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UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B-TECH GSE **Semester – VII**
Subject (Course): METHODS IN STRUCTURAL GEOLOGY **Max. Marks : 100**
Course Code : GSEG-401 **Duration : 3 Hrs**
No. of page/s: 03

All the questions of section A & B are compulsory. Wherever necessary do with neat sketches.

SECTION -A

Q.1 Explain in briefly the differences between the following terms. 2 x 5 = 10 M

a. Nappes and Klippen
b. Crenulation cleavage and Disjunctive cleavage
c. Unloading joints and Exfoliation joints
d. Slickensides and Fault gouge
e. Frictional faulting and Coulomb fracture faulting

Q.2. Fill in the blanks with suitable answer 1 X 10 = 10 M

i. The direction and magnitude of heave and throw can be measured only by finding common intersection points on either side of the fault called a…….points.
ii. A road is cut by a vertical dipping fault. As you walk along the road toward the fault, at the intersection of the fault and road, you have to turn to your right and walk some distance along the fault until you encounter the continuation of the road What would you call the fault……..?
iii. Folds are either anticlines or synclines. Many large hydrocarbon reservoirs occur within the cores of anticlines while adjacent synclines may contain the source of such material. Folds are _____ distortions of rock bodies.
iv. When the limbs of the fold occur on either side of the axial surface. The axial surface _____ the limbs of a fold.
v. Salt domes are the best examples of …… fold.
vi. Strain is proportional to stress in elastic deformation this hypothesis is proposed in …… Law.
vii. Two sets of related folds whose axial surfaces are inclined towards one another are called…….

viii. Dip of a bed is a vector quantity because it has got…… and …….

ix. The plunge and pitch are equal when the beds are in ……. Direction.

x. Faults where displacement is both vertical and horizontal are called,,,,,,,,,,,,,,, faults

SECTION –B

Q. 3 a) The given strike and true dip of the outcrop is **N 65° E, 35°SE.** Determine the apparent dip in vertical section trending **S 50° E** by numerical method. **4 M**

b)) In a banded sandstone quarry the following measurement were taken; the red color band shows apparent dip amount is **45°** and direction is **210°** and white color band shows apparent dip amount is **42°** and direction is **150°** . Find the direction of strike and true dip amount **6 M.**

Q. 4 Describe in briefly the type of stress occur during development of various types of geological structures and their significance in type of strain structural analysis**.** **20 M**

Q.5 Explain in briefly the role of following terms in context with structural analysis**.** **10M**
a) Fait Line fault Scrap b) Fault Breccia and Gouge c) Decollement Fold d) Asperities and Stable sliding.

SECTION –C Answer any two questions

Q. 6 a) Write a note on role of parts and types of stereographic net used in structural analysis. **5 M**

b) The following data obtain from the field structural analyses plot all these data using stereographic net. **15 M.**

i) Find the line of intersection of plane N40 E 65NW and N25W 55SW.

ii) Plot the lineation's is aligned with the following plunge and azimuth directions
a) 35 and 225, b) 45 and 165 c) 65 and 330 and d) 25 and 65

iii) Plot this stress data

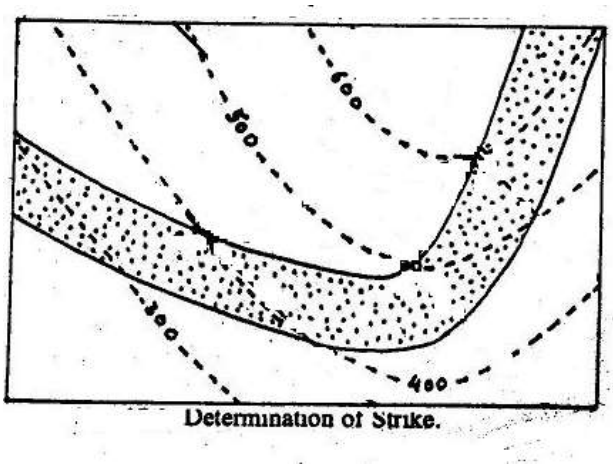
Sigma 1	Dip =30	Strike = 320	Magnitude = 75
Sigma 2	Dip =45	Strike = 150	Magnitude = 35
Sigma 3	Dip =25	Strike = 230	Magnitude = 55

Q. 7 a) Find out dip and strike from the given contour map **5 M**

b) Draw a suitable cross section and profile section for given outcrop map and find out what are the geological structure in the outcrop map. Calculate the dip and strike for each bed. **15 M.**

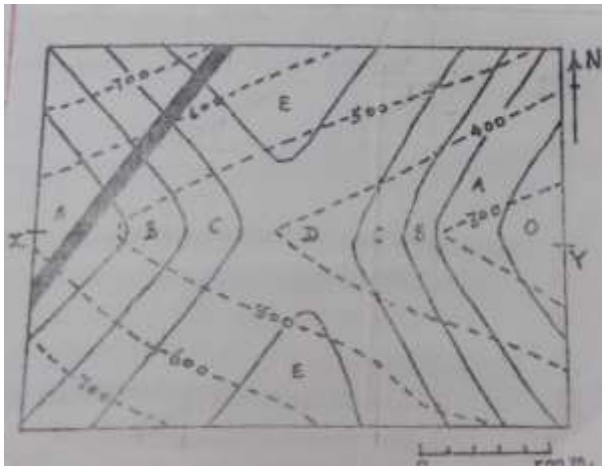
Q. 8 Describe in briefly the following terms consequence in context with structural analysis**.** a) Type of fault rocks b) Ring, synthetic and Antithetic faults c) Flexural slip, buckling and mass displacement in folding. D) Cooling joints, hydraulic joints and Cross-strike joints. **20 M**

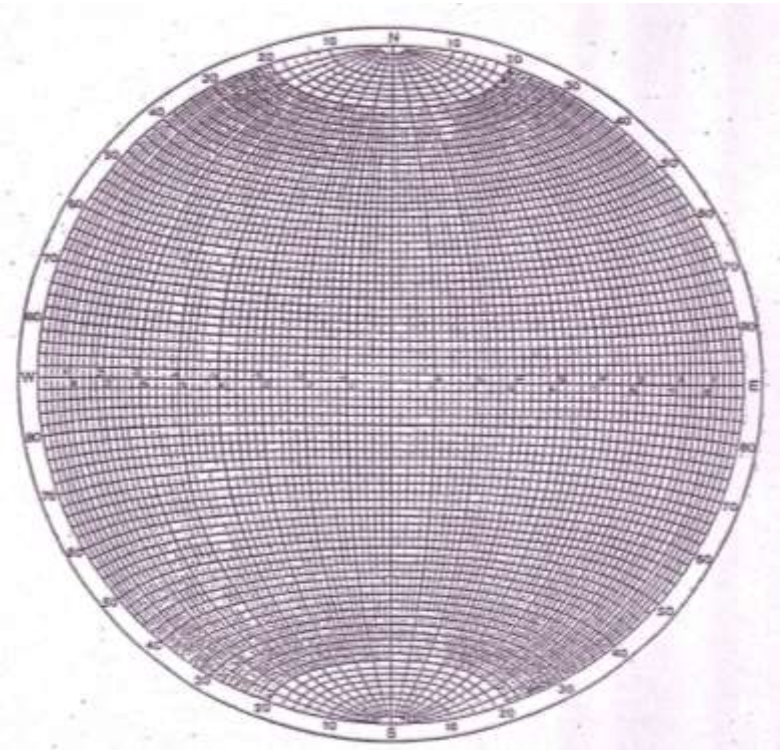
Map: Q.7a Scale 1cm = 50M



Determination of Strike.

Map: Q.7b Scale 1cm =100M





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SECTION -A

Q.1 Write a short note for the following terms. **2 x 5 = 10 M**

a. Conjugate fault
b. Plumose Joints
c. Passive flow folds
d. Hackle and Arrest line
e. Coulomb fracture faulting

Q.2. Fill in the blanks with suitable answer **1 X 10 = 10 M**

a. ……. Folds are formed within the incompetent beds are overlain by competent beds.
b. When the axis plunges directly down the dip of the axial plane; the fold is known as,,,,,,,,,,,,,,,
c. Salt domes are the best examples of …… fold
d. The plunge and pitch are equal when the beds are in ……. Direction
e. The direction and magnitude of heave and throw can be measured only by finding common intersection points on either side of the fault called a…….points
f. Thrust faults form ……. And…… in the large thrust belts
g. Low-angle normal faults with regional tectonic significance may be designate …… …….. faults
h. The…… angle between the fault plane and a vertical plane that strikes parallel to the fault.
i. …….. joints are joints that form immediately adjacent to and parallel to the shear face of a fault

j. ……joints occur when the joints intersect each other at angles significantly less than ninety degrees.

SECTION –B

Q.3 Discus in briefly the role of following terms in context with structural analysis**.** **10M**
a) Rake and Pitch b) Plunge and Hinge c) Rollover anticline fold d) Left and right lateral slip faults.

Q. 4 a) The following strike and true dip is observed in the outcrop is **N 55° E, 45°SE.** Determine the apparent dip in vertical section trending **S 65° E** by numerical method. **4 M**

b)) In a banded sandstone quarry the following measurement were taken; the green color band shows apparent dip amount is **35°** and direction is **230°** and red color band shows apparent dip amount is **32°** and direction is **140°** . Find the direction of strike and true dip amount **6 M.**

Q. 5 Explain in briefly the following terms role and significance in structural analysis**. 20 M**
a) Buckling and Flexural slip in fold b) Listric and Antithetic faults c) Ptygmatic and Parasitic folds d) Mural and Cooling joints e) Fracture trace and Fracture front

SECTION –C Answer any two questions

Q. 6 Describe in briefly the type of stress occur during development of various types of geological structures and their significance in type of strain structural analysis**.** **20 M**

Q. 7 a) Write a note on role of parts and types of stereographic net used in structural analysis. **5 M**

b) The following data obtain from the field structural analyses plot all these data using stereographic net. **15 M.**

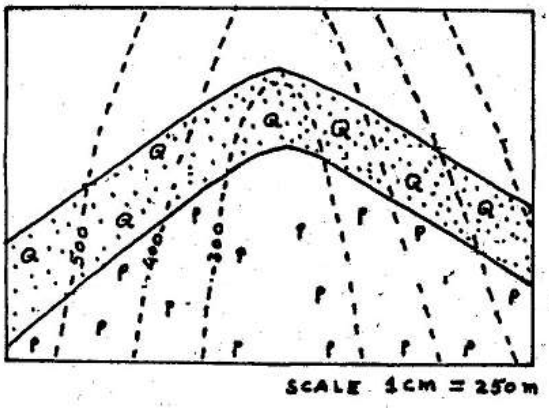
i) Find the line of intersection of plane N30 E 55NW and N35W 65SW.
ii) Plot the lineation's is aligned with the following plunge and azimuth directions
b) 25 and 225, b) 35 and 155 c) 55 and 320 and d) 35 and 75
iii) Plot this stress data

Sigma 1	Dip =20	Strike = 300	Magnitude = 65
Sigma 2	Dip =45	Strike = 170	Magnitude = 45
Sigma 3	Dip =35	Strike = 220	Magnitude = 75

Q. 8 **a**) Find out dip and strike of point ABC from given contour map **5 M**

b) Draw a suitable cross section and profile section for given outcrop map and find out what are the geological structure in the outcrop map. Calculate the dip and strike for each bed. **15 M**

Map: Q.8a Scale 1cm = 50M



Map: Q.8b Scale 1cm =100M