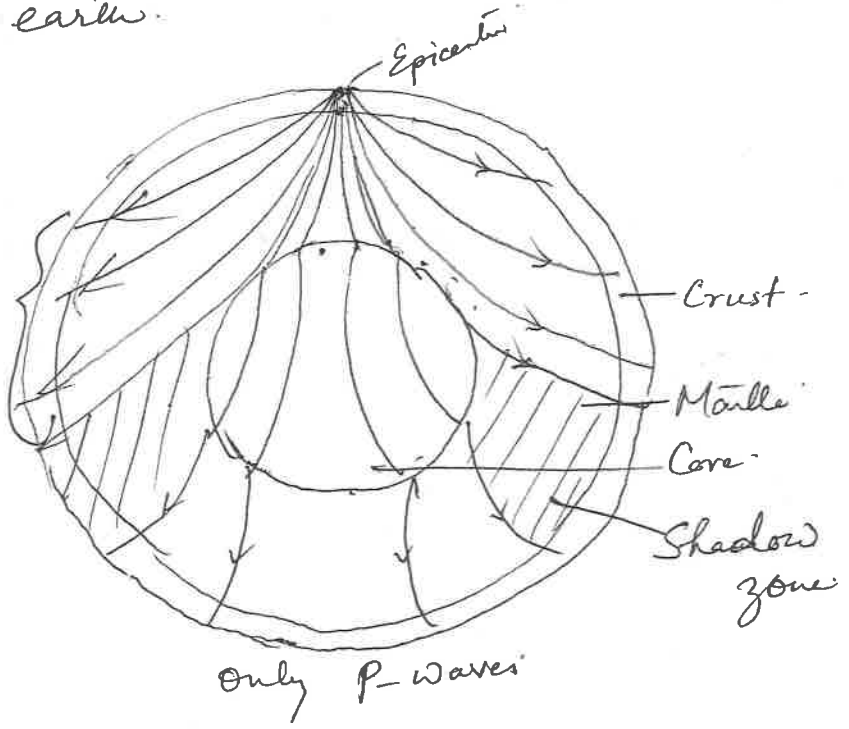
Cost, colour, Workability

4 (d) Various Types of plate boundaries. (5) M.

Convergent boundary, Divergent boundary and Transform boundary (To explain with diagram)

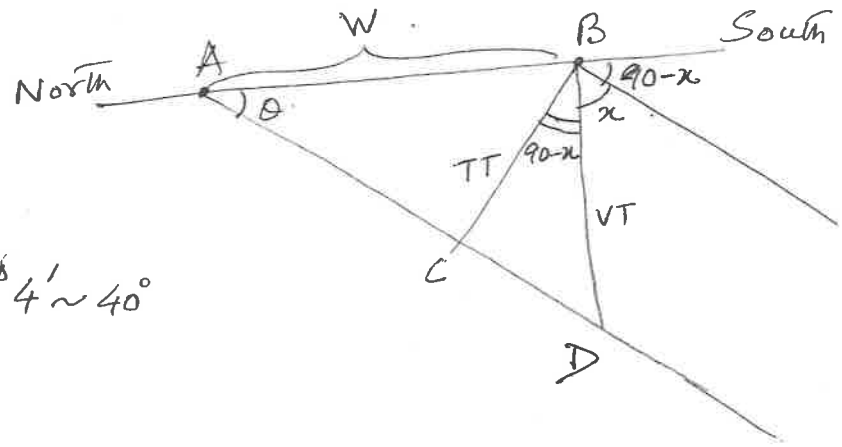
4 (e) Use of Seismic Waves in understanding the interior of the earth. (5)M

To Draw the diagram and explain it both P & S Waves.



2. (a) (6) M.

Here True Thickness (TT) = 75 m.
Vertical Thickness (VT) = 98 m.



From ΔBCD.

$\cos \angle CBD = \frac{TT}{VT}$

$= \frac{75}{98} = 0.7653.$

$\therefore \angle CBD = \cos^{-1}(0.7653) = 40^\circ 4' \sim 40^\circ$

$\therefore \underline{\angle BAD = 40^\circ}$

Now from ΔABD.

$\tan\theta = \frac{VT}{W}$

$\therefore W = \frac{VT}{\tan\theta} = \frac{98}{\tan 40^\circ} = \frac{98}{0.8390} = 116.8$
~ 117 m.

Thus, the required amount of inclination is 40° and the Width of outcrop is 117 m.

5(b) (6) M.

The Deccan Trap have been classified into three groups, namely Upper Traps, middle Traps and Lower Traps

		Area
Up Trap	450 m Thickness	(Bombay & Kathiawad)
Mid Trap	1500 m "	(Madhya Pradesh & Malwa)
Lr Trap	150 m "	(Madhya Pradesh)

Up Trap → Basaltic flows with neumerous Layers of Volcanic ash, Intratrappean beds found.

Mid Traps → Basaltic flows with Volcanic ash beds. Intratrappean beds are not found.

Lr Traps — Basaltic flows with intratrappean beds. Volcanic ash not found.

Lithology — Basic rocks like Basalts, gabbros are found

5(c) (Any four) 2 marks for each (8) M

i) Solifluction → In solifluction soil movement occurs in almost saturated condition. It takes place in very gentle s/of (2)

Soil Creep → In soil creep soil movement take place in dry state.

ii) Non Conformity — Older series is plutonic and younger series is sedimentary. (2)

Disconformity — Both the sequence is made of sedimentary rocks. With parallel relationship.

(iii) Fold axis → Line passes through max pt. of curvature (hinge points) (2) M

Axial plane → Imaginary plane passing through fold axis.

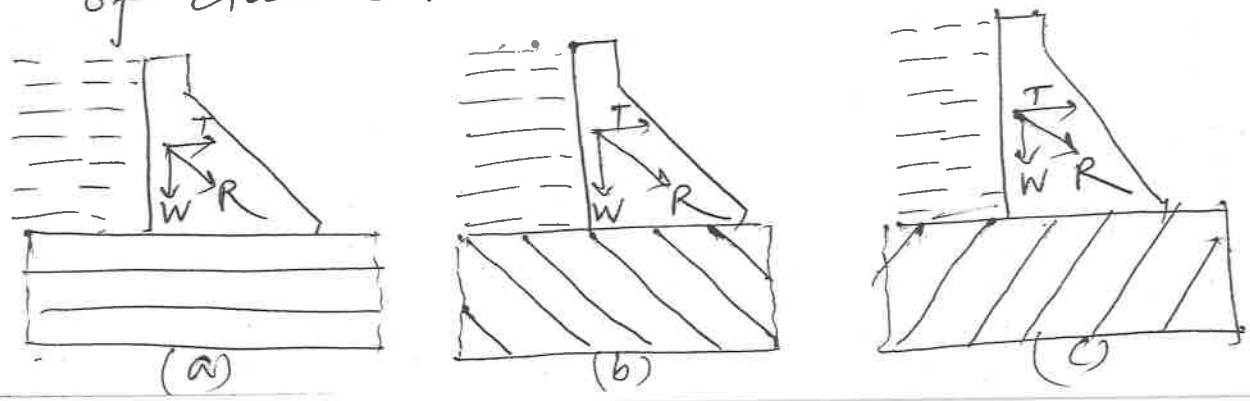
iv) Laccolith & Batholith

Laccolith is a concordant igneous intrusion which is convex in upper side, Lower part may be plane. The Less viscous magma pushes the overlying Layers.

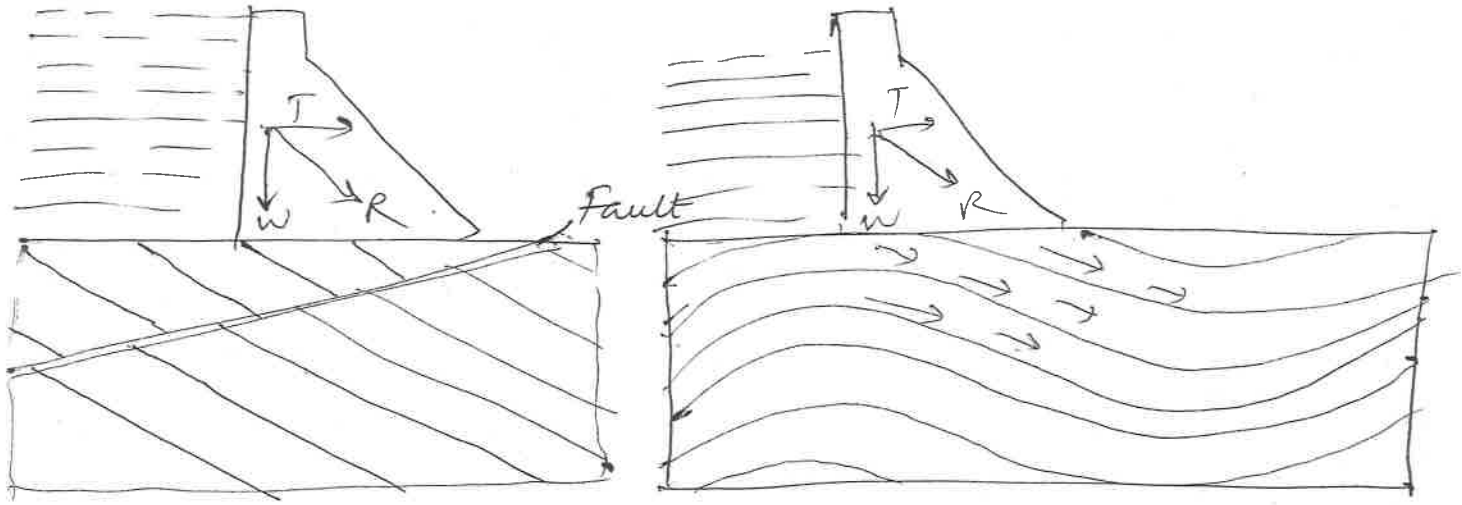
Batholith It is a discordant Shapeless intrusion. It spreads Laterally also.

(diagram must be there)

6. (a) Geological consideration in the selection of dam site. (10)



(a) On horizontal bedded rocks → Stable condition
(b) On downstream dipping rocks → Unsafe.
(c) On upstream dipping rocks → Safe against R



Fault is a source of danger. as the faulted rocks are generally shattered along the rupture surface and are liable to shock during earthquake. The most dangerous effect of fold ~~st~~ are shattering and jointing along the axial planes and stressing of limbs. So dams aligned along axial region would be resting on unsound rocks. In synclinal bends dam placed on the upstream limbs run the risk of leakage from beneath the dam. The balance of forces in the stressed limbs would be disturbed if these are opened up during Construction

6 (b) Importance of Core recovery & RQD. (4)M

All important engineering projects are constructed on rocks. It is therefore essential to have sound Knowlege of the strata through which construction is to be carried out. For direct ~~Subj~~ Subsurface investigation the core samples are interpreted & Tested for engg properties of rocks. The Core recovery is Calculated by excluding the aggregate length of core samples less than 10 cm

Core Recovery = Sum of Length of cores not less than 10 cm.

RQD is the Rock quality designation

$RQD = \frac{\text{Core Recovery}}{\text{Run}} \times 100\%$ which is expressed in terms of percentage.

RQD is used for describing the quality of area. whether it is suitable for construction ie. good or weak or fractured zone

If the range is 90 – 100 % excellent
75 – 90 % Good.
50 – 75 % Fair
below 50 % ~~bel~~ – poor.

From the given data. we get (6)

Core Recovery = 12+4+17+3+7+29+42+35+3
= 152 cm.

$RQD = \frac{\text{Core Recovery}}{\text{Run}} \times 100\%$

$= \frac{152}{300\text{ cm}} \times 100\% = 50.66\%$

Thus the area is fair for construction