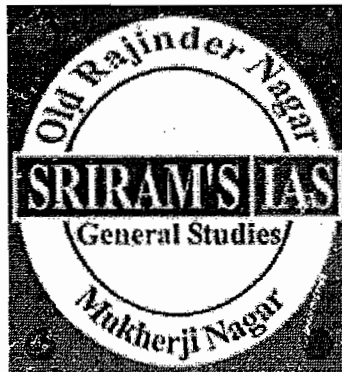


SRIRAM'S IAS



GENERAL STUDIES

WORLD PHYSICAL GEOGRAPHY MAINS (PAPER – I)

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AFRICA – PHYSICAL GEOGRAPHY AND MINERAL RESOURCES

Salient Features in the Physical Geography of Africa : Africa accounts for 20% of world area. Deserts make up 40 % of its landmass, forests make up 20% of its landmass and savanna grasslands make up 40% of its landmass. Africa has the largest tropical area of any continent and more than half of Africa gets less than 50 cm of rainfall. At a very broad level, Africa can be divided into High Africa and Low Africa. High Africa makes up Eastern and Southern Africa and Low Africa is made up of North, Western and Central Africa. About 75% of the landmass is made up of the geologically old Archean and Proterozoic rocks with rich mineral deposits. In general, Africa is a vast plateau which is higher in the southeast and sloping towards the northeast. The high mountains are located only in the fringe areas of the continent like the Atlas and the Drakensberg Mountains. The following gives a brief account of the prominent physical features of the continent.

The Atlas Mountains : These constitute the longest mountain chain of the continent and are non-volcanic fold mountains. The Atlas Mountains extend for 2400 km from Morocco to Tunisia. They are a divide between the Mediterranean Sea and the Sahara. The different range systems of Atlas mountains are the Tell Atlas, the Sahara Atlas, the Anti-Atlas, the Grand Atlas, and the Middle or Moyen Atlas. Rif Mountains are the northern most ranges of the Atlas. The plateau of Chotts with saline lakes is within the Atlas Mountains and is between the Sahara Atlas and Tell Atlas. In Tunisia, the Atlas Mountains are called the Tabassah Mountains. Mt. Toubkal is the highest peak of the Atlas Mountains.

The Ahaggar Mountains : These are volcanic mountains and plateaus within the North African Plateau. The Ahaggar highlands are mainly in Algeria; Libya and also partly in Niger. These include the Air Mountains. The Ahaggar rise above the Sahara desert from the underlying plateau as a high wall.

The Tibesti Mountains : These are volcanic mountains in northern part of Chad and parts of Niger and Libya. Their highest peak is Emi Koussi.

The Ruwenzori Mountains : These are non-volcanic block mountains. It is the highest non-volcanic mountain system of Africa. The ranges extend between Lake Edward and Lake Albert along the Zaire (D.R.C.) and Uganda border. The ranges descend into the East African Rift Valley. Margherita Peak (5119 m) is the highest point of Ruwenzori Mountains and 3rd highest peak in Africa and the peak is part of Mount Stanley. These ranges are rich in copper and cobalt.

The Drakensberg Mountains : These constitute the rim of the plateau of southern Africa. There are made up of volcanic rocks. The plateau of southern Africa reaches its greatest height in the Drakensberg Mountains. They extend for 1000 km from Cape Province till Transvaal and the highest peak is Thaba Ntlenyana (3482 m). The other important peaks are Mt Aux Sources (3299 m). River Tugela descending from Mt Aux sources creates the highest waterfall in southern Africa called the Tugela Falls.

The East African Rift Valley : This is 7200 km long in the continent and is a continuation of West Asian Rift Valley. The EAR developed due to plate tectonic related processes which also led to the development of the Red Sea. The EAR divides itself into the Western and Eastern Rift Valleys near Lake Turkana which merge at the southern end of L. Tanganyika. The rift is 30 to 90 km wide and at

many places the floor of the Rift Valley is below the sea level. The valley sides along the rift at places rise to 2 km from the floor. The rift is full of lakes, extinct and active volcanoes, plateau like structures etc. All the lakes in the eastern part of the continent (except Lake Victoria) are part of the Rift valley (like Tanganyika, Malawi, Albert, Edward etc.)

The Ethiopian Plateau : This is also called the Abyssinian Plateau and is a volcanic plateau. It is cut by the EAR. The eastern part of the plateau is locally called the Harar Plateau. It is covered by fertile volcanic soils. The highest peak is Ras Dashen. The plateau includes a major part of Ethiopia and Eritrea.

The Fouta Jallon Plateau: It is part of the West African plateau and covers large areas in Guinea, Sierra Leone and Liberia. It rises to great heights in the Nimba Mountains (of Guinea and Liberia). The plateau is rich in mineral deposits like bauxite and also gem stones like diamonds.

The Jos Plateau : It is the eastern part of the Fouta Jallon plateau and covers large areas of Nigeria. It is rich in mineral deposits. It makes up the highlands in western and eastern Nigeria.

The Adamawa Plateau : It is a volcanic plateau and is part of the plateau of Western Africa and is mostly in Cameroon. Mt. Cameroon is the tallest volcanic mountain of the Adamawa plateau.

The Zaire Basin : It is a faulted basin and contains the basin of Congo. It lies between the Kalahari basin in the south and Chad basin in the north. The basin is richly forested with equatorial evergreen forests.

The Kalahari Basin : It is the region of Kalahari Desert between the coastal mountains of Namibia and the High Veld of S. Africa. The basin has a desert climate which changes into a steppe climate in the east.

The Sudan Basin : This is the basin of White Nile and Blue Nile and contains the Africa's largest marshland called the Sudd. The Sudd is typically between the White and Blue Nile rivers. The White Nile loses much of the water in this marsh. The Sudd is rich in oil and gas.

Lake Chad Basin : This covers a major area in Chad and extends into Niger and Cameroon. The basin includes Lake Chad, a shallow lake whose average depth is 7 metres. The basin is drained by rivers Chari and Logone and is rich in oil and gas. The basin is between Ahaggar Mountains, Tibesti Mountains in the north and the Jos Plateau in the west.

The Sahara Desert: The world's largest desert occupying 9 million square kms. The desert occupies the plateau of Sahara which is made up of geologically old rocks. The plateau throws up many rocky mountains like the Ahaggar and Tibesti Mountains. The Nile basin is the biggest in the Sahara region. The Nile river flows for 1930 kms almost north and south. The Sahara is rich in oil and gas in Libya and Algeria. The desert includes dunes of sand called Ergs and Regs.

The Qattara Depression : This is a basin in the Sahara Plateau of Egypt and is full of swamps. The basin is made up of low hills and small-gorges of some streams.

The Sahel : This is a strip of Africa running along the southern margin of Sahara. It is located between the Savana regions in the south and Sahara in the north and extends between the Atlantic Coast to Red Sea coast. It was originally a savanna grassland which today has almost changed into a desert. The overgrazing of the grasslands by livestock and intensive agriculture during the period of

European colonization transformed the Savana ecosystem of the Sahel into a desert ecosystem. The region is exposed to repeated droughts and famine like conditions. The Sahel today continues to expand south and the Sahara continues to expand into the Sahel.

The Sinai Peninsula: It is a plateau between the Gulfs of Suez and Aqaba. It has a desert climate with a few oases. It is a rocky mountainous plateau with some highlands like Mt. Jabal Musa and Jabal Katrinah. The peninsula occupies 61,000 sq. km and is rich in mineral deposits like manganese and also has some petroleum oil. The plateau drops in height towards the Mediterranean Sea.

The Veld Region : These are temperate grassland regions in the plateau of Southern Africa and occupy large areas in S. Africa, Zimbabwe and Zambia. Their temperate grassland character is due to the significant height of the plateau, though the grasslands are part of the tropical climatic region of Africa. The grassy plains of the Veld are rich regions for cereal grains cultivation like wheat, maize, cultivation of fruits and tobacco, and livestock raising.

The Kalahari Desert: This is part of the sub-tropical high pressure belt and the desert occupies the Kalahari Basin. The desert has an area of 5 lakh square kms. It has large areas in Botswana and also spreads into S. Africa and Namibia. It is a huge reserve for animal wildlife and at many places has sub-humid character with more rainfall than a desert. The Okavango swamps lie in the northeast while the Makgadikgadi basin makes up the northeastern part of Kalahari. The rocks below are rich in mineral deposits like copper, nickel, diamonds etc.

The Namib Desert : It is one of the oldest deserts in the world and is due to the dry offshore trade winds and the cold Benguela current along the coast. It spreads almost north-south along the coast and occupies 2.7 lakh square kms. It is separated from the shore by the Namib escarpment. The rocks below the desert are rich in diamonds. Skeleton coast is the northern part of the Namib desert. Walvis Bay is an important sea port town of the desert.

Mt. Kilimanjaro : It is an extinct volcano in Tanzania and is the highest mountain of Africa. It is made up two peaks, Mt Uhuru and Mt Kibo. It's slopes are used for cultivation of coffee, wheat, maize and sugarcane.

Mt. Kenya : It is the second highest mountain of Africa and is almost along the equator. It is an extinct volcano and is covered by ice caps. The Kikuyu of Kenya call it Mt. Kirinyaga. It's slopes are part of the Mt. Kenya National Park.

Mt. Elgon : It is an extinct volcano along the Kenya – Uganda border which has a huge crater. It's slopes are used for cultivation of coffee, corn and millets.

Mt. Meru : It is an extinct volcanic mountain in Tanzania along Tanzania – Kenya border. Arusha town lies at its base. Large coffee plantations are developed on its slopes.

Mt. Nyirangongo : It is an active volcano in the Virunga Mountain of Zaire. It is part of the EAR. It has a huge crater and its latest eruption in 2002 destroyed the town of Goma in Zaire.

Lake Victoria : The 3rd largest lake in the world and the second largest freshwater lake in the world. It is 241 kms at its widest and is 82 meters deep at its deepest. The basin of Victoria is shared by Uganda, Kenya and Tanzania. It is one of the largest sources of Nile and gives birth to Victoria Nile. Thousands of streams flow into it and is part of the East African plateau. Uganda has 45% of its basin, 49% of its basin is in Tanzania and the rest 6% is in Kenya. It is the largest source of fishery in Africa.

Lake Kyoga : It is considered to be part of the Victoria basin and has a maximum depth of 5.7 meters. The Victoria Nile flows through it on its way from Lake Victoria to Lake Albert.

Lake Malawi: It is the 10th largest natural freshwater lake in the world. It is fed by Ruhuhu. It was formerly called Lake Nyasa, is a large lake within the EAR. It is the 3rd largest natural freshwater lake of Africa and is 563 km long and 701 m deep. It's basin is shared by Mozambique, Malawi and Tanzania. It flows into the Indian Ocean via river Shire.

Lake Tanganyika : This is the world's longest freshwater lake and the 6th largest natural freshwater lake in world. It is 676 km long and 48 km wide at it's widest with a maximum depth of 1435 meters. It is the deepest lake of Africa and the second deepest lake in the world. Rusizi river flows into it and Lukuga flows out of it. The basin of the Lake is shared by Burundi, Tanzania, Zambia and Zaire. 45% of its basin is in Zaire and 41% is in Tanzania. Kigoma and Bujumbura are important lake ports.

Lake Albert : It is part of the EAR and also called Lake Mobutu Sese Soko. It occupies the EAR along the border between Uganda and Zaire. It has a maximum depth of 60 metres and is about 180 km long. It gives birth to Albert Nile, a source of Nile which joins Victoria Nile.

Lake Edward : It is part of the EAR and is along the border of Zaire and Uganda. It is 64 km long and 51 km wide at its widest. It is connected to Lake George. The Kazinga stream flows into Lake Edward from Lake George.

Lake Bangweulu : It is a shallow lake in northeastern Zambia and is not part of the EAR. It is part of the Congo Basin and gives birth to Luapula river. It is part of the Bangweulu swamps and is 72 km long at its longest and 24 km wide at its widest.

L. Nasser : An artificial lake of the reservoir behind Aswan High dam across Nile. It covers around 4000 square km area and is for irrigation and hydropower.

Lake Kivu : A small lake within the EAR which is along border of Zaire with Rwanda. River Rusizi flows out of Kivu into Lake Tanganyika.

Lake Mweru : A freshwater lake and is part of the Congo river. It is along border of Zambia with Zaire It is 110 km long at its longest. It is between Luapula and Luvua rivers. The Luapula enters it from the south and Luvua leaves it on the north.

Lake Volta : An artificial lake behind the Akosombo dam in Ghana and is the world's largest artificial lake extending for 400 km. It is a huge source of hydropower, fishery and inland transport and is part of basin of river Volta.

Lake Turkana: It is part of the EAR and is mostly in Kenya and partly in Ethiopia. Earlier called Lake Rudolf, the Lake beds along its shores have yielded a rich collection of human fossils. It is a saline lake, and the 4th largest saline lake in the world.

Lake Tana : A large source of Nile it gives birth to Blue Nile. It is part of the EAR and is part of the plateau of Ethiopia.

Lake Kariba : It is an artificial lake created by Kariba dam across river Zambezi along the border of Zambia and Zimbabwe. It is a huge hydropower project and is one on the largest dams in the world.

Lake Cabora Bassa : The 4th largest artificial lake of Africa, and is the reservoir of Cabora Bassa dam across river Zambezi in Mozambique. It is a huge hydro power project whose electric power is mainly supplied to S. Africa.

Kainji Lake : An artificial lake behind the Kainji dam across river Niger in Nigeria. The dam is for hydropower and irrigation.

Congo River : 5th longest river in world and the 2nd largest river after Amazon in the world. It is born from merger of Lualaba and Luvua rivers in Zaire. It is called Zaire river in Zaire. It flows for a total distance of 4667 km. It is joined by Lomami, Ubangi and Aruwemi in Zaire (DRC). It's basin is shared by Congo, Zaire, Angola, Central African Republic and Zambia. It forms the Buyoma Falls in Zaire.

River Nile : The second longest river in the world after Amazon. It flows for 6671 km after its birth close to the equator. The largest source of Nile is Blue Nile and the other largest source is Lake Victoria. The Nile is joined by Blue Nile and Atbara rivers born in Ethiopia. The river forms a huge delta in the Mediterranean. The Aswan High Dam across Nile in Egypt is a major irrigation project. Victoria Nile from Lake Victoria forms the Murchison Falls in Uganda.

River Niger : The third longest river of Africa after Nile and Congo. It is born in the highlands of Guinea near Guinea's border with Sierra Leone. It flows across Guinea, Mali, Niger, Benin and Nigeria before it flows into the Gulf of Guinea. The main tributary of Niger is Benue. The Niger forms an inland delta in Mali.

River Zambezi : The fourth longest river of Africa after Nile, Congo and Niger. It flows for 2736 km and is born in Zambia. It forms the border of Zambia and Zimbabwe and then flows across Mozambique into the Indian Ocean. It forms the Victoria Falls along the border of Zambia and Zimbabwe. Its basin is in Namibia, Botswana, Zambia, Zimbabwe, Mozambique. The basin of Zambezi is rich in mineral deposits including oil and coal. The Kafue and Shire are its main tributaries. The Victoria Falls (earlier Livingstone Falls) have a drop of 78 to 108 meters due to a gorge across the course of Zambezi. It is the largest waterfall in Africa.

River Orange : It is one of the longest rivers of the Southern African Plateau and is born in the mountains of Lesotho. It flows for 2100 Kms and its basin is shared by S. Africa, Lesotho and Namibia. It forms the border between Namibia and S. Africa. It forms the Augrabies Falls in S. Africa which has a drop of 150 meters. Vaal is the largest tributary of Orange.

River Limpopo : It is born in S. Africa and flows for 1600 km before joining the Indian ocean. The river forms the boundary of S. Africa with Botswana and Mozambique. Its main tributary is Crocodile River.

River Senegal : It is born in the Fouta Jallon Plateau of Guinea. It flows across Guinea, Mali (and forms the border between Mauritania and Mali) and Senegal before entering Atlantic. It flows for 1641 Kms.

River Gambia : It flows for 1130 km after its birth in the Fouta Jallon Plateau of Guinea. It flows across Gambia and Senegal before joining the Atlantic. It is an important waterway which is navigable by ocean going ships. It flows into the Atlantic via an estuary.

River Volta : It is born from the merger of White Volta, Black Volta and Red Volta. The single river born is called Volta River in Ghana which flows into the Gulf of Guinea. The Akosombo dam in Ghana is across river Volta and is a huge project for hydropower.

River Kasai : It is a major tributary of Congo. It is born in Angola and partly defines the border between Angola and Zaire (DRC) before flowing into Zaire and joining the Congo. The Kasai river bed is an important diamond mining region.

MINERAL RESOURCES OF AFRICA: Except coal, the continent is rich in all mineral resources, both metallic and non-metallic in addition to gemstones. A brief account of the mineral wealth is given below.

- A) **IRON ORE** : Tell Atlas Mountains of Algeria are rich in iron ore particularly close to Oran and the Aures Plateau . The Transvaal Province of S. Africa has large deposits of iron ore, particularly close to Rustenberg. Large deposits are also found in the Northern Cape Province. S. Africa is the largest producer of iron ore in the continent. The desert interior of Mauritania in Zouérate and Fort Guourand have huge reserves of iron ore. The Bomi and Nimba Mountains of Liberia have large reserves of the metal.
- B) **COPPER ORE** : The plateau areas of south-central Africa are rich in copper. The Copperbelt of the Zaire – Zambia region extends from Luanshya in Zambia into the Katanga or Shaba region of D.R.C. The region has 10% of world copper reserves. The zone runs for 450 kms and is 260 kms wide. In S. Africa, copper reserves are close to Upington in the Orange River Valley. Other large deposits occur in Namaqualand and Messina.
- C) **COBALT** : The Copperbelt also has significant deposits of cobalt and tin. The Zaire section is rich in cobalt. Uganda has sizeable deposits of cobalt near Kilemba near Kasese.
- D) **BAUXITE** : Guinea has the largest reserves of bauxite in Africa and is the 2nd largest producer in the world. Much of the deposit is in the Fouta Jallon Plateau. The Ashanti Plateau of Ghana and the Fouta Jallon Plateau of Sierra Leone are rich in bauxite deposits.
- E) **MANGANESE** : S. Africa has large reserves in Kimberley in Transvaal State and Griqualand in Veld region. Large manganese deposits are in Gabon (which are about 8% of world reserves) and also in Nasuta mines in Ghana.
- F) **NICKEL** : Lydenberg and other areas in Cape Province of S. Africa have rich reserves of nickel ore. Nagamiland in Botswana has sizeable reserves. Zimbabwe has large reserves in the Great Dyke region of the High Veld.
- G) **TIN** : The tin ore occurs in large reserves in Katanga Belt of Zambia – Zaire (DRC), in Northern Province of S. Africa, in the Jos plateau of Nigeria.
- H) **PLATINUM** : S. Africa has largest reserves of platinum in Africa, which are mainly in Rustenberg, The Great Dyke in Zimbabwe also has sizeable deposits.
- I) **GOLD** : Africa's largest deposits of gold are in the Witwatersrand region of S. Africa. The main mines are in Klerksdorp, Lydenberg, West Kimberly. The regions around Welkom in Free State of S. Africa also have huge reserves of gold. Gold deposits are sizeable in Ankobar river deposits of Ghana. Gatooma goldmines in Zimbabwe also have major reserves.

- J) **COAL** : Most of Africa's coal deposits are in S. Africa. The chief coalfields are in Middleburg, Vereenging (in Gauteng State) and Witbank (in eastern Transvaal). Some coal deposits also occur in Wankie (Zimbabwe), Maniamba Mines (Mozambique), Mamba mines (Zambia), Enugu Mines (Nigeria).
- K) **OIL AND GAS** : Large deposits of oil and gas are in the Gulf of Guinea continental shelf. Hence the countries that share the shelf of Equatorial Guinea (like Gabon, Equatorial Guinea, Cameroon etc) have large reserves. The Niger delta in the Gulf of Guinea is very rich in oil hence making Nigeria the largest producer of oil in Africa. Angola is sub-Saharan Africa's large producer of oil which occurs in the coastal areas near Luana, Namibe, Tombua in the Cabinda province. The Sudd region of Sudan and S. Sudan border has large reserves of oil in the Abyei fields. The Sahara desert of Algeria (in Hassi Massoud fields and natural gas in Hassi R'Mel Fields) and in Libya (in the coastal onshore, offshore areas along the Mediterranean in Ras Lanuf, Zelden and Ras Sidar fields) has large reserves. The other oil deposits of Africa are in Lake Chad basin, the Quattara basin (of Egypt) and offshore areas of Congo and Zaire.
- L) **DIAMONDS** : The geologically older rocks making up the plateaus of Africa are very rich in diamonds. The Kalahari desert of Botswana at Orapa, the Kimberley region of North Cape of S. Africa, the Orange riverbeds of S. Africa and Namibia, the Kasai river beds of Zaire and Angola, and the plateau areas of Sierra Leone, Central African Republic, the Namib Desert of Namibia are rich in diamond deposits.
- M) **PHOSPHATES**: Large rock phosphate deposits are found in Sahara plateau of western Morocco. These are two thirds of world reserves. The Sahara plateau of adjacent Algeria and Tunisia is also rich in phosphate. Some rock phosphate is also found in Drakensberg Plateau of S. Africa and Red Sea coast of Eritrea.
- N) **URANIUM** : Large deposits of uranium are part of the Tibesti and Ahaggar plateaus of Niger. The rocks underneath the Namib desert have sizeable deposits of uranium. The state of Northern Province of S. Africa has huge deposits of uranium.
- O) **GRAPHITE** : The world's largest reserves of graphite are found in the plateau areas of Madagascar. Sizeable deposits are in Mozambique and southeast Kenya.

PHYSICAL GEOGRAPHY AND MINERAL RESOURCES OF CHINA

INTRODUCTION: China is the 3rd largest country by area after Russia and Canada. It extends for 4023 Km north to south and 4828 Km east to west. Its coastline is 6468 Km along the Pacific. The chief physical features of China are briefly discussed below.

Tibetan Highlands: These make-up Southwestern China surrounded by Pamir, Himalayan and Kun Lun Mountains. The average elevation of the Tibetan Plateau is nearly 5 km above the MSL. The Tibetan Plateau has a desert climate. The highlands in the Plateau gives birth to some large river systems like Salween, Yangtze, Mekong, Brahmaputra, Indus etc. The Qaidam basin in Tibetan Plateau is a mineral rich region and is located between the Altun and Kun Lun Mountains.

The Tarim Basin: This is South of Tian Shan Mountains with an average height of 1000 meters below the Tibetan Plateau. It is surrounded by Tian Shan, Pamir and Kun Lun Mountains. Lop Nur is part of Tarim basin and has saline lakes.

The Taklimakan Desert: This makes up Central Tarim basin and is one of the driest deserts of Asia. It has hills of low height and has the river basin of Tarim. The Turfan Depression (the lowest part of China) is part of the Taklimakan desert.

The Dzungarian Basin: This is north of Tian Shan Mountains and west of Altai Mountains. It is a region of steppe grasslands and is a region of nomadic herding.

The Tian Shan Mountains: These are part of the Alpine-Himalayan system extending for 2400 km from Pamir Knot into China. Pobeda Peak is the highest peak. The Tian Shan Mountains are rich in mineral deposits.

The Kun Lun Mountains: They begin in the Pamir Knot and extend for 3700 km. Ulugh Muztagh is the highest peak. The Tsinling Mountains and the Altun Mountains are extensions of Kun Lun Mountains. They are part of the Alpine-Himalayan system.

The Qinling Mountains: These are the eastern branches of the Kun Lun ranges. They separate the North China Plains from the South China Plains.

The Altai Mountains: These are born in Kazakhstan and extend into Mongolia, China and parts of Russia. They are part of the Alpine-Himalayan system and are rich in mineral deposits like gold, silver, copper etc.

The Great Qinggan Ranges: These are the continuation of the Qinling Mountains towards the north (and are east of the Tibetan Plateau). The average height is 1000-3000 meters above MSL. Mt. Tai Pai is the tallest peak.

The Sichuan Basin: This is a region with hills and valleys in the upper course of river Yangtze. The basin is drained by four tributaries of Yangtze and is rich in oil, gas, coal, and other mineral resources.

The North China Plains: These are the plains of Hwang He and contain one-third of China's arable land. It is a region with rich agriculture. The Loess Plains are part of the North China Plains in the north, with less rainfall.

The Manchurian Region: The region makes up northeastern China, east of the Great Qinggan ranges. It has the plains of rivers Songhua and Liao. It is rich in mineral resources like coal, iron ore and is densely forested with conifers. It is a rich agricultural region. The Chang Bai Mountains are in Southern Manchuria.

The Yunnan Plateau: This makes up southern China in the State of Yunnan. The Plateau has geologically ancient rocks and includes many plains within the plateau. It is rich in mineral deposits.

The Mongolian Border Uplands: These are a series of highlands between Gobi and Eastern Plains. The Great Qinggan range forms the northern part of the region. The region has a rugged terrain with little agricultural land. The southern part has the loess hills and the basin of Hwang He.

The Gobi Desert: It is an intermontane desert extending roughly 1900 Sq. km. both east to west and north to south. It is a basin with high plateaus. The Plateaus of Gobi Desert are rich in mineral deposits. It includes the Loess Hills and the cities of Hohhot and Baatow of China.

The Shantung or Shandong Peninsula: It is the landmass of China jutting into the Yellow sea. It has the Gulf of Pohai to the north and includes the city of Qingdao. It has deposits of gold and iron ore and is a rich agricultural region.

Rivers of China: The chief rivers of China are given below.

Yangtze: It is born in Qinghai province in Tibetan Highlands. It flows for 6300 km into the South China Sea past the port of Shanghai. The Yangtze Plains of Central China are the richest agricultural regions of China. It has some important industrial cities on its banks like Wuhan, Chongqing, Nanjing and etc. It is the chief commercial waterway of China.

Hwang He: It is also called the Yellow River and flows for 4672 km. It is born in the Tibetan Highlands of Qinghai province. It flows through the Loess plains of North China and hence carries lot of silt. It frequently changes its course and is responsible for floods. It flows into the Gulf of Bohai.

Xi Jiang: It is the most important river of China in the south. It is born in Yunnan province and flows for 2655 km into the South China Sea past the port of Hong Kong. Wuzhou is an important industrial city on its banks. Its plains are rich agricultural regions of Southern China.

Mineral Resources of China: China has large reserves of some important minerals resources. Large coal deposits are in Shansi and Shensi States of North China. The Manchurian region has coalfields in Penshihu and Fushun. Coal deposits also occur in the Southern states of Sichuan, Yunnan and Huan. Large iron ore deposits are in Manchuria, in Anshan and Penshihu. In North China Plains iron ore occurs in Hopei, Shantung and Shansi States. The middle Yangtze basin has large iron ore deposits in Tayeh and Pingsian. Manganese is mainly mined in Hunan, Jiangsi and Kweichow. Large Tungsten deposits are in Jiangsi province, Yunnan and Guangdong. The Sichuan basin is rich in natural gas. Antimony is mainly mined in Jiangsi, Hunan and Kweichow States. Manchuria and Hunan have rich reserves of Zinc. Yunnan and Sinkiang have large reserves of copper ore. The oilfields of China in Gansu, Sinkiang and Qinghai provinces. Taching oilfields are in Manchuria. The oilfields in Sinkiang State are in Urumqi, Kashi and Kashgar. The Gulf of Bohai has huge reserves of oil in the offshore areas.

EUROPE – PHYSICAL FEATURES AND MINERAL RESOURCES

Introduction : Europe accounts for 7% of earth's land surface. It extends for 6400 km east – west and for 4800 kms North-south. It is the third most populated continent after Asia and Africa. The highest point of the landmass is Mt. Elbruz and the lowest point is Caspian Sea floor. The most northerly point of Europe is Cape Nordkyn and the most southerly point is Cape Tarifa in Spain. Europe is a huge peninsula that extends westward from northwestern Asia. No water body separates Asia and Europe completely, hence it is sometimes called Eurasia. The major divisions of Europe are

- 1) **Northwest Mountains** : These are the highlands of northwestern Sweden, northern UK, northwest Russia and northern Finland. The mountains belong to the Caledonian and Hercynian folds of Paleozoic era. The Northwest Mountains are thinly populated.
- 2) **The Great European Plain** : This covers a major part of Europe north of the Alpine and related mountains (like the Carpathians, the Caucasus the Alps etc). It extends from Arctic ocean to Caucasus Mountains. It includes the north France plains, the north German plains, the plains of Poland, Hungary, Romania, Ukraine, Netherlands, Belgium, England etc. The Great European Plains is a plain with low hills and has some of the world's most fertile farmlands. These Plains are narrowest in Belgium.
- 3) **The Central Uplands and Plateaus**: This make up the central part of Europe and include some of the largest uplands / plateaus like the Meseta, the Massif Central (of France), the Transylvanian Plateau, the Swiss Plateau, the Plateau of Bavaria etc. The river valleys of these plateaus have good farmland. The plateaus are rich in mineral deposits.
- 4) **The Alpine Mountains System** : These include- young fold mountains between Spain and Caspian sea. The system includes Alps, Pyrenees, Caucasus, Sierra Nevada Ranges of Spain, the Apennines, Dinaric Alps the Carpathians, the Balkans. Mt. Elbrus of Caucasus is the highest peak of the Alpine mountain system.
- 5) **The Major Peninsulas** : Europe's major peninsulas are the Scandinavian peninsula (Norway / Sweden), Jutland (Denmark and Germany), Iberian peninsula (Spain and Portugal), Balkan peninsula (of Albania, Bosnia, Croatia, Bulgaria, Greece, Macedonia, European Turkey, Croatia, Slovenia and Serbia).

The following deals with the outstanding physical features of Europe.

ALPS: These are part of the Alpine-Himalayan fold mountain system. They are the largest mountain system of Europe and extend for 1200 km. They are widest in southern Germany and northern Italy. Mt. Blanc (4807 m) is the tallest peak. The western and central Alps are higher and narrower than eastern Alps. There are around 40 passes across the Alps. The important passes are the Brenner pass which connects Austria and Italy, the Great St. Bernard pass between Italy and Switzerland, the Simplon pass between Italy and Switzerland and the St. Gothard pass in Switzerland. The Alpine system of Europe includes the Cantabrian Mountains, the Pyrenees, the Carpathians, the Caucasus Mountains and the Balkan Mountains, the Apennines, the Dinaric Alps, and the Pindus Mountains of Greece. The Alps proper are ranges of France, Switzerland, Italy, Germany and Austria. The French Alps are rich in bauxite while the Austrian Alps are rich in iron ore.

The Pyrenees Mountains : They are part of the Alpine system and form the frontier between Spain and France. They extend for 435 kms from Bay of Biscay to Mediterranean and cover an area of 52,000 square kms. Their average height is 1070 m. The highest peak of the Pyrenees is Pico de Aneto (3404 m). The mountains are rich in iron ore, lead, silver and cobalt. Pine and conifer forests cover the mountains. The principality of Andorra is part of the Pyrenees.

The Jura Mountains : These are part of the Alpine system extending from France into Switzerland besides forming their border. They define the northern edge of the Swiss plateau. The highest peaks of the Juras are around 1800 m high. The Juras are rich in some minerals like iron ore. They form the watershed between rivers Rhine and Rhone. The Juras of Switzerland are home to watch making industry.

The Carpathian Mountains : These are part of the Alpine-Himalayan system. They stretch for 1500 km across central and eastern Europe roughly between Bratislava (Slovakia) and Orsova (Romania). They are in parts of Czech Republic, Slovakia, Poland, Hungary, Ukraine, Romania and Serbia. Most of the Carpathians are in Slovakia and Romania. The highest peak is Gerlachovsky (2655 m) in Slovakia. The Tatras mountains along the border of Poland and Slovakia are the highest ranges of the Carpathians. It is the largest mountain system of Europe and are separated from the Alps by the Danube and from Balkan mountains by Danube. The Carpathians are the sources of Dneister, Vistula and other rivers. The Carpathians are rich in coal, iron ore and salt deposits. They are densely forested with oak, fir and beech forests.

The Balkan Mountains : These are part of the Alpine system and are mostly in Bulgaria. Botev peak in Bulgaria is the tallest peak.

The Rhodope Mountains : These are old mountains which formed in Paleozoic era and extend in southern Bulgaria. Musala peak is a prominent peak.

The Vosges Mountains : These are older than the Alpine system and formed in Paleozoic era. They are in northeastern France along its border with Germany. The Rhine Valley lies east of Vosges.

The Black Forest : It is a forested mountainous region in the province of Baden Wurttemberg in southwestern Germany. Its highest peak is Feldberg. These are part of the Hercynian (Paleozoic) folds of Europe. Their average height is 750-900 metres above the mean sea level. The mountains include many plateaus and deep narrow valleys. They are in the southwest part of Germany and give birth to river Danube. The mountains are rich in many natural springs. The Black Forest is separated from the Vosges by the valley of Rhine. It has many mineral rich hot springs which have given birth to health resorts.

The Bohemian Mountains : These are part of Hercynian folds in the western part of Czech Republic. They include the Ore Mountains in the northwest and the Bohemian Forest in the west. These are rich in mineral deposits like uranium, coal and iron ore. The Bohemian Mountains include the Karlsbad Caves, famous for their mineral springs.

The Sudetan Mountains : These are in the northern part of Czech Republic and are Paleozoic i.e. Hercynian mountains. They include the Giant Mountains which constitute a major nature reserve.

The Moravian Mountains: These are Paleozoic Mountains and make up much of central part of Czech Republic. They are a collection of plateaus, high plains and low hills and constitute a major agricultural region of the country.

The Transylvanian Plateau: This is part of the Carpathians where Carpathians attain their greatest width. The plateau has rich soils and makes up the central and northwestern part of Romania. The plateau is rich in forestry and mineral resources.

Brittany Peninsula : It lies between the English Channel and the Bay of Biscay. It makes up 5 departments of France. It includes largest cities like Nantes, Brest and Rennes.

Normandy : It is a peninsula surrounded by the English Channel and is part of northern France. It includes the port of Cherbourg, and Le Havre. It is an important agricultural region for cattle rearing, apple orchards and horse breeding.

The Grampian Mountains : These are major mountains of northern Scotland and make up much of the Scottish Highlands.

The Cheviot Hills : These are Paleozoic fold mountains along the border of Scotland and England. Cheviot is the highest peak. They include some extinct volcanoes and are about 50 km in length. These are the largest area of land above 1000 m in U.K.

The Cambrian Mountains : These are the largest mountains of Wales and include many glaciated landforms. They developed in Paleozoic. They are sources of rivers Severn and Wye and the highest peak is Pumlumon.

The Thuringian Mountains : These are low hills in Thuringia state of Germany and include the Thuringia Plateau. The mountains include some volcanic rocks.

The Bohemian Forest : It is a low mountain system of Czech Republic, Austria, Germany. The mountains are densely forested and include many plateaus. Großer Arber in German section is the most prominent peak.

Mt. Stromboli : An active volcano in the Tyrrhenian Sea of the Mediterranean. It is called the Lighthouse of the Mediterranean because of its frequent eruptions. The latest eruption was in 2008.

Mt. Etna : An active volcano (Stratovolcano) in Sicily. It is the second largest active volcano and highest active volcano in Europe and rises to 3329 m. It has created volcanic plains of Catania in Sicily.

Cantabrian Mountains : Extend for 300 kms in northern Spain and are part of the Alps – Pyrenees system. The highest peak is Torre de Cerredo. The mountains include many inter-montane plateaus and are rich in iron ore. They are a divide between the coastal plains in the north and the dry Meseta plateau of the south. The most prominent pass is the Pajares Pass.

Midlands : This is part of Central England and is part of the English Lowlands. It is an important industrial region and is rich in coal / iron ore. Birmingham the second largest city of UK is part of Midlands. Geographically it is a plateau surrounded by Thames, Severn Trent and Ouse rivers. It is also an important agricultural region.

The Pennine Mountains : These are part of the Caledonian and Hercynian fold mountains of the Paleozoic era. They are the most prominent mountains of England and extend for 400 km. The Pennines are rich in coal, and iron and give birth to a large number of streams and rivers (like Tyne and Tees), Cross Fell is the tallest peak of Pennines. The slopes of Pennines are rich regions for beef / dairy cattle and sheep rearing.

The Cumbria Mountains : These are Paleozoic mountains of England and are part of Caledonian system. They are rich in coal, gypsum and limestone and include England's highest peak – Scafell Pike.

The Polders : This makes up two fifth of the landmass of Netherlands. It has a semi-arid climate and lies mostly below the sea level. Much of the Polders was reclaimed by the Dutch from sea by building many dams and dykes (to protect it from invasion by sea). The Polders includes the most productive farmlands and largest cities of the Netherlands.

The Ardennes Mountains: These are part of the Alpine system but are of low height. They extend from northern France into Belgium and Luxembourg. They have an average height of 500 m and are rich in coal and iron ore. They are densely forested.

Massif Central : It makes up the highlands of central France. It is a block mountain and is part of Hercynian fold system of Europe. It is rich in iron ore and coal.

Pindus Mountains : These separate the east and west sections of mainland Greece and are heavily forested. These are part of Alpine system. Many regions of the mountains rise to more than 2400 m above the mean sea level. The region called Macedonia includes portions of Pindus Mountains and southern Balkan Mountains with fertile valleys which include two agricultural regions of Salonika and Serral. The Pindus Mountains are rich in lignite.

Crete : It is the largest Greek island in the Mediterranean Sea with many hills / mountains and fertile valleys. It includes Knossos, the centre of ancient Minoan Civilization.

Panonian Plains : These are fertile plains in northern Croatia and adjacent Hungary. River Drava, an important tributary of Danube flows through the plains. The plains extend into northern Serbia. In Croatia, the Panonian plains include the historical region of Slavonia.

The Dinaric Alps : These are part of the Alpine fold system. They extend along the entire length of Croatia. They give birth to cold winds called Bora in winter which blow into the Adriatic Sea across the coast.

Dalmatia : This is the coastal region of Croatia between Adriatic Sea and Bosnia. It is made up of rocky cliffs and is famous for its karst landscape.

The Swiss Plateau : It is an inter-montanne plateau surrounded by the Jura mountains and Alps. It has the richest farmlands of Switzerland and most of its industries. Berne and Zurich are the important cities of the Swiss plateau.

Mt. Vesuvius : The only active volcano of mainland Europe. It is in peninsular Italy close to Naples. It's major eruption of 79 AD buried the city of Pompei.

The Appenine Mountains : These are the most prominent mountains of peninsular Italy and make up two third of the landmass of the peninsula. Those are part of the Alpine system. The prominent peaks are Monte Corno (2914 m) and Mt. Amaro (2795 m). Mt. Vesuvius is part of the Appenines. Appenines are very rich in limestone and marble.

The Lombardy Plains : These are part of the northern plains of river Po. It consists of many glacial lakes in the north. Lombardy is the richest industrial and agricultural region of Italy and includes the city of Milan.

The Meseta : It is a huge plateau of the Iberian Peninsula and makes up a major part of Spain and Portugal. It is a block mountain and belongs to the Hercynian system. The Meseta is a dry plateau and includes the Ebro river basin and Guadalquivir river basin. The Meseta has poor soils and is drained by rivers Tagus and Douro. It is crossed by some prominent mountain ranges like Sierra Gata and Sierra Gredos.

The Lorraine Plateau : This makes up northeastern France. It has the Ardennes Mountains in the north along the border with Belgium and the Vosges Mountains in the southeast. It is drained by river Moselle. The Plateau is rich in iron ore.

The Caucasus Mountains : These are part of the Alpine fold mountain system. They extend for 1200 km across Russia, Georgia and Azerbaijan. They are a divide between Black Sea and Caspian Sea. Mt. Elbrus (5633 m), the highest peak of Europe is part of the Caucasus. The mountains are rich in coal, oil, manganese, tungsten and molybdenum. They are considered to be a divide between Asia and Europe.

The Armenian Plateau : This makes up the southwestern part of Azerbaijan and a major part of Armenia. It is a rugged plateau and has many gorges. It is a volcanic plateau with an average height of 1500 m above the mean sea level. It includes river Kura basin and a large lake – Lake Sevan.

Scandinavian Peninsula: This is made up of Norway and Sweden and is surrounded by the North Sea, Baltic and Gulf of Bothnia. It is made up of geologically ancient rocks and includes the Hardanger Plateau – Europe's largest highland plain (in Norway) the Jostedal Glacier – the largest ice-field of Europe outside Iceland, and Lapland – a plateau in northern Norway and Sweden.

Lapland : It is a plateau in the northern part of Northern Europe occupying northern Sweden, Norway, and Finland, and to a small extent in Russia. It is inhabited by Lapps. It is rich in iron ore, nickel. About 40% of population in Lapp.

The Bavarian Plateau : It makes up southern Germany and most of the State of Bavaria. It includes the Bavarian Alps that merge with the Alps of Austria. The plateau shares its edge with Austria and Czech Republic. Munich and Nuremberg are major cities in the plateau. Many streams from the plateau flow into the Danube. Mt. Zugspitze (2903 m) is highest peak of Germany in the Bavarian Alps.

Lake Vanern : The third largest lake of Europe, after Ladoga and Onega and the largest lake of Sweden. It gives birth to river Gota which has been transformed into the Gota Canal waterway which connects lake Vanern with lake Vattern. The Gota river flows into Kattegat Strait. The biggest river flowing into the Lake is Klar.

The Gulf of Bothnia : It is the northern most arm of Baltic Sea and is between Finland and Sweden. It extends for 725 km north to south. Many rivers flow into it like Oulu, Ume, Lule, Angerman etc. The ports overlooking it are Oulu and Vaasa (Finland), Lulea, Sundsvall and Gävle in Sweden.

Dneister : It is born in Carpathians of Ukraine. It forms part of the border of Ukraine and Moldova. It flows for 1352 kms before entering Black Sea near Odessa. It is the second longest river of Ukraine.

The Gulf of Lion : It is an arm of the Mediterranean along the coast of Southern France. The biggest river flowing into it is Rhone and the chief ports are Marseille and Toulon. It is an important fishery region.

The Dover Strait : This is the narrowest part of the English Channel and is between the ports of Dover (U.K.) and Calais (France). It links the English Channel with the North Sea. It is about 30 to 40 kms wide and is a submerged river valley. It is one of the busiest seaways of the world.

River Seine: A major river in northern France and is born in the Langres Plateau. It flows into the English Channel via the Bay of Seine. The river has 37 bridges in Paris and the major ports at its mouth are Le Havre and Rouen. It is an important waterway of northern France.

The Ems River : It flows for 371 kms in northwest Germany and northeastern Netherlands and forms part of border of Netherlands and Germany.

The Elbe River : It is born in the Krkonose Mountains of Czech Republic and flows into Germany to eventually flow into the North Sea. It includes the port of Hamburg in its estuary. The Elbe basin is in Germany (65%), Czech Republic (34%), Austria and Poland. It's major tributaries are Vltava Saale, and Havel. Elbe basin has some of the richest farmlands of Germany.

The Weser : It is born by the confluence of Fulda and Werra and is a major river of northwestern Germany. It is born in Thuringia and flows for 744 kms before draining into the North Sea via port of Bremen.

Lake Ijesselmeer : A shallow lake which has been created by cutting off an arm of the North Sea (Zuider Zee). The Boulder Dam separates it from the North Sea. It is the largest lake of Western Europe. It is connected to Lake Ketelmeer.

Lake Constance : It is part of Rhine river valley and is shared by Germany, Switzerland and Austria. It is the third largest lake of Central Europe (after L. Ballaton and Lake Geneva): It is a source of freshwater to many cities of southern Germany. It occupies 539 square km and is 72 km long. It is a glacial lake.

Lake Geneva : The largest freshwater lake of Western Europe and has the largest volume of water in continental Europe. 40% of its basin is in France and 60% is in Switzerland. It is a glacial lake and is part of Rhone river valley. The Seujet Dam near Geneva controls the level of the lake. It is 70 km long and 15 kms wide at its widest.

Lake Maggiore : The second largest lake of Italy after Lake Garda. It occupies a tectonic basin within the Alps and is one of the sources of river Po (via river Ticino)

Lake Ladoga : The largest lake of Europe and the 14th largest in the world. It's area is 17,891 square kms and has an average depth of 51 m. It is drained by river Neva into the Gulf of Finland. It is part of the Volga- Baltic waterway.

River Shannon : Flows for 386 km and is the longest river in Ireland. It is an important waterway and flows into Atlantic via an estuary. The port of Limerick is at its mouth. It is born in Cuilagh Mountains of Ireland. It includes many lakes in its course.

River Po : Flows for 652 kms after its birth in the Alps of Italy. It is the longest river of Italy and has many important cities on its banks like Turin, Ferrara etc. It flows along 45th parallel and drains into Adriatic Sea. It is a meandering river and hence has created many ox-bow lakes.

The Tiber : The second longest river in Italy. It is born in the Apennine Mountains and flows for 406 kms and drains into the Tyrrhenian Sea. It has Vatican City and Rome on either of its banks. It is the main waterway of Rome.

Lake Garda : The largest lake in Italy and is between Venice and Milan. It is separated from Adige river by Mt. Baldo. It is 54 km long and is 18 km wide at its widest.

Guadalquivir : It is the second longest river in Spain and flows for 657 km and is born in the Cazorla Mountains. It flows into the Gulf of Cadiz of the Atlantic Ocean. It supports the agriculture of Andalusia region of Spain. The basin has one of the richest plant lives of Europe. Its plains are a rich olive growing region of Spain.

The Ebro : It is a large river of Spain and is born in the Cantabrian Mountains. It is the longest river of Spain and flows for 910 kms. It forms a delta in the Mediterranean which is rich in marshes.

Douro River : It is a major river of the Iberian Peninsula and is born in the Meseta of Spain. It flows across Portugal and Spain before flowing into Atlantic via the port of Porto. It forms part of the border of Spain and Portugal. It forms many canyons. Its basin is a rich region for wine grape cultivation.

The Tagus : Also called Tapajos, is the longest river of the Iberian Peninsula. It flows for 1038 km and forms part of the border of Spain and Portugal. It flows across Spain and Portugal after its birth in the Meseta of Spain. The port of Lisbon is at its mouth.

River Tay : The longest river of Scotland and the largest river of British Isles. It flows for 193 kms.

River Thames : The longest river of England. It flows for 346 kms and drains into the North Sea via the Thames Estuary. The port of London is on Thames Estuary. It has many famous cities on its banks like Oxford, Reading and Kingston.

River Schelde : It is born in northern France (close to Lille) and flows across Belgium into North Sea. It has Antwerp on its banks and is linked to Rhine and Meuse by canals.

River Meuse : It is born in Langres plateau of Eastern France and flows through Ardennes Highlands. It flows across France, Belgium and Netherlands into North Sea. It is called Maas in Belgium and Netherlands. Its basin is rich in coal. Liege in Belgium is on its banks.

River Moselle : It is a tributary of Rhine and is born in the Vosges Mountains of Eastern France. It flows for 513 kms and flows from France to Germany where it joins Rhine. Its plains and valleys have some rich vineyards of grape.

River Loire : The longest river of France, flows for 1050 km before draining into the Bay of Biscay. The river widens near St. Nazaire. It is connected to Saone, Rhone and Seine by Canals.

Lake Lucerne : Surrounded by forests, is a 114 sq. km lake in the Swiss plateau and looks like a cross. It is 39 km long. It has Lucerne close to its banks.

River Severn : The longest river of UK and is born in central Wales. It flows into Bristol channel.

River Oder : Flows for 855 km. It is born in the Sudeten Mountains of Czech Republic and Poland before joining river Neisse. The combined river, called older – Neisse forms the border of Germany with Poland. It flows into Baltic. The most important tributary of Oder is Warta.

Rhine : It is the most important commercial waterway of Europe. It is born in the Alps of Switzerland and flows for 1320 km before entering the North Sea. It flows along Germany – Switzerland border, then forms border of France and Germany before entering Germany. It's important tributaries are Neckar, Main, Moselle and Ruhr. The important river ports are Basel, Strasbourg, Cologne, Duisberg, and Bonn. Canals connect Rhine with Elbe, Danube, Rhone, Weser and Ems. It also flows along western border of Liechtenstein and Austria.

Danube : The second longest river of Europe with a length of 2860 kms. It is born in the Black Forest of Germany and flows across Austria, Slovakia, Hungary, Croatia, Serbia and Romania. It forms most of borer of Romania with Bulgaria before flowing into the Black Sea. It is linked to river Main of Germany by a canal which hence links North Sea with Black Sea.

Lake Como : A prominent lake at the foot of Alps in Italy in the Lombardy region. River Adda flows through it.

Minerals Resources of Europe

- A) **Coal :** Germany has some of the largest deposits of coal in Europe. The Ruhr valley has the largest reserves of coal in Germany. The Saar coalfields along Germany – France border has good quality cooking coal. The Aachen coalfield near Germany's border with Belgium is another coal deposit. Coalfields are also present close to Wiesbaden in the state of Hesse. Germany has huge lignite deposits close to Leipzig (Saxony State), Magdeberg (Saxony Anhalt State) and also in state of Saxony in the west. France has large deposits of coal in the Franco – Belgian coalfields of the river basins of Sambre and Meuse in the north. The Sambre-Meuse basin is shared by France and Belgium. France shares the Saar coalfield in the east with Germany. The Lorraine plateau has rich of reserves of coal in France. The Campine coalfields are in northern Belgium. Poland has some of the largest deposits of coal. The Silesian coalfields of Poland are part of the Carpathians and these are close to the industrial city of Katowice. These are the second largest coalfields after Ruhr in Europe. In U.K., the Penine mountains, the Midlands region, the Wales region contain some of the largest coalfields. The Penine coalfields include those at Yorkshire, Derbyshire and Nottingham. The Penine coalfields are also in the northeast in Durham and Northumberland. Coalfields of Midlands are in Staffordshire, Warwick and Leicester. In Wales, the coalfields are close to Cambrian Mountains. Large lignite deposits are in Bohemian basin of Czech Republic. The Pindus Mountains of Greece have large lignite deposits. In Ukraine, huge coal deposits are part of the Donetsk basin. The Carpathians of Slovakia, Hungary and Romania have some large reserves.
- B) **Oil and Gas :** The continental shelf of North Sea has some of the largest oil and gas deposits of Europe. UK and Norway are major countries exploiting the oil/gas reserves of the North Sea. The Carpathians of Romania have large deposits of oil near Ploiesti. Oil occurs in the Seine basin of northern France and natural gas is found in the Pyrenees region in the southwest close to Bearn. In Germany, the northern state of Schleswig – Holstein, the Hannover region in Lower Saxony state with the Elmsland fields are rich in oil. Some natural gas is found in Ruhr region. In offshore areas of Ebro basin of Spain some oil deposits are found. The Caucasus Mountains of Azerbaijan are rich in oil at Baku. In the Netherlands, some of the largest natural gas deposits are found in the northern state of Groningen at Slochteren. Netherlands has some

oil close to Hague. The Po plains of northern Italy have some large reserves of natural gas. Kharkov in Northeast Ukraine has some large reserves of natural gas.

- C) **Iron Ore** : Large deposits of iron ore are in Lorraine plateau of France, the Donestsk basin near Krivoi Rog in Ukraine, the Lapland region of Sweden near Gallivare, and Kiruna, the Cantabrian mountains of northern Spain, the Ardennes mountains of France and Belgium and the Midland region of UK near Birmingham. In Germany, iron ore deposits are in Salzgitter near Hannover (Lower Saxony State) and in Ruhr region (Ruhr – Westphalia State). The Erberz Mountains of Austria which are part of Alps have some iron ore. The Pyrenees Mountains are rich iron ore. The Carpathians of Hungary have rich deposits of iron ore.
- D) **Other Mineral Deposits** : The Erberz mountains of Austria have very large deposits of graphite and magnetite. The Pyrenees Mountains of France and Spain are rich in cobalt, lead, and silver. Lead and zinc ore deposits occur in Central Wales of UK and the Carpathians of Poland. The Ore Mountains of Czech Republic have some Uranium. The Caucasus have large reserves of tungsten, molybdenum and manganese. The Rhone valley of France is rich in bauxite. The Dnepr basin of Ukraine has some large deposits of manganese. Some of the world's largest deposits of potash and other salts are in the states of Lower Saxony and Saxony and Saxony Anhalt in Germany. The upper Ebro basin of Spain has some large potash deposits. The Pyrenees of France and Spain are rich in sulphur. The Northern Highlands of Scotland have significant deposits of copper.

NORTH AMERICA – PHYSICAL GEOGRAPHY AND MINERAL RESOURCES

Introduction : N. America accounts for about 6% world's land area. It is surrounded by Arctic, Atlantic and Pacific Oceans. The major physical features of the region are briefly discussed below :

The Pacific Ranges and Lowlands : The mountain / highland system in the west is called the Western Cordillera. This includes :

- A. **The Coast Range :** Those ranges extend about 4000 km along the west coast of N. America between Alaska through Canada and till southern California. The important ranges of this system are St. Elias Mountains, the Olympic Mountains, the Klamath Mountains, the Alexander Archipelago and the Queen Charlotte islands. Mt. McKinley, the highest mountain of N. America is part of Alaska range.
- B. **Inner Pacific Coast Mountain System :** This includes the 1) Cascade Ranges which extend from northern California till British Columbia. The Cascade Ranges are made up of volcanic rocks and include many volcanic peaks like Mt. St., Helens, Mt. Rainier, Mt. Adams, Mt. Hood and others. The Columbia river cuts through the Cascade Ranges 2) The Sierra Nevada Ranges – These are a group of block mountains and are the highlands of central California. The Sierra Nevada Ranges includes Mt. Whitney, the tallest peak of USA.

The Rocky Mountains : These are N. America's largest mountain system. The Rockies extend for 4800 km from Alaska to New Mexico. The McKenzie Ranges, Yukon Ranges (of Canada) and the Brooks Range of Alaska, the Selwyn Ranges (Canada) etc are part of the Rockies. The Rockies are called the Great Continental Divide as they separate the rivers flowing into Atlantic from those flowing into Pacific. The Rio Grande, Colorado and Missouri rivers are born in the Rockies. The most important passes of Rockies are the Yellow Head Pass and the Kicking Horse Pass (in Canada). The Fraser, Columbia rivers are also born in Rockies. The highest peak of Rockies is Mt. Elbert (in Rockies of USA). The Rockies are rich in mineral deposits like coal, oil and gas and other minerals.

The Western Plateaus, Basins and Ranges Region : This region lies between the Rockies and the Pacific Coast Ranges. The Colorado Plateau that makes up Colorado, New Mexico, Utah and Arizona is made up of sedimentary rocks and includes the Grand Canyon of river Colorado. The Yukon Plateau of Canada has pre-Cambrian rocks and is rich in minerals. It includes the Great Bear and Great Slave lakes. The Fraser Plateau of British Columbia includes Peace and Fraser rivers. The Columbia – Snake plateau in British Columbia, Washington and Oregon is a volcanic plateau and includes the basin of river Columbia and its tributary, the Snake. The Great Basin of Nevada lies between Sierra Nevada and Rockies and is a region of inland drainage with dry climate. Death Valley of California, the lowest point in the landmass of N. America, is part of this region. The Western Plateau and Ranges are very rich in gold, lead, zinc, copper and silver deposits.

The Great Lakes : The Great Lakes are the remains of the glacial sheets that covered N. America during Pleistocene Glaciation and occupy downbuckles of the N. American landmass. The Great Lakes are connected to the Atlantic by the St. Lawrence Seaway. This Seaway has been developed from the St. Lawrence river that flows out of Lake Ontario into the Gulf of St. Lawrence, an arm of the Atlantic. Within The Great Lakes, Lake Superior is the largest freshwater lake in the world. It is connected to Lake Huron by the Soo Canals. Lakes Superior is close to the iron ore deposits of Minnesota Ranges. Lake Huron is connected to Lake Erie. Lake Michigan, entirely in USA, and is the third largest of the Great Lakes. River Chicago flows out of Lake Michigan. Lake Erie is the southernmost of the Great Lakes and the fourth largest of the Great Lakes. It is linked to Lake Ontario

by the Welland Canal. Lake Ontario is the smallest of the Great Lakes and is linked to Hudson river by the Erie Canal. Great Lakes is an important waterway and oceangoing ships reach Lake Superior from Atlantic. There are many lake ports along the Great Lakes like Hamilton (in Canada) and Rochester (in New York) on Lake Ontario, Toledo, Cleveland (in USA) and Port Colborne (in Canada) on Lake Erie, Gary, Chicago (in USA) on Lake Michigan, Port Huron (in Canada), on Lake Huron and, Duluth (USA) and Thunder Bay on Lake Superior. The Niagara Falls are developed by river Niagara between Lake Erie and Lake Ontario. The St. Lawrence Seaway is 725 km long along St. Lawrence river and moves cargo from USA/Canada to Europe.

The Interior Plains : These cover much of Central Canada and Mid-western USA. These extend between Rocky Mountains to Appalachian Mountains for 2400 km. These include the Prairies of N. America and also the dry grasslands in the Great Plains towards the west. The Interior Plains in the east are rich agricultural regions while the Great Plains towards the west are rich wheat and livestock regions and also rich mineral producing regions. The Missouri-Mississippi system is the biggest river system of the Interior Plains. The other rivers are Arkansas, Saskatchewan and Canadian. The Great Plains are famous as the Wheat Belt of N. America.

The Appalachians : These are old fold mountains of the Hercynian System of Paleozoic Era. They extend for 2400 km from Maine to Alabama. Mt. Mitchell is the highest peak of Appalachians. They include Blue Ridge Mountains, White Mountains, Green Mountains the Great Smokies and the Notre Dame Mountains. The Appalachians include large plateaus like Allegheny Plateau (which is very rich in coal), the Cumberland Plateau etc. The Appalachians are very rich in coal including anthracite coal, iron ore and other minerals. A series of stream descend from the mountains into the Atlantic coastal plains creating excellent sites for hydropower generation. Many cities have come up at these sites of hydro power generation like Philadelphia, Colombia, Raleigh etc. The Appalachians are rich regions for cattle and sheep rearing.

The Interior Highlands : These are highlands of the Interior Plains and are made up of Ozark – Ouachita Mountains spreading across states of Missouri, Oklahoma and Arkansas. These are rich in lead, zinc and iron ore.

The Gulf Coastal Plains : These extend along the Gulf of Mexico from river Rio Grande to New Jersey. These cover parts of 16 states of USA and include the Mississippi delta. These are rich agricultural regions and have huge reserves of oil and gas, both onshore and offshore.

The Laurentian Shield : This is also called the Canadian Shield and extends between east coast of Canada to Great Bear and Great Slave Lakes in the west. It covers half of Canada's landmass and includes the Adirondack Mountains of USA (in the northeast part of USA). A major part of the states of Quebec, Ontario, and large areas of the states of Nunavut, Saskatchewan, Manitoba and Northwest Territories are part of the Shield. The shield is made up geologically ancient Archean rocks and is very rich in mineral deposits. The Shield terminates in the Laurentian Mountains of Quebec.

The Yukon Plateau: This is made up of pre-Cambrian rocks and covers much of British Columbia and Yukon states of Canada. It is rich in mineral deposits and includes the river basins of Fraser and Yukon rivers.

The Grand Canyon: It is a 446 km long river created by river valley created by Colorado in Northeast Arizona. It is nearly 1.5 km deep and 29 km wide. It is one of the most well developed river canyons of the world and is part of the Grand Canyon National Park.

The Great Salt Lake: It is an inland saline lake in Utah and is at an average height of 1200 metres above the mean sea level. The lake is 130 km long and 80 km wide at its widest and ranks as one of the saltiest water bodies in the world. The Southern Pacific Rail crosses the lake.

The Great Salt Lake Desert: It is a large desert west of Great Salt Lake in Utah and parts of Nevada. It is full of salt pans.

The Yellowstone National Park : This is part of the Rocky Mountains region and has the largest number of hot springs and geysers than any other area in the world. It includes the Yellowstone river and its Grand Canyon. It is the largest national park in USA and is in Wyoming.

The Great Bear Lake : It is the largest lake in Canada and the third largest lake of N. America after Superior and Huron. It is 446 metres deep at its deepest. It is connected to McKenzie river by Great Bear River. The shore areas of the lake are rich in uranium.

The Great Slave Lake : It is the second largest lake in Canada and is 480 km long. Along with Great Bear Lake, it is a remnant of large glacial lake of Pleistocene glaciation. It gives birth to McKenzie river.

Lake Athabasca : It is a large freshwater body and is also a remnant of a post – glacial lake. Rivers Athabasca and Peace flow into the Lake. Slave River flows out of Athabasca to join Great Slave Lake.

Lake Winnipeg : It is a large lake in Manitoba. It is joined to Nelson River which flows into the Hudson Bay.

Rivers of North America :

- A) **River Mississippi :** The second longest river of USA, flowing for 3766 km. It is born in the state of Minnesota and becomes widest in Illinois. It's longest and largest tributary is Missouri. It's plains are rich agricultural regions for cotton, sugarcane and rice. It is the most important commercial water way of USA. It forms a huge delta in the Gulf of Mexico.
- B) **Missouri River :** The longest river of USA and flows for 4090 km. It is born in the state of Montana in Rocky Mountains. It's basin includes of 10 states of USA and 2 provinces of Canada. It joins Mississippi in Minnesota. It is a major source of hydropower and irrigation with huge dams across it. Kansas City, Omaha and Nebraska are river ports of the river.
- C) **River Ohio :** It is an important tributary of Mississippi joining it in Illinois. It flows through some of the busiest industrial regions and rich farmlands of USA and is hence an important waterway. It is born in Pennsylvania.
- D) **Rio Grande River :** It is born in the Rocky Mountains of Colorado state. It forms the boundary of USA and Mexico for nearly 800 km. It flows into the Gulf of Mexico. It supports a large number of dams for irrigation and hydropower (like Amisted Dam, Falcon Reservoir, Elephant Butte dam).
- E) **River Hudson :** Flows for 492 kms in New York state before draining into Atlantic past the city of New York. It is connected to Lake Erie by the Erie Canal and hence is part of the Great lakes waterway. It's important tributary in Mohawk.
- F) **River McKenzie :** The longest river of Canada. It flows out from Great Slave Lake and drains into Arctic i.e. the Beaufort Sea. The basin of McKenzie is rich in mineral resources including oil.
- G) **Columbia River :** It is one of the longest rivers of western part of N. America flowing for 1954 km. It is born in British Columbia (Canada) and flows into USA after which it enters Pacific Ocean. It's largest tributary is Snake. It has many dams across it including Grand

Coulee in the state of Washington, which is one of the largest hydropower projects of the world. The Columbia is a major source of irrigation in northwest part of N. America.

- H) **St. Lawrence River:** It is called the Mother of Canada. It flows for 1320 kms and is the second longest river of Canada after McKenzie. It is born in Lake Ontario and flows into Gulf of St. Lawrence. A major part of the river has been transformed into the St. Lawrence Seaway.
- I) **River Fraser:** It is born in the Rocky Mountains and flows for 1375 kms in the province of British Columbia. It drains into Strait of Georgia, near Vancouver city. It forms an estuary at its mouth.
- J) **Yukon River :** It is born in the Rockies of British Columbia and flows across Yukon province of Canada and the into Alaska, USA. It flows for 3185 km before it drains into the Bering Sea. It forms a delta in the Bering sea.
- K) **Peace River :** It is born in the Rockies of British Columbia and flows into Alberta. It is 1923 km long and flows into the Slave River. The Slave River flows out of Lake Athabasca into Great Slave lake.

The Hudson Bay : It is an inland sea of the Atlantic and is 1690 km long and 1118 km wide. It is connected to Atlantic by the Hudson Strait and also to the Arctic Via Foxe channel. It includes the port of Churchill in Manitoba. The Hudson Bay rail links the port of Churchill with agricultural regions of western Canada.

Physical Features of Central America : It may be noted that N. America includes Greenland, Mexico, Central America and the Islands of the Caribbean Sea in addition to USA and Canada. Mexico, Central America and Caribbean islands are sometimes called Middle America, located between Anglo-America and S. America. The outstanding physical features of Central America include the following.

The Plateau of Mexico : This is made up of geologically old rocks of the pre-Cambrian eon. It is an intermontane plateau between Sierra Madre Oriental and Sierra Madre Occidental. The western edge has many active volcanoes. The plateau includes a line of volcanoes that extend east to west (called the Transversal) that include Popocatepetl (an active volcano and the second highest peak of N. America after Mt. McKinley) Paricutin (the youngest volcano of the western hemisphere that formed in 1943) and Ixtacihuatl (a dormant volcano, and the Orizaba (a dormant volcano). The plateau is very rich in mineral deposits including some of the world's largest deposits of silver ore. Lake Chapala, the largest lake of Mexico, is part of the plateau.

The Sierra Madre Occidental and Oriental : The Sierra Madre Oriental that forms the eastern edge of the Mexican Plateau is a continuation of the Rockies. It is full of tall ranges and peaks and is very rich in coal and iron ore. The Sierra Madre Occidental is part of the Pacific Coast Ranges of USA and Canada and are fold mountains. They include the Barranca Cobre Canyon of the Urique river. These include a series of block mountains and are low in height compared to the Oriental. The Sierra Madre Mountain system continues into other countries of Central America like the Sierra Madre of Guatemala (which includes Tajumulco the highest volcano of Central America), the Central Highlands of Nicaragua, the Central Mountains of Honduras, the Meseta Central of Costa Rica, Highlands of El Salvador and the Central Highlands of Panama (which are called the San Blas, the Darien and the Tabasara Mountains)

The Isthmus of Panama: This makes up the country of Panama and links North America with South America. It is 660 Kms long and is 210 Km at its widest and 45 Kms at its narrowest. The Panama Canal cuts through it centrally. The isthmus is covered with pine forests.

The Chiapas Mountains : These are block mountains in the southern part of the Tehuantepec Isthmus. They include many plains on plateau tops which are farmed by the Mayan Indians. The valley slopes are rich in coffee plantations.

The Isthmus of Tehuantepec : This is a 209 km wide strip of land that connects Yucatan Peninsula with the plateau of Mexico and is a narrow part of the Plateau of Mexico. It is rich in sulphur deposits.

The Yucatan Peninsula : This is a Plateau made up of limestones that is surrounded by the Caribbean Sea and Gulf of Mexico. It is full of Karst landforms and is a divide between the Gulf of Mexico and the Caribbean. It includes the landmasses of Mexico, Belize and parts of Guatemala. The southern part is covered by rich tropical forests.

Gulf of California: This is between the California Peninsula and Mexico. It is a rich region for oyster fishery. It receives the waters of river Colorado.

The Panama Canal : This was completed in 1914 and is one of the busiest seaways of the world. It reduces the distance between New York city (the Atlantic coast of USA) and San Francisco (the Pacific coast of USA) from 20,900 km to 8370 kms. The 81 km long canal extends from Limon Bay (Atlantic) to Panama Bay (Pacific) i.e., between Cristobal and Panama City. The Chagres river (flowing into Atlantic) has been widened to create the Panama Canal.

Lake Nicaragua : The largest lake of Central America, is in Nicaragua. It is 7925 square kms and includes many volcanoes in it. River Tipitapa connects the lake with Lake Managua.

Greenland : The landmass of Greenland is made up of the old geological rocks of Archean age and younger rock formations. This was part of the landmass of Canada and USA. The Rocky Mountains continue into Greenland and there are many prominent mountains in the landmass like Mt. Gunnbjorn, the tallest peak. Ice sheets cover 85% of the landmass and are on an average 1.6 km thick. The coastlines are of the Fjord variety. The northernmost part of Greenland is Cape Morris Jessup, the northern most land of the world (which is just 710 km from the north pole).

Mineral Resources of North America: N. America has rich reserves of the major mineral deposits. The chief resources and the distribution are briefly brought out below.

- A) **Coal :** USA has the second largest reserves of coal. The Appalachians contain huge coal deposits and account for 90% of coal output of the country. The Appalachian coalfields are in Pennsylvania, are rich in anthracite. The Eastern Interior coalfields are in Illinois, Kentucky and Indiana and have the second largest coal reserves of USA. The Gulf coast region has coalfields in Arkansas, Texas and Mississippi. The Rocky Mountains have huge deposits of lignite and bituminous coal. In Canada, coal deposits are in Appalachians of Nova Scotia. Large reserves of coal ore are in Alberta, British Columbia, while lignite reserves are in Manitoba and Saskatchewan.
- B) **Iron Ore :** The Mesabi Ranges in Minnesota have huge deposits of iron ore. Iron ore deposits are near Birmingham in Alabama, in Chattanooga in Tennessee, in Cornwall in Pennsylvania and in Adirondack Mountains of New York and in Ouachita Mountains of Oklahoma and Arkansas. In Canada, large reserves are in South Quebec and the shield areas of Newfoundland like Schefferville, Labrador City, Bell Island.
- C) **Oil and Gas :** The largest reserves of oil and gas are in the Mid-Continent Region in Kansas, Texas, Oklahoma, Louisiana and New Mexico. The Gulf Coast region is the second largest producer with oilfields (both onshore and offshore) in Texas, Mississippi, Southern Arkansas and Louisiana. The Appalachians from Pennsylvania to Tennessee had large reserves in the past which have been exploited. The Rocky Mountains include oilfields in Wyoming, Utah and Colorado.

Large reserves of natural gas in the USA are in Gulf Coastal Region of Texas and Louisiana. The shale gas potential is huge in Colorado. In the west, the oilfields are in San Joaquin Valley of California. Canada has some of the largest reserves of natural gas in Alberta and British Columbia. Bituminous sands containing oil occur in large reserves in Athabasca river valley of Alberta.

D) Mineral Deposits : Large copper deposits of USA are in Bingham (Utah), Butte Mines (Montana) Morenci and Bisbee Mines (Arizona) and small reserves in Ajo and Globe (Arizona). In Canada, the main copper reserves are in Manitoba, Ontario, Quebec and British Columbia. Large silver deposits of USA are in Butte (Montana) Coeur d' Alene (Idaho). Kimberley in British Columbia of Canada has large silver deposits. Silver deposits are also in Ontario and Yukon. Gold deposits in USA are in Klamath Mountains of California, Black Hills in South Dakota and in Virginia City in Nevada. In Canada, gold deposits are in Yukon river valley, in Klondike (Yukon Province), Kirkland (Ontario), Yellowknife (Northwest Territory) and Porcupine (Ontario). Zinc deposits of USA are in Butte (Montana) and in Canada the largest deposits are in Sullivan in Kimberley (British Columbia). The other zinc mines are in Manitoba, Yukon Territory. The other copper deposits of Canada are in Noranda (Quebec), Sudbury (Ontario), in Manitoba and Coppermine in Northwest Territories. Lead deposits of USA are in Butte (Montana), Coeur d'Alene (Idaho) and Virginia City (Nevada). Large deposits of lead are mined in southeastern Missouri. In Canada, lead mines are in Northwest Territory and Yukon. The shores of the Great Slave Lake are rich in lead and zinc. The USA has large reserves of molybdenum in Climax Mines of Colorado State. Bingham Mines in Utah also has large reserves. The USA has large deposits of sulphur in Texas, Louisiana and California and large deposits of potash are in Florida and Tennessee. Canada has some of the world's largest deposits of Uranium in Ontario and in Uranium City of Saskatchewan. The basin of Great Bear Lake is also rich in Uranium. Some of the world's largest deposits of nickel are in Sudbury (Ontario) in Canada. Canada has large deposits of platinum in Sudbury (Ontario). Tungsten mines are in Yukon Territory, Cobalt mines are in Sudbury and large asbestos deposits are in Thetford (Quebec State) and also in Matheson (Ontario).

The Plateau of Mexico and the Sierra Madre Highlands are the richest mineralized regions of Central America. The plateau region has the world's largest silver deposits. Gold deposits are in Sierra Madre Occidental. Large deposits of iron ore, silver, copper are in California Peninsula, Sierra Madre Occidental. The onshore and offshore areas along the Gulf of Mexico have large reserves of oil and natural gas in the states of Veracruz, Campeche, Tabasco. The Tehuantepec region has huge reserves of oil and sulphur.

Physical Geography and Mineral Resources of South Asia

Introduction: The Indian subcontinent and some Island regions along with Afghanistan make-up South Asia. India, Pakistan, Afghanistan and Bangladesh occupy huge area of South Asia. The most important physical features of South Asia are given below (except India).

The Hindukush Mountains: These extend for 800 kms after their birth in Pamir Knot. They form part of boundary between Afghanistan and Pakistan. The Tirich Mountains in Pakistan represent highest sections. Kohi Baba and Istornal are tall peaks of the Hindukush in Afghanistan. They merge with the Armenian Knot to join the Zagros Mountains. They are rich in mineral deposits including gemstones.

The Sulaiman and Kirthar Ranges: These are the continuation of the Himalayan folds in Pakistan. The average height of Sulaiman ranges is around 2000 m and they are cut by many passes. The Kirthar ranges are the continuation of the Sulaiman ranges with an average height of 2000-2400 meters. The Kirthar ranges continue as the Makran Coast Ranges which in turn join with the Zagros Mountains of Iran. The Bolan Pass is between Sulaiman and Kirthar ranges and connects Quetta with Indus Valley.

The Chhattagram or Chittagong Ranges: These are the highlands of eastern Bangladesh along the border with Myanmar. These are fold mountains and are of Himalayan age. They are part of the Himalayans of northeast India. The highest peak is Keokradong. The mountains give birth to Chittagong river.

The Central Highlands of Sri Lanka: Central Sri Lanka has the Central Highlands which are geologically ancient and belong to the Archean era. These are full of tall ranges and plateaus and give birth to the largest rivers of Sri Lanka. They are rich in mineral deposits like iron ore, graphite, manganese and bauxite. The prominent peaks are Pidurutalagala, (which is close to city of Nuwara Eliya) and Adams Peak (close to city of Ratnapura).

The Plateau of Afghanistan: This is part of plateau of Iran and is made up of geologically ancient Archean rocks. It is rich in mineral deposits including iron ore and gemstones. The plateau is drained by many rivers descending from the Hindukush. The plains of these rivers are rich agricultural regions.

The Baluchistan Plateau: This is part of the plateau of Iran and is located between the Chagai Mountains and the Makran ranges. It is very rich in minerals deposits, including oil and gas. It has desert character and includes many such lakes. The average height is between 500-1000 meters. The large salt lakes with marshes are Hamun-i-Mashkal and Hamuni Lora.

The Registan Desert: This is a low plain in the Plateau of Afghanistan which has a semi-desert to desert character. The region supports some agriculture and is rich in some mineral deposits like phosphates and gypsum. It is between the states of Kandahar and Helmand.

The Kathmandu Valley: The largest valley in the Himalayas of Nepal. It is located between the Greater Himalayas and Lesser Himalayas. Fertile alluvial and lacustrine soils make up the Valley. It includes the cities of Patan and Kathmandu.

The Pokhara Valley: This is the second largest valley of Nepal and is in western Nepal. It is drained by river Seti and has fertile alluvial and lacustrine soils. It has the cities like Pokhara and Lekhnath.

River Kabul: It is born in the Hindukush Mountains of Afghanistan. It flows for 700 kms before joining Indus in Pakistan. It has many important cities on its banks like Kabul, Jalalabad and Nowsheri. Its important tributaries are Kunar, Bara. The Kabul valley is a rich rice growing region of Afghanistan.

River Fara: It is born in Bayan ranges of the Himalayan Mountains and flows into a swampy region on the Iran-Afghan border. It is a major source of irrigation in western Afghanistan.

River Harirud: This is one of the longest rivers of Afghanistan flowing for 1100 kms. It is born in the Hindukush Mountains and eventually flows into Turkmenistan after flowing along the border of Iran and Afghanistan. Herat, the largest city of western Afghanistan is in the flood plains of this river.

River Helmand: It is the longest river of Afghanistan and flows into the Sistan depression along Iran-Afghanistan border. It feeds Lake Hamun and is an important source of irrigation. The Kajaki Dam, one of the biggest dams in Afghanistan, is across the rivers.

River Meghna: It is formed by the merger of Ganges, Brahmaputra and other streams which descend from the hills in the east including river Surma. It merges with Ganga and Brahmaputra near Chandpur. It flows for 264 kms before entering the Bay of Bengal.

Mineral Resources: Iron ore deposits in Pakistan are mainly in Mianwali, Sargodha, Attock and Chitral. The Central Highlands of Sri Lanka, particularly the west, have some iron ore deposits. Large iron ore deposits are in the Hajigak region of Bamiyan in Afghanistan. The main coal fields in Afghanistan are in northern region, north of the Hindukush Mountains. Kathmandu Valley has iron ore deposits. Manganese deposits are in Balochistan Plateau. The Chagai hills of Baluchistan are rich in copper. The Potwar plateau of Pakistan's northern region has oilfields at Chakwal and Dhulian. The Sui gas fields are in Sind province near Karachi. Coal deposits of Pakistan are in the Salt ranges in the north and Khost fields in Baluchistan. The Sylhet hill region of Bangladesh has oil and gas. Patia oilfields occur in the Chittagong hills region. Bangladesh has some coal deposits in Myenmensingh and Sylhet. The Central Highlands of Sri Lanka are rich in graphite, iron ore, gemstones and feldspars.

Physical Geography and Mineral Resources of Central Asia.

Introduction: The region is made of 5 countries of Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan and Kyrgyzstan. The chief physical features of the region are brought out below.

The Pamir Mountains: It is a huge mountain mass that lies mostly in Tajikistan and also borders parts of Afghanistan, Pakistan, China and Kyrgyzstan. It is part of the Alpine-Himalayan system of folds and many peaks rise to more than 6000 meters in height. The Communism Peak is the highest peak. There are many large glaciers including Fedchenko glacier. Many mountain ranges start from the Pamirs like the Hindukush, the Kunlun and the Karakorams.

The Alay Mountains: These are northern most ranges of the Pamirs where the Tian Shan and the Pamirs merge. They form the border between Kyrgyzstan and Tajikistan.

The Fergana Valley: This makes up most of eastern Uzbekistan and is surrounded by Tien Shan mountains. It is drained by river Zarafshan and includes many prominent cities like Samarkand, Bukhara, etc.

The Karakum Desert: This makes up almost entire Turkmenistan (80%). It has been formed by the Amu Darya river. It has rich resources of oil, gas and sulphur. The Karakum Canal is the main source of water for agriculture in the desert.

The Kyzyl Kum Desert: This makes up large areas in northern Uzbekistan and southern Kazakhstan. It is between Syr Darya and Amu Darya rivers. It includes many enclosed basins and some low hills. It has sizeable reserves of oil and gas, gold and salt. The desert serves as a pasture for Karakul sheep, horses and camels.

The Aral Sea: It is a saline lake along border of Uzbekistan and Kazakhstan, east of the Caspian Sea. The lake is one of the largest inland water bodies in the world. It receives the waters of the two largest rivers of Central Asia, the Syr Darya and the Amu Darya.

Lake Balkhash: This is a large lake in Kazakhstan. Most of the lake is a freshwater lake and it receives the water of many rivers. It occupies an area nearly 17000 square kms.

Amu Darya: It is one of the largest rivers of Central Asia and flows for nearly 2500 kms. It is a result of merger of Panj and Vaksh rivers. It forms the border of Afghanistan with some Central Asian countries (Tajikistan, Uzbekistan and Turkmenistan). It flows into the Aral Sea. It forms the borders between Karakum and Kyzyl-Kum deserts.

The Syr Darya: It is another long river of Central Asia whose basin is shared by Kazakhstan, and Uzbekistan. It's main tributary is Naryn. It flows into the Aral Sea. It is a major source of irrigation to vast areas in Central Asia.

Mineral Resources: The most important mineral resources of Central Asia are oil and gas. The largest gas reserves are in Turkmenistan and Kazakhstan. Oil fields are part of the deserts. The Pamir Mountains, the Alay Mountains and the Tien Shan Mountains have rich resources of some metallic minerals like copper, iron, lead and zinc. The largest coal fields are in Kazakhstan in the Qaraghandy region. The Precambrian rocks below the deserts that make up the plateau of Central Asia are rich metallic and non-metallic mineral deposits.

PHYSICAL GEOGRAPHY AND MINERAL RESOURCES OF SOUTHEAST ASIA

INTRODUCTION: Southeast Asia covers 9% of the landmass of Asia. Ten independent countries make up most of Southeast Asia. Five of them- Myanmar, Cambodia, Laos, Thailand, Vietnam and the Peninsular Southeast Asia. Malaysia lies partly on the island of Borneo. Brunei is completely part of Borneo. The Philippines and Indonesia are made up of islands. The main physical of Southeast Asia are briefly given below.

The Shah Plateau, this makes up entire eastern part of Myanmar and is made up of Precambrian rocks. The Salween river cuts through the Plateau contrary. The plateau is rich in mined deposits and gemstones.

The Siam Plateau, this makes up the northern and northwestern part of Thailand and is locally called Khorat Plateau and is made up of Precambrian rocks. It has rocks to south mountains and valleys (of river like Ping, Wang, Yam and Nam river). The Plateau terminates in the Tennessee mountains in the west and Luang Prabang mountains in the east. It is last in rich in mineral deposits.

The Laos Plateau, this makes up northern part of Laos. It is broken by valleys of Mekong, Pra, Chu and Ca levees. It is actually the Southern part of Yunnan Plateau of China and is rich in minerals.

The Arakan yoma mountains, these are tertiary fold mountains of the Alpine-Himalayan system. Pat Victoria is the highest point. These extend till the coast of Bay of Bengal.

The Pegu Yoma mountains, these are branches of the Arakan yoma and separate Irrawaddy Valley from Sittang Valley of lower Myanmar. The pupa is a prominent peak of these mountains.

Tennesserian mountains, these are part of the alpine-Himalayan system and extend along Thailand-Myanmar Borders. Pat Khat and Aung Than peaks.

The Annamite Range, these extend for 1100 km through Vietnam, Laos and a small part of northeastern Cambodia. Niguel Lin is the highest point. Bolaven Plateau, Nakai Plateau, and Phouane Plateau are part of the ranges.

The Barisan mountains, these are tertiary fold mountains which are part of many islands like Java, Sumatra, Borneo and Philippine islands. They are made up of many active and extinct volcanoes. They make up the ranges of Sumatra, Java, Kalimantan in Borneo and many islands of the Philippines and surface expressions of the submerged Burien mountains.

The Greater Sunde Islands, these islands include the large islands of Indonesia like Borneo, Sucawasi, Java and Sumatra. Borneo is the 3rd largest island of the world (after Greenland and New Guinea). It is covered by thick tropical rain forests (It includes Kapuas river the longest rivers of Indonesia).

The lesser Sumde Islands, these are around 6 islands that include Bali, Hores, Lombok, Sumba, Sumbawa and Timor.

The Isthmus of Kra, this is a land bridge that connects peninsular Malaysia with mainland Asia. The eastern part is part of Thailand, and the west is part of Myanmar. It is bound by the Gulf of Thailand

and the Andaman sea. (The Isthmus named after the town of Kea buri in Thailand). It is 40-50 km wide, at its northwest.

The Gulf of Thailand or seam, this is the C body of water surrounded by Cambodia, Thailand and Vietnam. It is low in Salinity. The Chao Praya is the main river that empties into the Gulf of Thailand.

The Johor Strait, this separates peninsular Malaysia from Singapore islands. Singapore island is linked by rail/road to the city of Johor in peninsular Malaysia.

The Malacca strait, this is between peninsular Malaysia and Sumatra. It is nearly 800 km long and at the narrowest is 65 km. It connects the Andaman Sea with South China sea.

The Sunda strait, this is between Java and Sumatra Islands. This includes the volcanic mountains of Krakatoa.

The Makassar Strait, it is between Borneo islands and Sulawesi Islands. It joins the Java sea with Celebes sea.

The Karimata strait, this is between Sumatra and Borneo. It connects the South China Sea with Java sea and is 150 km long.

Rivers of Southeast Asia:

River Chao Praya, it is born from confluence of Ping and Plate river in Thailand. It flows for 372 km through the fertile plains of central Thailand which support rich agriculture of rice and sugarcane. Bangkok is located on the banks of Chao Praya.

Red river, It is the principal river of north Vietnam and is born in China. It flows for 1200 km before entering the Gulf of Tonkin. In which it forms a delta. It has the city of Haiphong on the banks.

The Mekong river, this is the largest river of Indo-China peninsular and flows for nearly 4000 km. It is born in the Tibetan plateau and forms part of borders of Thailand and Laos, Myanmar. Laos flows across Cambodia and Vietnam. It flows into the South sea from Vietnam and forms a huge delta. Phnom Penh the capital of Cambodia and Vientiane the capital of Laos are on its banks.

River Salween, this is born in Southeastern Tibet and flows through the Shan Plateau of Myanmar. It drains into the Gulf of Martaban.

River Irrawaddy, it is born in the highlands of northern Myanmar and flows across central Myanmar. Its major tributary is Chindwin. Mandalay, Myingyan, Bhamo are the chief towns on its banks. The port of Yangon (Rangoon) is at its mouth in the delta.

Mineral resources of southern Asia, oil and gas deposits are in the islands of Sumatra close to Medan. Sarawak has large natural gas fields. The offshore areas of the kingdom of Brunei are rich in oil and gas. The Gulf of Martaban and the Gulf of Thailand also have rich resources of oil and gas. The Large Tin deposit are in Kinta valley of Peninsular Malaysia and in Kalimantan state of Indonesia in Borneo islands. The islands of Java are rich in oil, natural gas, gold and silver. Kalimantan state has large deposits of gold, diamonds, tin, iron ore and copper. The island of Mindanao of Philippines has rich resources of copper and nickel. Gold and copper deposits occur in islands of Luzon in the Philippines. The Shan and the Khorat Plateau are of Myanmar and Thailand respectively have large reserves of iron ore, lead, zinc, silver, and gemstones (like rubies and sapphires).

Physical Geography and Mineral Resources of Russia

INTRODUCTION: Russia is the largest country in the world by area (twice the size of Canada). It has coastlines along Baltic, Black, Caspian and Pacific. It stretches 9650 kms east to west and 4500 kms north to south. The chief regions of Russia and their physical features are briefly discussed below.

The European Plain: This is part of the Great European Plains. It is on top of the Russian Platform and its southern edge terminates in the Caucasus Mountains and the Caspian Sea lowlands. Its average height is about 180 meters above the mean sea level. The European Plains are drained by Volga, N.Dvina, Pechora and other rivers. It includes the lakes of Onega and Ladoga in the northwest. The Volga basin and Pechora basin within the region are rich in oil and gas.

The Ural Mountains: These stretch for 2400 Kms and are part of the Hercynian folds. The Urals extend from Arctic Circle to Kazakhstan. Mt. Narodnaýa is the highest peak. The Urals region is a mineral rich region and is heavily industrialized with large industrial cities like Chelyabinsk and Yekaterinberg. The Urals are an Asia-Europe Divide.

The West Siberian Plain: This is part of the Siberian Plateau (a Volcanic Plateau). The average elevation of the plain is 150 meters above the Mean Sea Level. It is the largest level tract of land in Russia. It has fertile glacial soils in the north. It is drained by river Ob and its tributary Irtysh. It is very rich in natural gas.

The Central Siberian Plateau: It is made up of geologically ancient rocks and includes a series of plateaus, rift valleys and fold mountains. The Sayan Mountains, the Baikal Mountains and the Altai ranges are the principal fold mountains which are part of Paleozoic fold systems. Yenisey is the principal river of the region and the plateau is very rich in mineral deposits. Thick Pine forests cover much of the plateau.

The East Siberian Highlands: This is made up of a series of plateaus with geologically ancient rocks and plateaus. It includes the Chukchi Peninsula and the Kamchatka Peninsula and many active volcanoes. It is very rich in mineral deposits. Lena is the principal river of the region. The principal mountains are the Stanovoy, the Anadyr and the Verkhoyansk Ranges.

Lake Ladoga: This is the largest lake of Europe. It is part of a fault basin and occupies an area of 17,703 sq Kms. It is connected to the Lake Onega by canals and rivers. (Lake Ladoga drains into Lake Onega by the Svir river). It is part of the canal system that links the Baltic Sea with the White Sea.

Lake Peipus: It is along Russia's border with Estonia and is 150 Kms long. It also occupies a fault Basin.

Lake Baikal: It is the deepest lake in the world and holds the world's largest quantity of freshwater. It is 1620 meters at its deepest point. It is part of a rift Valley and is 636 Kms long and 79 Kms wide. River Angara is born from Lake Baikal. Its average depth is 1300 meters below the Mean Sea Level.

Sakhalin Island: It is the biggest island of Russia in the Pacific and is 970 Km long and 160 Km wide. It is covered by dense forests of Pine and Spruce. It is rich in coal, oil and natural gas.

Novaya Zemlya: These are two islands of Russia in the Arctic with rich reserves of coal. It is used for nuclear tests by Russia.

Franz Joseph Land: It is an Island of Russia in the Arctic. It is the most northerly land in the eastern hemisphere.

New Siberian Islands: This is a group of Islands of Russia in the Arctic Ocean. They divide the Laptev Sea, from the East Siberian Sea. The Laptev Strait separates the Siberian mainland from the New Siberian Islands.

Rivers of Russia: The major rivers of Russia are:

Volga: It is the longest river of Europe flowing for 3530 Kms. It drains into the Caspian Sea and forms a delta. The Volga basin has rich reserves of oil and gas. Canal links it with Don river. It has many dams for hydropower across it and has some of the most important industrial cities of European Plain of Russia on its banks like Volgograd, Nizhny, Saratov, Kazan, Samara etc.

Ural River : It is born in the Ural Mountains region and is 2527 Km long. It flows into Kazakhstan (from Russia) and then into the Caspian Sea.

Don River: It is a major river of Russia that flows into Black Sea via the Sea of Azov. It flows for 1963 km. The city of Rostov is on its banks and its most important tributary is Donets.

River Ob: It is born in the Altai Mountains of western Siberia. It flows for 3650 Kms across Siberia into Arctic Ocean via the Gulf of Ob. It is an important waterway of Siberia for many agro products.

Yenisey River: It is born in the Sayan Mountains. It flows for 4093 km and drains into the Kara Sea (an arm of the Arctic). The Trans-Siberian rail crosses the river. It has huge dam for hydropower at Krasnoyarsk.

River Lena: The longest river of Russia. It is born in the Baikal Mountains and flows for 4400 Kms before draining into the Arctic. One of the largest cities of Siberia, Yakutsk is on its banks. Aldan is the most important tributary.

River Amur: It forms at the border of China and Russia. It flows for 4416 Kms, a major part of which is along the Russia-China border. It flows into the Pacific close to Sakhalin. Its important tributaries are Shilka, Ussuri, Sungari etc.

Mineral Resources of Russia: Large iron ore deposits are in Angar Basin, the Kursk Magnetic Anomaly which is in European Plain, the Kuznetsk basin in Siberia at Gornaya Shorea and the Ural Mountains. Large coal deposits are in Pechora basin, Kuzentsk basin, the Tunguska basin of Siberia and the Lena basin. Moscow-Tula basin has large reserves of lignite. Large oilfields of Russia are in the Volga basin, particularly close to Perm, the Ob basin, the Lena basin and the offshore/onshore areas of Sakhalin Islands. The largest natural gas resources of Russia are in the West Siberian plain and the other large deposits are in Volga and Pechora basins. Large gold deposits of Russia are in Kolyma river basin, the Aldan basin, the Chukchi Peninsula and the Lena basin. The Ural Mountain region is rich in a variety of mineral deposits like copper, nickel, platinum, bauxite and iron ore. Kola Peninsula is rich in nickel and phosphates. Diamond deposits are in Kolyma basin, Aldan basin.

SOUTH AMERICA – PHYSICAL FEATURES AND MINERALS RESOURCES

Introduction : It is the 4th largest continent by area after Asia, Africa, and North America, covering about 12% of world's land surface. The land surface of S. America broadly resembles that of N. America. The major physical features of the continent are :

Andes Mountains: These constitute the longest and largest mountain systems of S. America. They stretch from Venezuela to Tierra del Fuego islands for 7200 km. The Andes are young fold mountains of the Tertiary Period like the Himalayas. They constitute the world longest chain of mountains above the mean sea level. They are 800 km wide at the widest and many Andean Peaks rise to above 6.1 km in height. The Central Andes are the broadest and many plateaus of Peru and Bolivia are part of this section. The Central Andes include prominent mountain peaks like Cotopaxi, Chimborazo, Huascaran etc. Many peaks are volcanic and some of them are active like Cotopaxi. The chief headstreams of Amazon, Orinoco and Parana rivers are born in the Andes. The Andes are very rich in copper, gold, silver, tin, platinum and mercury. They include Uyuni, the world's largest reserve of lithium and Yanacocha gold mine, the world's largest gold mine, in Peru.

The Guiana Highlands : These cover northern part of S. America, north of Amazon basin, and are made up of pre-Cambrian rocks with rich mineral deposits. These are the highlands of Guyana, Suriname, French Guyana, north Brazil and parts of Venezuela. The tributary of Amazon, Branco River divides the Highlands into western section (Sierra Pacaraima) and eastern section (Tumalcumaque Highlands). Mt. Roraima is the highest point of Guiana Highlands.

The Brazilian Highlands : This makes up the Brazilian Plateau and reaches great heights towards the east coast. The Brazilian Highlands are made up of pre-Cambrian rocks and are rich in mineral deposits. These cover nearly a fourth of the landmass of S. America. Pico Bandeira is the highest point of the Highlands. Much of the Highland is made up of low hills and plateaus. The Brazilian Plateau west of river Parana is called the Mato Grosso Plateau. Most streams of the plateau flow inland into Parana basin except river Sao Francisco which descends from the plateau to flow into Atlantic. The Great Escarpment is the edge of the Brazilian Highlands along the Atlantic Coast.

The Patagonia Plateau : This is a volcanic plateau and is geographically an inter-montane desert. The desert has alternate plateaus and mountains separated by river valleys and canyons. It has some of the world's best preserved petrified forests. It has many glacial, riverine and volcanic features. Underneath the volcanic plateau, crystalline rocks of Precambrian make up the crust.

The Atacama Desert : This extends for 970 km from northern Chile to southern Peru along the coast. It is one of the driest deserts in the world with an average yearly rainfall of 1.3 cm. There are many salt lakes (called Salares). The desert is located on top of an Andean Plateau. It is rich in minerals of copper, gold, silver, iron, boron, lithium, potassium and sodium nitrate. Arica in Chile in the Atacama desert boasts of the world record for the lowest rainfall on earth's surface.

The Amazon Basin: This is the river basin of Amazon and is part of equatorial latitudes. It is between Guiana Highlands and Brazilian Highlands. It is the largest river basin of the world and covers 40% of the landmass of S. America. Much of the Amazon basin is a low lying plain around above the mean sea level. The Amazon river (world's longest river) drains the basin along with its large tributaries like Negro, Madeira etc. The Amazon basin includes the world's largest expanse of tropical rainforest

called the Selva. This is in Brazil, Bolivia and Peru. The Amazon basin is connected to the Orinoco basin of Venezuela.

The Altiplano Plateau : This is the highest plateau within Andes and is an inter-montane plateau. Much of the plateau is in Bolivia and a part of it is Peru. The plateau is rich in mineral deposits. It includes L. Titicaca, the world's highest navigable lake. The plateau accounts for 40% of the population of Bolivia.

The Llanos : These are tropical grasslands of South America, north of the Amazon basin. These lie between Guiana Highlands and Andean Highlands. They are in the Orinoco river basin extending from Columbia along the course to its delta in the Atlantic.

The Pampas: These are temperate grasslands of Argentina and Uruguay. They include a diversity of grass species. The grass is evergreen and forms large clumps. The Pampas are part of a fertile plain with good soil. They include two-third of population of Argentina and 20% of its land. It is a major agricultural region for wheat, maize and livestock rearing.

The Campos: These are Savana like grasslands in parts of Paraguay, Uruguay, northeastern Argentina and a large area of the Brazilian Highlands. The region is made up of large expanses of tall grass with scattered trees, many of which are Acacias. It is a major agricultural region for some food crops and for cattle, sheep and horse rearing.

The Gran Chaco Region: This is a region with marshes and tropical grasslands. The Gran Chaco occupies a major part of Paraguay, northern Argentina and significant areas of southern Bolivia. The region is between Parana river in the east and Andes in the west. The region is a low lying plain. This grass is coarse and occurs in the form of separate clumps. The region is devoted to cotton cultivation and cattle. The region occupies a synclinal valley between the Andes and the Brazilian Plateau. Braided channels, ox-bow lakes and swamps dominate the landscape of the Gran Chaco.

The Rio de La Plata Basin : This is a huge basin that includes the valleys and floodplains of rivers Paraguay, Uruguay and Parana. The basin opens into the Atlantic via an estuary which extends for nearly 270 kms inland. The estuary is the channel for the flow of Uruguay and Parana rivers into the Atlantic. The estuary includes some important port cities like Montevideo and Buenos Aires.

River Amazon : This is the longest river of the world. It carries the largest quantity of water among all rivers of the world. The river occupies the nearly flat Amazon basin and hence is navigable for its entire length of 3158 km in Brazil. It forms a huge delta in the Atlantic and has a huge river island at its mouth called Marajo. Ocean going ships can reach the port of Iquitos in Peru along Amazon from the Atlantic.

River Parana : It is the second longest river of S. America. It is born in the Great Escarpment due to the merger of Paranaiba and Rio Grande. The river forms part of the border of Paraguay and Argentina and also part border of Brazil and Paraguay. It flows into Atlantic from Argentina via Rio Plata Estuary.

River Paraguay : This is the longest tributary of Parana. It is born in south central Brazil and flows across Paraguay to join Parana close to Argentina-Paraguay border.

River Uruguay : It is born in southeastern Brazil. It forms part of the border of Brazil and Argentina and entire border between Argentina and Uruguay. The river widens to form a lake before entering Rio Plata estuary.

River Sao Francisco : The third longest river of S. America. Its entire length of 2914 km is in Brazil. It is born in the Brazilian Highlands of Minas Gerais State. The Paulo Alfonso Falls are formed by this river. The Sao Francisco is a major source of irrigation for eastern Brazil.

Orinoco River : It is born in Guiana Highlands of Colombia close to Colombia – Brazil border. It flows for 2666 kms and drains into the Atlantic. It forms part of the border of Colombia and Venezuela. It is the main river of the Llanos of S. America. It forms a huge delta beginning on the seaward side of the city of Barancas.

Angel Falls : The highest waterfall in the world with a drop of 979 m. The water falls into Churun river from the Tepui mountains.

Cuquenán Falls : This is formed by river Cuquenán in Venezuela and is one of the highest waterfall in the world.

Iguacu Falls : These are developed by river Iguacu near Brazil – Argentina border. The drop of water is 72 metres.

Lake Maracaibo : This is the largest lake of south America. It is connected to the Caribbean Sea by the Gulf of Maracaibo. It is rich in oil and gas.

Mirim Lake : A lagoon along the border of Uruguay and Brazil. A sand bar has developed the lagoon.

Patos Lagoon: This is the largest lagoon of Brazil. It include the port city of Porto Alegre.

Lake Titicaca : This is a 180 km long and 72 km wide lake and lies in the Andean Highlands at height of 3812 m above the MSL. It is connected to Lake Poopo of Bolivia.

MINERAL RESOURCES OF SOUTH AMERICA: The following gives a brief account of the mineral resources of South America.

Iron Ore : Brazil has the largest reserves of iron ore in the continent. The two major reserve regions are Itabira and Carajas, in the states of Minas Gerais and Para. In Venezuela, which is the second largest producer of iron ore in S. America, the biggest deposits are in Cerro Bolívar in Guiana Highlands. El Tofo in northeastern Chile have large reserves of iron ore. The other significant reserves are in Peru (Acari and Marcona mines). The other significant reserves are in Peru and Colombia in the Andes.

Manganese : The Lafayette region of Minas Gerais and the Ampa regions in northern Brazil are principal deposits of manganese. Small reserves of manganese are in Andes of Argentina.

Copper : S. America contributes to the largest copper ore output in the world. Largest deposits of copper in Chile are in the Andes mountains. The major deposits in Chile are in Chuquibambilla, El Teniente and Portrerillos. Cerro de Pasco is a major copper field of central Peru in the Andes. The other important deposits are Morococha and Casapalca. Carajás in Bahia state of Brazil has some large deposits of copper.

Bauxite : Brazil has large reserves of bauxite in Minas Gerais and in the Amazon basin. The other large deposits are in Suriname, Guyana and Venezuela in the Guiana Highlands.

Tin : Most of South America's tin ore reserves are in Bolivia and Brazil. In Bolivia, tin deposits are in a belt between Oruru to Potosi in the Andes and in Brazil, largest reserves of the country are in Amazon basin.

Silver : Cerro de Pesco in Peru is a major silver ore producing region. In Chile, silver is obtained as a by-product of copper mining in Chuquicamata, Portrerillos and El Teniente. Potosi in Bolivia is another major Silver producing region.

Gold : The Andes of Colombia and the Brazilian Plateau in Minas Gerais, Mato Grosso states of Brazil have large gold deposits of S. America. Peru also produces gold from the Andes.

Other Mineral Deposits : Large deposits of Mica are in Minas Gerais state of Brazil. Diamond deposits of S. America are mainly in the Brazilian Highlands in the states of Minas Gerais, and Mato Grosso. The Brazilian Highlands and Guiana Highlands have significant deposits of uranium.

Coal : S. America is relatively poor in coal resources. Cali, Bogota and Medellin are regions of rich coalfields in Colombia which is the largest producer of coal in South America. The coalfields of Chile are close to Concepcion. In Brazil, the important coalfields are in the states of Santa Catarina, Sao Paulo, Rio Grande and Parana. Some coalfields are part of Patagonia Plateau of Argentina.

Oil and Gas : The richest reserves of oil and gas are in the Orinoco basin and the Gulf of Maracaibo in Venezuela. Temblador, Officina, Guarico and Barinas are important oilfields of the Orinoco basin. In Colombia, the chief oilfields are in Magdalena river basin and the Maracaibo plains. The offshore areas of Brazil along Rio de Janeiro and Amazon delta are the principal oilfields. The Amazon basin of Ecuador has rich reserves of oil. In Argentina, Comodoro Rivadavia fields in the south are major fields. Eastern Bolivia has large oilfields at Camiri, Rio Bermejo and Sanandita. The upper Amazon basin of Peru has the principal reserves of oil and gas.

SOUTHWEST ASIA: PHYSICAL GEOGRAPHY AND MINERAL RESOURCES

Introduction: Southwest Asia covers 16% of the landmass of Asia. It includes the countries of the Arabian Peninsula, Afghanistan (though Afghanistan is really the land bridge between south Asia on one hand, and Central and West Asia on the other), the Caucasus countries of Azerbaijan, Georgia and Armenia, Iran, Iraq, Syria, Israel, Lebanon, Jordan, and Turkey. The outstanding physical geography of Southwest Asia is its system of deserts and rugged mountains. The following gives a brief review of the salient features of the physical geography of Southwest Asia.

The Arabian Peninsula: This is a vast desert and bounded by the Red Sea, the Persian Gulf, the Arabian Sea and the Gulf of Oman. The countries of the Peninsula are Saudi Arabia, Yemen, Oman, Qatar, Kuwait, and the UAE (a federation of 7 countries). The Arabian Peninsula includes the following physical features:

- a) **The Arabian Plateau :** This is a volcanic plateau. It occupies much of interior Saudi Arabia. It is made up of basaltic rocks
- b) **The Rub-al-Khali:** This is a vast desert and is the world's largest area of sand deposits. The desert enters Yemen and Oman. The northern part of the desert is called An Nafud while the central part is called Najd. The western part of the desert (i.e. the western edge of the Arabian Plateau) towards the Red Sea coast is called the Hejaz in the north and the Asir in the south. Rocky mountains rise along the Red Sea Coast in the north (Hejaz). The narrow coastal plains along the Red Sea are called Tihamah.
- c) The Eastern Lowlands of the Arabian Peninsula are along the Persian Gulf and have many fertile Oases. These are called the Hasa Lowlands.

The Anatolia Plateau : This makes up Asiatic Turkey. It is surrounded by the Pontic and Taurus Mountains and is made up geologically old rocks and is rich in mineral deposits. The Armenian Knot is the highest point of the Plateau. The plateau has fertile plains of many rivers. Lake Van Gulu, one of the saltiest lakes of the world, part of the plateau. The Anatolia Plateau is separated from Europe by the Marmara Sea, the Bosphorus Strait and the Dardanelles.

The Pontic and Taurus Mountains : These are fold mountains and belong to the Himalayan-Alpine system. They radiate west from the Armenian Knot. (They are the western continuation of the Hindukush Mountains via Elburz Mountains of Iran). The Pontic Mountains are richly forested and their slopes towards the Black Sea receive heavy rainfall. The Taurus Mountains slope towards the Mediterranean. Tigris and Euphrates rivers are born in the Taurus Mountains.

The Plateau of Iran: This is made up of geologically old rocks and lies between the Hindukush and Elburz Mountains in the north and the Zagros Mountains in the south. The central and eastern parts of the plateau have deserts and saline lakes. The two deserts of the Plateau are Dasht Lut (which occupies a volcanic plateau) and Dasht Kavir. The Kavir is also part of a basin north of Dasht Lut and has many salt marshes.

The Mesopotamian Region : This occupies parts of southeastern Turkey, eastern Syria and most of Iraq. It is made up of basins of Tigris and Euphrates. (It extends between Taurus Mountains to Persian Gulf and Zagros Mountains to Syrian Desert in the west). Towards the Persian Gulf, the Mesopotamian region is a low marshland with rich oilfields.

The Zagros Mountains: These are part of the Alpine-Himalayan System of folds and are the westward continuation of Makran Ranges of Pakistan into Iran. The Zagros Mountains are the most rugged mountain systems of Iran and are rich in mineral deposits. These slopes in central and northern parts have fertile agricultural valleys. They continue into Southeastern Turkey and Azerbaijan. The highest peaks are Zard Kun and Mt. Dena.

The Elburz Mountains : These are prominent fold mountains at the northern edge of the plateau of Iran. They are the continuation of the Hindukush into Iran. Mt. Damavand is the highest peak. The northern slopes of Elburz overlooking the Caspian Sea receive heavy rainfall. They join the Zagros Mountains in the Armenian Knot.

The Syrian Desert: It is a star shaped desert (occupying a plateau). It extends from the An Nafud desert of Saudi Arabia to Syria and occupies large areas of western Iraq and Syria. The desert slopes towards the Euphrates (which forms its eastern boundary). It has an average height of 600-900 meters above the MSL. It includes the Oasis of Palmyra.

The Persian Gulf : It is an 800 km long and 200 km wide sea between Iran and the Arabian Peninsula. It is an arm of the Indian Ocean and is linked to the Gulf of Oman by the Strait of Hormuz. The strait has the Iranian port of Bandar-e-Abbas. The Persian Gulf has nearly 40% of world's proven reserves of oil. The countries overlooking it are Saudi, Bahrain, Qatar, Oman, Iran, Iraq, UAE and Kuwait.

The Jordan Rift Valley : It is part of the East African Rift valley. It includes the Dead Sea and the Jordan River Valley. It separates the east and west banks of Jordan River. The valley floors are rich agricultural regions for fruits and vegetables.

The Dead Sea : It occupies the Jordan Rift Valley. It is one of the saltiest lakes of the world. It occupies 1040 sq. km and is 80 km long. The deepest point is 799 meters below the MSL.

The Transjordan Plateau : This makes up a major part of Jordan. It is made up of geologically ancient rocks and rises steeply from the Jordan Rift Valley. It has the largest cities of Jordan and its best farmlands.

The Judeo-Galilean Highlands : This make up central and northern Israel. The Galilee Highlands in the north have the highest mountains of Israel including Mt. Meron. The Judean Highlands are in the West Bank region and include low hills.

The Negev Desert : This makes up southern Israel. It has a desert character and is made up of low hills and plains. It is rich in salt deposits and copper. It is a plateau at an average height of 300-600 meters above the MSL. It stretches along the Gulf of Aqaba.

The Armenian Plateau : This makes up entire Armenia and Southwest Azerbaijan. It extends between Caucasus Mountains and eastern Turkey. It is a volcanic plateau and is made up of rugged mountains and river valleys. Its highest point is Mt. Ararat.

The Caucasus Mountains : These are rugged mountains and are part of the Alpine-Himalayan system. They run across Georgia, Azerbaijan and Russia. They are a divide between Black Sea and Caspian Sea. Mt. Elburz is the highest peak. The mountains are rich in oil, manganese, tungsten and molybdenum.

The Lebanon Mountains : These are fold mountains which extend for 160 km in Lebanon and Syria. The highest point is Qurnat Sawda. The slopes are used for irrigated farming of fruits and vegetables. The mountains are covered by rich Oak and Pine forests.

The Anti – Lebanon Mountains : These run from Lebanon into Syria (with a major part being in Syria). They run for 150 km and merge with the Golan Heights Plateau.

The Bekaa Valley : It is a fertile valley with the plains of rivers Orontes, Hasbani and Littani. It is between the Lebanon and Anti-Lebanon Mountains and is a rich agricultural region.

River Tigris: This flows for 1900 km after its birth in the Taurus Mountains of Turkey. It was a source of irrigation for Mesopotamian cities. It includes the cities of Tikrit and Baghdad on its banks. The basin of Tigris has rich oilfields.

River Euphrates : This is the longest river of West Asia flowing for 2736 km. It is a major source of irrigation for Syria, Iraq and Turkey. It is born in the Taurus Mountains of Turkey. Euphrates and Tigris join to give birth to Shatt-al-Arab River which flows into the Persian Gulf. A canal links Euphrates and Tigris. The Euphrates is born due to the merger of Karasu and Murat.

The River Orontes : It is a major river of Syria. It is born in the Anti-Lebanon Mountains and forms a huge gorge. It widens to form lake Homs. It flows into Mediterranean past the town of Samandegi.

River Jordan: It is born close to Mt. Hermon in Syria. It flows for 160 km and its course is mainly confined to the Jordan Rift Valley. The northern stretch of the river forms the border between Israel on one hand and Jordan and Syria on the other. It flows into the Dead Sea.

Mineral Resources:

Iron ore: Turkey is the largest producer of iron ore in West Asia. Large iron ore deposits are in Camdag, near Sea of Marmara and in Tarbali. Iran has large iron ore deposits in the neighborhood of Isfahan, Kerman, in Elburz Mountains in the northeast and in Anarak basin in the Kavir desert. Iron ore in Saudi Arabia is mined near Jeddah. Some iron ore is mined in Kurddagh region of Syria.

Chromite : Turkey is the largest producer of Chrome ore. Large deposits are in Southeast in Guleman region, in Bursa region along the Aegean coast and in Antalya region close to the Mediterranean coast. The other deposits are close to the cities of Iskenderun and Eskesehir. The main chromite deposits of Iran are in Khorasan State in the vicinity of the Elburz Mountains.

Copper: Turkey is the biggest producer of copper ore. The large deposits are in Southeastern Turkey in Madani Mines, and in Murgur Mines (which are close to the border with Russia along the Black Sea). In Iran copper is mainly mined in Khorasan at Sar Cheshmah and in Birjand in the east. Some copper is also produced by Caucasus Mountains of Azerbaijan.

Other minerals: Huge reserves of rock phosphate are in the Trans-Jordan Plateau of Jordan. The biggest mine is in Shedilya. The other large deposits of rock phosphate are in the Syrian desert of Syria and in the West Bank region of Israel.

Coal: Turkey is the largest producer of coal in West Asia. Large coal deposits in Turkey are along the Black Sea coast. In Iran, large coal deposits are in the vicinity of cities of Tehran and Kerman.

Oil and Gas: West Asia has two-thirds of world reserves of oil and has some of the largest reserves of natural gas in the world. Major oil fields are within the continental shelf of the Persian Gulf. Saudi Arabia has the largest reserves in West Asia and most of its oil fields are in the state of Hassa along the Persian Gulf. The Ghawar field in the region is one of the biggest field in the world. Iran has huge reserves in the Khuzestan region in the neighborhood of Masjid-i-Suleman. The other large fields are in the neighborhood of Qum near Tehran. In Iraq, the biggest oil fields are in the Kirkuk and Mosul regions in the north and also in Burgan in the south. The Dhukan oilfield is a large reserve in Qatar. The Aalif field of Yemen, offshore areas of Bahrain, Heletz and Negba regions of Israel and offshore areas of Oman are other important oilfields. Qatar has the largest gas reserves in west Asia.

