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Q1 what is development. Explain the different embryonic stages.

Answer: Development:

Definition :- Development is the progressive changes in which a fertilized egg is changed into a multicellular adult organism. — OR —

“All those successive change occurring from fertilization of an egg up to the formation of fetus and fetus into an adult is known as development.”

Embryology :- The Scientific study of development of an organism from a fertilized egg till hatching (in oviparous) and till birth (in viviparous) is called embryology.

Embryonic development:

Definition :- The progressive changes in the embryo for the formation of organism are called embryonic development.

Embryonic period :- The whole period during embryonic development is called embryonic period.

Stages of embryonic period :- It composed of the following stages

1: cleavage and blastocyst: (ETEh-2009)

cleavage :- (segmentation) A series of mitotic division in the zygote are collectively called cleavage or segmentation about 36-hours after fertilization the first cleavage division arises in the zygote.

Blastomeres :- The cells formed during cleavage process are called blastomeres. For example 1st cleavage in zygote produce two identical cells called blastomeres. The second cleavage result in the formation of 4-cells, where 3rd cleavage produce, 8-cells and so on.

Morulla :- A loose collection of cells which form cluster or solid ball of 16 or more cells called morulla - or - The process of cleavage continue upto 16-cells which is called morulla. morulla will move through oviduct and continues its journey toward uterus.

Compaction :- By the days 3 or 4 after fertilization, the embryo consists of about 100-cells and floats in the uterus. The cells are closely packed together by the process of compaction.

Blastocyst :- compacted embryo of 100-cells are now called blastocyst. Blastocyst is surrounded by Zona - pellucida (external membrane) which slowly breaks down - releasing the blastocyst which is known as hatching. The Blastocyst is a fluid filled hallow sac or embryo.

parts of blastocyst :- Blastocyst is composed of two parts. i.e

1-Trophoblast : < outer part >

The outer part of blastocyst is known as Trophoblast - which is single layer, large, flattened cells around the inner cell mass and fluid.

Function of Trophoblast :- Trophoblast play imp; role in -

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- 1: To protect embryo, the trophoblast displays L-selectin <WBC adhesion> molecule on blastocyst surface soon after hatching. L-selectin molecule has the ability to adhere with the coming WBCs in order to protect embryo from their attack.
- 2: Trophoblast also plays imp; role in placenta formation.
- 3: Trophoblast also released several other factors having immune suppressive effects in order to protect embryo from initial immune defences of mother.

2- Inner cell mass : <inner part>

The inner part of blastocyst is called inner cell mass, which is a small cluster of 20 to 30 rounded cells, located on inner side of trophoblastic layer. inner cell mass is also known as embryoblast b/c it form actual embryo.

Function of inner cell mass : (ETEA-2015)

- 1: The inner cell mass forms embryonic disc which forms — embryo proper in next stages of embryonic development.
- 2: All the extra-embryonic-membranes <i.e.- Amnion, — allantois, yolk sac > are all derivatives of inner cell mass except chorion, which is a derivative of trophoblastic.

The diagram illustrates the progression of embryonic development through five stages, each shown in a circular cross-section:

- Day 1 (Zygote):** A single cell with a prominent nucleus.
- Day 1 or 2 (2-Cell):** Two cells, each with its own nucleus, joined together.
- Day 2 or 3 (4-Cell):** Four cells arranged in a square pattern, each with a nucleus.
- Day 4 or 5 (Morula):** A solid ball of many small cells.
- Day 5 or 6 (Blastocyst):** A hollow sphere of cells with a distinct inner cell mass and an outer layer (trophoblast).

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2: Implantation of early embryo :-

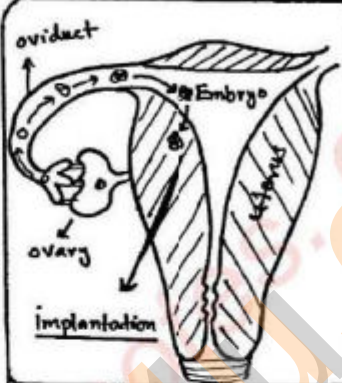
Definition :- The attachment of — embryo within the wall (endometrium) of uterus is called implantation.

Occurance :- In human implantation of embryo is most likely to occurs about 7 days after ovulation — ranging between 6 — 12 days.

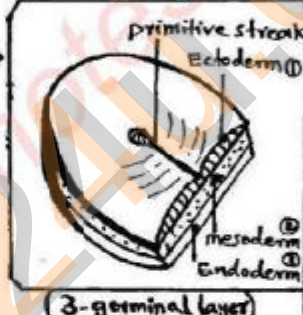
Extra embryonic membrane :- similarly the extra — embryonic membrane which is formed during 1st 2 to 3 — weeks of development which include — Amnion, allantois, and chorion are also important during this stage. The Amnion develops when cells of epiblast fashion or arranged themselves in transparent membranous sac. The cavity inside the amnion is called amniotic cavity which is filled with amniotic fluid. ← (ETEA-2008)

Tubular body :- The embryonic disc curves to form a tubular body. The developing amnion also curves with it in the same way. The amniotic sac will cover the embryo — from all sides. The only broken point is where umbilical — cord enters embryo.

Epiblast and hypoblast :- The embryonic disc or the inner cell mass develops into an upper layer called epiblast and a lower layer called hypoblast.



Implantation:

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3: Gastrulation : (ETEA-2006) Definition :- The process of formation of 3-layered embryo is called gastrulation. —OR— The process of formation of gastrula is called gastrulation. Explanation :- about 21 days after two layer embryo (Epiblast and hypoblast) is transformed into 3-layer embryo — called as gastrula. These 3-layers — are called primary germ layer. These 3-layers are — ectoderm, mesoderm, and endoderm. The process of gastrulation — (or 3-germ layers embryo) is accompanied by cellular — rearrangement and migration. primitive streak :- The process of gastrulation begins — with the formation of groove called primitive streak on dorsal surface of embryonic disc and establishes the Longitudinal axis of the embryo. Endoderm formation :- The surface cells (epiblast) — of embryonic disc migrate medially across other cells and enter groove (primitive streak). Then, they displace the — inner cells (hypoblast) and form the innermost layer of gastrula called endoderm. ← (ETEA-2013) Mesoderm formation :- Those cells of embryonic disc which follow push on both sides laterally between epiblast		
		 The diagram illustrates a cross-section of a 3-germinal layer embryo. It shows a central groove labeled 'primitive streak'. Above the streak is the 'Ectoderm' layer, and below it are the 'mesoderm' and 'Endoderm' layers. The entire structure is labeled '3-germinal layer'.

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and hypoblast form the upper and lower surface of mesoderm. Mesodermal cells just beneath the primitive streak aggregate immediately and form a rod of — mesodermal cells called notochord, which is the first axial support of embryo. This time, embryo is 2mm long. <u>Ectoderm formation</u> :- The cells that remain on dorsal — surface of embryo (epiblast) form ectoderm. <u>primitive tissues</u> :- These 3 above layers serve as primitive tissues, from which all organs of the body will develop during late stage of embryonic development i.e.—organogenesis. <u>4: Neurulation</u>:- <u>Definition</u> :- The process of development of neural tube (Nervous system in future) during embryogenesis is known as neurulation. <u>Explanation</u> :- Neurulation is a major event in embryogenesis. During neurulation certain ectodermal cells of embryo — differentiate to form neural tube. in future such neural tube form brain and spinal cord. Neurulation process is induced by chemical signals from Notochord which is — mesodermal in origin. <u>Step of neurulation</u> :- It consists of following major steps. <u>1-Formation of neural plate</u> :- After the elongation of — 3-layered gastrula—embryo, one of the band (cells) of outer layer (ectoderm) become thicken and form a plate		

like structure called neural plate.

2- Formation of neural groove:- Neural plate then folds inward forming a groove like structure called neural groove.

3- Formation of neural folds:- Neural groove further deepens and form prominent folds called neural folds.

4- Formation of neural tube:-

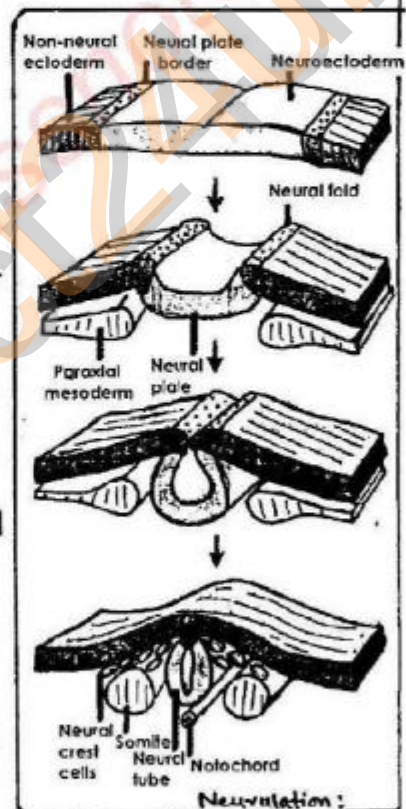
After 22 days, the superior margins of neural tubes fuse with one another to form a tube called neural tube.

5- Formation of CNS :- The anterior end of neural tube is transformed into brain where as posterior end of neural tube is becomes spinal cord.

6- Formation of PNS :- The remaining cells of neural crest migrate widely and give rise to 12 pairs of cranial nerves, 31-pairs of spinal nerves, sympathetic ganglia and other associated nerves to

medulla of adrenal gland. Beside this other connective tissues and pigment-cells of skin are also formed over here.

7- Formation of ventricle :- ventricles are cavities in brain. These ventricles are formed at the end of first



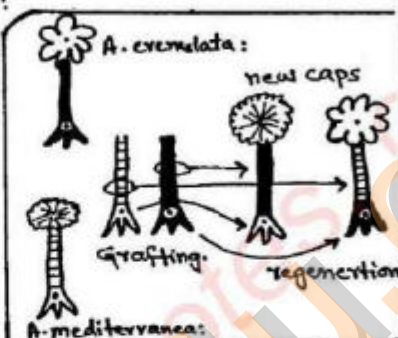
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month. similarly the 3-primary brain (ie- Fore, mid and - hind brain) becomes develop and prominent.		
<u>8- Formation of hemisphere:-</u> Hemisphere are the most evident part of brain. It appears at the end of second-month. It covers top of the brain stem and brain waves can be recorded by EEG.		
<u>5: Organogenesis :</u>		at the end of embryonic period- the length of embryo is 22mm, i.e. slightly less than 1-inch.
<u>Definition :-</u> The process of formation of organs from 3-primary germ layer of gastrula-embryo is called organogenesis.		
<u>For example:</u> (ETEA-2010, 2011, 2013, 2014)		
<u>1- Ectoderm:-</u> Ectoderm is developing - skin, nervous - system, PNS, eye, inner ear, nail, hair and other connective tissues.		
<u>2- Mesoderm:-</u> mesoderm is developing - Bones, muscles, Kidneys, heart, Blood vessels, gonads, notochord (cranium, vertebral column), and joints.		
<u>3- Endoderm:-</u> Endoderm is developing - digestive system, respiratory system, urogenital system and its relative glands		
<u>Q2</u> Describe the role of nucleus and cytoplasm in development		
<u>Answer: control of development :</u>		
<u>Introduction :-</u> The development of a trait or character is strictly under the control of specific genes present on chromosomes in the nucleus. During morphogenesis much of these genes remaining switch off where as so many		

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becomes switch ON and express the corresponding trait. although all cells of a embryo possess the same nucleus - however cytoplasm may vary. This perhapes that nucleus determines the characteristics of organism while the - cytoplasm selectively turn ON or turn OFF that genes. <u>For example :-</u> genes for enzyme produced in stomach is also present in the cells of tips of finger but these genes express (switch ON) in stomach and become supress (switch OFF) in finger tip-cells. <u>1: Role of Nucleus in development :-</u> Information for development of organism is present in nucleus. <u>Example: (ETEA-2017)</u> <u>Acetabularia :-</u> Acetabularia is marine, green, unicellular algae inhabits European seawater. It body is composed 3 parts. i: <u>Rhizoids :-</u> It helps in attachment to the ground. ii: <u>stalk :-</u> A long stalk arises from rhizoid. iii: <u>cap :-</u> umbrella shaped cap is present at the top of stalk. <u>length :-</u> Acetabularia is 2-3 inches in length. <u>Nucleus and cytoplasm :-</u> Acetabularia contain nucleus in it base and cytoplasm in it stalk. <u>Species of acetabularia :-</u> Acetabularia has two species on the basis of shape of cap or hat. i.e - (ETEA-2019) 1- <u>Acetabularia mediterranea :-</u> It has a regular (umbrella) shaped cap. 2- <u>Acetabularia crenulata :-</u> It has irregular shaped cap.		

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Experimental work of Hammerling:

- 1: Hammerling showed that if the cap is removed or cut from *Acetabularia*, a new cap is regenerated on them.
- 2: He cut off the cap from both and threw away. Then he cut the stalk of both *acetabularia* and then grafted the stalk of *acetabularia-crenulata* into *acetabularia mediterranea* and vice versa.
- 3: Then they were allowed to grow and allowed to form caps.
- 4: It was found the new cap regenerated according to the type of nucleus present in the base while cytoplasm of cell present in stalk did not affect the growth of cap.



Conclusion from Hammerling experiment:

The above experiment proved that the genes are expressed according to the type of nucleus and cytoplasm in the form of stalk does not play any role in the expression of genes. The nucleus shows strong control on the development of cap through the messenger RNA.

2: Role of cytoplasm in development:

Cytoplasm provides the best suitable environment for expression (<turn on>) of genes because cytoplasm contains different morphogenic determinants which control cell differentiation.

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Therefore, cytoplasm play a role in the development of organism in early embryonic period. (embryogenesis). <u>Experimental work on Frog Zygote :</u> 1- <u>Frog fertilized egg</u> :- when frog egg is fertilized then a grey colour crescent shaped structure appears at the junction of animal pole and vegetal pole which is a sign of fertilization in a frog egg. 2- <u>Animal pole</u> :- animal pole is the side of frog egg where nucleus and active cytoplasm is present. 3- <u>Vegetal pole</u> :- vegetal pole is the side of frog egg where reserved food (yolk) is present. 4- <u>Grey crescent</u> :- Grey crescent is the part of frog egg - cytoplasm where salts, minerals and vitamins accumulate. Grey crescent directs the embryonic development of frog zygote. 5: <u>normal cleavage</u> :- The zygote of frog normally divides equally in such a way that both the blastomeres receive equal amount of grey crescent. if both blastomeres separate from each other, so such cells will grow to form a normal tadpole. 6: <u>experimental cleavage</u> :- Experimental, if the frog zygote is divided in such a way that one blastomere receives all of grey crescent and the others does not receive any grey crescent at all. Then only that cell (blastomere) will develop into normal tadpole - which contains grey crescent. while those cells (blastomere)		

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Which does not have grey crescent will develop into an undifferentiated mass of cells but not to a tadpole larva.

Conclusion :- From the above experiment it was concluded that cytoplasm (grey crescent) plays the role of selection (activation) of genes in early embryonic development.

(a) Normal (b) Experimental

animal pole animal pole

gray crescent gray crescent

vegetal pole vegetal pole

gray crescent divided between cells gray crescent entirely included in left cells

development development

two normal tadpoles normal tadpole undifferentiated

Q3 write short note on morphogenetic determinants.

Answer :- Morphogenetic determinants :

Introduction :- Different cytoplasmic components contain different morphogenetic determinants. These morphogenetic determinants are responsible for cell-differentiation. These determinants are present in blastomeres.

For example :- (Ascidian larva)

A fertilized egg of ascidian (lower chordate) contains 4-different colour determinants in their cytoplasm. These -

cytoplasmic determinants are segregated into different – blastomere during cleavage which causes different cellular differentiation. i.e –

1: Clear cytoplasm (determinant):- If a blastomere contain – clear cytoplasm (determinant) so such cell (blastomere) – produce or differentiate into epidermis of larva.

2: Yellow cytoplasm:- if ascidian blastomere contain yellow cytoplasm or determinant so such blastomere will be – produce or differentiate into muscle tissues.

3: Grey vegetal cytoplasm:- if ascidian blastomere contain grey vegetal cytoplasm or determinant then such blastomere will produce or differentiate into gut (Digestive tract).

4: Grey equatorial cytoplasm:- if ascidian blastomere contain Grey equatorial cytoplasm or determinant then such blastomere will produce or differentiate into notochord and neural tube.

Q4 what is the mechanism of cellular determination. Explain the work done by Hans Spemann in the discovery of Embryonic induction.

Answer: Mechanism of cellular determination:

Definition:- The process of formation of different types of cells of different tissue from similar cell is called cellular determination or cellular differentiation.

For example:- All cells of an organism are produced as a result of mitotic division of single cell (zygote). so, all of

them have same set of chromosomes but still some cells — develop into stomach, some into neuron, etc. due to — cellular determination mechanism or cell specialization.

Factors causes cellular determination:- cellular determination occurs due to the following factors during embryogenesis.

1: Asymmetric Segregation of cellular determinant:-

Cellular determinant:- cellular determinants are those — cytoplasm molecules (usually protein and mRNAs) which are responsible for the expression (ON or OFF) of genes to define the function of a particular cell.

Asymmetric segregation:- After the cell division, each daughter cell receives equal number or set of chromosomes. Similarly, one daughter cell (blastomere) receive all of the localized molecules (morphogenetic determinant) and other daughter cell (blastomere) receive none of these molecules. This unequal distribution of cellular determinants to — daughter cells is known as asymmetric segregation. This results in two different daughter cells which will have different fates (i.e.-different structure and function) based on differences in genes expression (switch ON or OFF) for that specific trait.

2: inductive signaling b/w cells :-

Embryonic induction :- The ability of one type (group) of cells to influence (control) the development of other type

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<or group> of cells within embryo is called embryonic induction <u>Explanation</u> :- not only cells are different from each other due to asymmetric segregation of cellular determinants but in most cases cellular differentiation occurs due to inductive signals coming from other cells or group. <u>Inductive signaling</u> :- There are following 3-possible - mechanism for inductive signaling. <u>1-Mechanism-I</u> :- In this type of signaling a diffusible - substance (e.g.-Hormone) is sent to adjacent cells through extracellular fluid. The adjacent cells will receive the signal (hormone) by surface receptor present on its membrane. The receptor transmits signal further into inside of the cell through second messenger. In this way adjacent cell shows response according to the signal provided. <u>2-mechanism-II</u> :- In this type of signaling cells keep its direct contact with adjacent cells with the help of trans-membrane protein called glycoprotein. In this mechanism cells stimulates each other directly to perform certain - function, changes and development. <u>3-Mechanism-III</u> :- In this type of signaling, each and every cell of embryo has cytoplasmic connection through gap - junction which allow the signals to pass from one group of cells to adjacent cells. <u>For example</u> :- In case of plant these junctions are called		

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plasmodesmata, while cardiac muscle cells are interconnected through intercalated discs.		
<u>Experimental work of Spemann and Mangold : (ETER-2011,2018)</u>		
<u>Experiment on Frog :-</u> Han's spemann and Hilde - Mangold in 1924 performed experiment on the embryo of amphibian known as frog to show neural induction as a example of inductive signaling or embryonic induction. i.e-		
<u>Experiment No-1:-</u> Spemann cut a piece of ectoderm from the embryo of frog. He grew the cutted ectoderm in a separate dish. The isolated piece of ectoderm did not develop any structure even although it was healthy and active. The embryo from which piece of ectoderm was removed healed and live but it develop no nervous system.		
<u>Conclusion :-</u> It shows that nervous system develop from ectoderm.		
<u>Experiment No-2:-</u> In this experiment Spemann cut a piece of ectoderm from the top of notochordal mesoderm. Then he - removed the notochordal mesoderm. Finally he placed the piece of ectoderm in its original place. The embryo healed and lived but it developed no nervous system although ectoderm was present.		
<u>Conclusion :-</u> It shows that the mesoderm has some effect on ectoderm to stimulate ectodermal cells to form nervous-system.		
<u>Experiment No-3:-</u>		
In this experiment spemann took two early gastrula embryos. He removed a piece of mesoderm from the dorsal lip of -		

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blastopore from the embryo-A while from the embryo-B he removed a similar size piece from the region just opposite to the dorsal lip of blastopore. Now he transplanted the piece will move inside the embryo and form notochordal mesoderm so it will stimulate the formation of nervous system just - above it from ectodermal cells. while the one nervous system will be formed at the normal side by the embryo own ectoplasm. Thus the embryo-B will results in the formation of an individual with two heads and one trunk. an individual with two heads and one trunk is known as Siamese twin.

conclusion of spemann and manglod exp; :

- 1: The above - famous experiments shows that - the - donor tissue is called inducer because it induces recipient to develop, while the recipient embryo is called as responsive tissue because it has given response in the form of development.
- 2: The chemical secreted and transferred by inducer are - called morphogens because they have brought morphological change.
- 3: It is clear that notochordal mesoderm releases certain signals or chemicals which induce neurulation in ectoderm.



The diagram illustrates the experimental process. It begins with two embryos: Donor (A) and Recipient (B). A small rectangular piece of tissue is shown being removed from Donor (A) and placed into Recipient (B). This leads to the formation of 'Two neural tubes' within the recipient embryo. The final stage shows a 'Siamese twin' with two distinct heads and a single trunk, representing the result of the induction experiment.

Q.5 Discuss the major event of human embryonic development.

Answer: Human embryonic development :-

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Gestation period :- Human spend its first 9-months in - amniotic cavity. The whole embryonic period, from zygote upto birth of baby is completed in 9-months. This is called gestation period or pregnancy.

Trimester :- The 9-months pregnancy is divided into 3-phases, each of 3-months duration is called trimester. During each trimester the fetus grows and develops.

1: First Trimester :-

Duration :- Month - 1st, 2nd and 3rd.

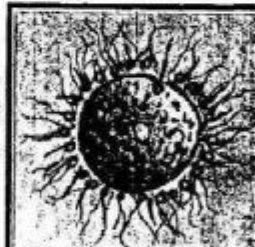
Events in first trimester :- This trimester consist of 3-months i.e. week 1st to 12th. During this trimester the - following embryonic development does completed -

Cleavage :- The zygote after fertilization moves down in the fallopian tube towards the uterus. at the same time zygote will divide - rapidly (cleavage) to forming blastomeres, morulla and blastocyst (2-layer embryo).

Blastocyst :- The inner cells (layer) - of the blastocyst becomes inner cell mass which form actual embryo and extra - (Amnion + allantoise) embryonic membrane, where as the outer cells (layer) of the blastocyst becomes Trophoblast which form placenta and - chorion extra embryonic membrane.

First trimester

Fertilization



12th week of pregnancy



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<u>Implantation</u> :- Implantation of blastocyst embryo occurs in the 4th week of pregnancy which is the attachment of embryo to uterine wall or endometrium. ← (ETER-2015, 2017) <u>Embryonic period</u> :- The 5th week of pregnancy marks the beginning of embryonic period. During this period first of all two layers embryo (blastocyst) is converted into 3-layers embryo called gastrula. now major structure and system developed from these 3-germinal layer of gastrula and this process is called organogenesis i.e. - i: <u>Ectoderm</u> :- Ectoderm give rise to - CNS, PNS, skin, eyes, inner ear, nail, hair and connective tissues. etc. ii: <u>Mesoderm</u> :- Mesoderm give rise to - heart, blood vessels, skeleton (bones and joints), muscles, notochord, kidneys. etc. iii: <u>Endoderm</u> :- Endoderm give rise to - internal body lining of alimentary canal and urinogenital tract, and associated glands. <u>other development and growth</u> :- (in first trimester) i.e. - 1: Growth becomes rapid in the coming week. 2: Neural tube is closing. 3: heart start pumping. 4: Basic facial features begins to appear such as - → Inner ear begin to form with passage ways. → eye lenses begin to form and eyes are visible. → Nose has been formed, Nostrils become visible. → upper Lip has be formed. 5: Small buds will appear which elongate to form arms and legs.		

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6: Arms attain paddles shape while the whole body attains - C-shaped curvature. 7: Finger nails begin to form. 8: The trunk of the body begins to straighten. <u>Human profile</u> :- The fetus is now completed human profile and technically it is now called fetus at the end of first trimester. ← (ETEA-2019) <u>2: Second trimester</u> :- <u>Duration</u> :- Month - 4th, 5th and 6th. <u>Events in 2nd trimester</u> :- In 2nd trimester the following embryonic development does complete. <u>Foetal gonads</u> :- Foetal sex (gonads) becomes apparent and can be identified as during ultrasound. primary sex organ like ovaries and uterus develop in female. while testes (male gonad) develop in male (male baby). <u>Foetal ear</u> :- Foetal ear begins to stand out at the side of head. Nerve endings from brain also reach to ear, thus it allow the foetus to hear. <u>Foetal head and internal organs</u> :- In 2nd trimester the fetus head is about half of the over all size of the body. The - internal organs continues to grow and mature. The fetus growth is rapidly during 5th-month of pregnancy. <u>Foetal muscle and hairs</u> :- Foetal muscles and body fats is begins stored under skin. body hairs start to appears.		
		 2ND TRIMESTER

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Foetal fingerprints :- Fetal finger have developed finger-prints which is identity to each and every individual.

3: Third trimester :-

Duration :- Month — 7th, 8th and 9th.

events in 3rd trimester :-

3rd trimester is the last 3-months of embryonic development, consist of the followings events.

Growth rate :- Growth rate is very maximum in 3rd trimester, about 28gm per day increase occurs in weight. as a result final — weight gain takes place which is the most weight gain — throughout pregnancy.

Foetus movement :- Foetus start movement which is felt by her or his mother called quickening. This movement of foetus is because of improved brain and muscle function. at the last of 3rd trimester, through this movement fetus slowly descends into pelvic cavity or turns down towards cervix.

baby size and weight :- About 40 weeks after pregnancy baby becomes 18—20 inches long and weight 6—9 pounds (2.7Kg — 4Kg), However healthy babies born in different sizes.

Birth :- After 40 weeks the baby could born any day — now. The birth process occurs by positive feedback mechanism. when the baby is born the umbilical cord is cut and then tied.



3RD TRIMESTER

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Q 8 Write note on – placentation, umbilical cord, Birth.

Answer: 1:- placentation:

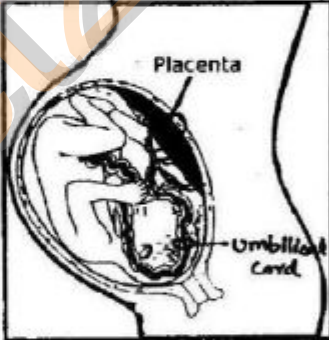
Definition:- The process of the formation of placenta – during embryonic development is called placentation.

Placenta:- A mutual connection between mother and fetus for exchange of substances is called placenta.

Intimate part:- placenta is partly formed by embryonic – tissues (fetal) and partly formed by uterine tissues (maternal). Placenta always connected to embryo or fetus by means of umbilical cord.

Function of placenta:

- 1: The blood vessels of the placenta are close to blood vessels of uterus so that oxygen, glucose, amino-acids and salts can pass from the mother blood to the embryo (fetus) blood easily.
- 2: In similarly way CO_2 and urea in the fetus blood escape in to the placenta and are carried away by mother blood in uterus.
- 3: The placenta can also prevent some harmful substances to transfer from mother blood to fetus.
- 4: Through placenta mother transfers passive immunity to the fetus which work in the early few months after birth.
- 5: placenta is a tissue which helps in the attachment of fetus to the wall of uterus.



6: placenta also secretes progesterone hormone which - helps in the stay of embryo in the uterus.

Secretion of placenta:- placenta also acts as a endocrine gland because it secrete important ovarian hormones i.e- estrogen and progesterone. such hormones help in -

1- maintaining of pregnancy.

Placenta also secrete Estradiol which help in secretion of

2- prevent further ovulation during pregnancy.

3- prepare mother for delivery.

Prostaglandins and also produce more oxytocin-receptors.

4- helps in the periodic contraction of uterus during delivery.

2: Umbilical cord:

Definition:- Fetus or embryo is attached to the placenta by a rope like structure called umbilical cord.

Explanation:- Umbilical cord is a connection between - embryo (Fetus) and mother body and acts as a supply line.

Umbilical cord is developed from outer layer around the embryo called allantois. The umbilical cord contains an - artery and vein which then extend to hepatic artery and vein of embryo (fetus).

Function of umbilical cord:-

1: useful substances coming from mother to placenta are - supplied to embryo (fetus) through artery of umbilical cord.

2: wastes materials from fetus reach to placenta through vein of umbilical cord from where they are discharged into mother blood for excretion.

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<u>3: Birth:</u> Both oxytocin and prostaglandins (secreted by uterus) help in uterine contraction. -		
<u>Labour: <Delivery></u> All those changes which causes birth of the baby is called Labour or delivery.		
<u>Explanation: <Starting of Labour></u> In the last week of pregnancy the baby head turns down towards the cervix of uterus. As the head of baby touches the cervix it causes contraction of uterine walls which is a stimulus for the secretion of oxytocin. oxytocin stimulates further contraction of uterus and creates Labour pain.		
<u>Dilation of cervix:-</u> This rhythmical contraction and relaxation in uterus leads to softening and dilation of cervix. The baby head act as wedge which also help in cervix dilation.		
<u>Rupture of amniotic sac:-</u> The amniotic sac ruptures and amniotic fluid escapes. The baby head undergo rotation and passes through vagina. vagina acts as birth canal during birth, so in this way baby is born.		
<u>Umbilical cord after birth:-</u> Baby is still attached with the mother through umbilical cord. The umbilical cord is now cut and tied. As baby is delivered to external world, sudden fall in temperature occurs which is stimulus for baby which cries and takes its first breath. The umbilical cord attached to baby abdomen shrinks and fall after a few days leaving a scar called navel.		
<u>After birth:-</u> usually after birth of baby still labour pain		

or contraction continues to expel the placenta out. This is called after birth. The average blood loss is about 350cm³ during birth.

Q.7 write a short note on Lactation.

Answer: Lactation:

Definition :- The process of production of milk in the mammary glands of mother after pregnancy is called lactation.

Importance :- The chief function of lactation is to provide nutrition and immune-protection to the baby after birth.

Hormonal control :- Lactation is under the control of hormones which produce by mother body from 24-week of pregnancy that stimulate the growth of the milk duct system in the breasts (mammary glands).

For example :-

1: **progesterone :-** progesterone control the breast growth by increasing the size of alveoli and lobes of mammary gland.

2: **prolactin :-** prolactin control the growth and differentiation of alveoli and duct system of mammary glands (breast).

3: **Estrogen :-** Estrogen stimulates the milk duct system of mammary gland to grow and differentiate.

4: **oxytocin :-** oxytocin is necessary for the milk ejection reflex.

5: **Human placental lactogen :-** From 2nd month of pregnancy, The placenta release large amount of HPL. This hormone plays important role in growth of breast and nipples.

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<u>production of milk</u> :- By the 5th or 6th month of pregnancy the breasts (mammary glands) are ready to produce milk. <u>Colostrum</u> :- colostrum is the first milk after birth on which baby feeds upon. colostrum contains high amount of WBCs and antibodies than natural milk, that is why this milk is very much important and necessary for babies. <u>For example</u> :- colostrum contain immunoglobulin-A - (antibody) and interferon (protein) which coats the lining of the baby immature intestines that helps to - prevent pathogens from invading the baby system. <u>Feeding duration</u> :- mother milk should continues for two year. However, depending on the general health condition of mother, maternal milk may not be available for so long. The baby then feed from other sources of milk. e.g- bottle feeding. <u>Menstrual cycle vs lactation</u> :- usually the menstrual cycle does not occurs during nursing of baby but sometimes it can start even when mother's are breast feeding. Q 8: <u>Differentiate between Gestation and Pregnancy.</u> <u>Answer: 1: Gestation:</u> <u>Definition:</u> gestation is the period of time between fertilization and birth. <u>Explanation:</u> gestation means the carrying of an embryo or fetus inside the female womb. During this time, the baby grows and develops inside the mother's womb. <u>2: Pregnancy:</u> <u>Definition:</u> pregnancy is the process and series of changes that take place in a woman body and tissues as a result of the developing of foetus. <u>Explanation:</u> after fertilization formation of the zygote undergoes divisions and it develop into an embryo then develop into the foetus. The growth and development of the foetus takes place in the uterus in three trimesters.		

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Q9 write a short on twins :		
<u>Answer: Twins and Quadruplets :</u>		
<u>Definitions :</u>		
<u>Twins</u> :- Birth of two babies at a time is called twins.		
<u>Quadruplets</u> :- Birth of 4-babies at a time is called Quadruplets		
<u>multiple birth</u> :- multiple birth is general term used for the birth of many babies at a time.		
<u>Types of twins</u> :- multiple fetuses can be the same (identical) or different (Fraternal) i.e. -		
<u>1: Identical or maternal twins :</u>		
<u>Definition</u> :- A pair of twins who are alike in all genetic - characteristics (including sex) , typically very similar in appearance and developing from a single fertilized ovum is called identical twins.		
<u>Monozygotic twins</u> :- maternal twins are also known as - monozygotic twins because they develop from the same zygote.		
<u>Explanation</u> :- soon after fertilization the zygote undergoes cleavage to form embryo. During first cleavage two cell or blastomere is formed. The two blastomeres instead of remaining together, may separate and behave as two — independent zygotes and each one develops into a separate fetus. In this ^{way} two foetuses develops from a single zygote is called maternal or identical twins.		
<u>genetical identical</u> :- Both twins (organisms) are genetical		

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identical because they are produce mitotically (asexually) from a single zygote. <u>Placenta</u> :- Identical twins usually share same placenta. <u>Amniotic Sac</u> :- Identical twins usually grow within separate — amniotic sacs in the uterus. In rare cases they share one amniotic Sac. <u>Same sex</u> :- identical twins will be of the same sex. i.e — Both will be male or both will be female. <u>2: Fraternal twins</u> : (ETEA-2008) <u>Definition</u> :- A pair of twins who are genetically distinct and not necessarily of the same sex or more similar in appearance than other siblings (brother or sister) and developing from separate fertilized ova is called fraternal twin. <u>Heterozygotic twins</u> :- Fraternal twins are also called — heterozygotic twins because they develop from different zygotes. <u>Explanation</u> :- Sometimes more than one egg (ovum) is produced by female ovaries. all these eggs are then fertilized by sperms independently and develop into two different fetuses or offspring called fraternal twins. <u>Non-genetical</u> :- Both twins (offsprings) are non-genetical because they are produced sexually (combination of diff; gametes) <u>Placenta</u> :- Fraternal twin have separate placenta. <u>Amniotic Sac</u> :- Fraternal twin have separate amniotic sac. <u>Sex</u> :- Fraternal twins may be of the same or different sexes but not more alike.		

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Q 10: <u>Compare the breast feeding with bottle feeding.</u>		
Answer: <u>Breast Feeding Vs Bottle Feeding.</u>		
1: Breast Feeding:		
<u>Advantages for Babies:</u>		
1. Due to the anti-infective properties of breast milk, breast feed babies tend to have less incidence of ear-infection, respiratory illness, allergies, diarrhoea and vomiting. 2. Due to digestibility of breast milk, breastfed babies are rarely constipated. 3. The stools of breastfed babies are mild smelling. 4. Breast milk is constantly changing in its composition to meet the changing needs of the baby. 5. I.Q levels are an average of 8-points higher in children who were breastfed. 6. Breast milk is always at perfect temperature.		
<u>Advantages for Mother:</u>		
1. The uterus of a breast feeding mother shrinks to its pre-pregnancy size more quick. 2. Women who nurse their babies for at least 6-months his lessen their chance of breast cancer, osteoporosis, etc. 3. The return of fertility is delayed with feeding.		
2: Bottle Feeding:		
<u>Advantages of bottle feeding:</u> the only advantage of bottle feeding is that anyone can feed baby and presence of mother is not necessary or it is easy to tell how much at the baby is getting.		
<u>Disadvantages for Babies:</u>		
1. It can create unhygienic circumstance for baby. 2. It is vulnerable to carry various types of infections. 3. It can cause indigestion and several stomach disorders. 4. Not as efficiently utilized as breast milk.		

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5: some babies have difficulty in utilizing certain nutrients of the bottle milk. 6: Bottle fed babies also have the risk of developing an - allergy to a particular formula. as a result such babies may have symptoms that include - irritability, crying - after feedings, nausea, vomiting, diarrhea, a skin rash. <u>Disadvantages for mother's:</u> if a mother feeds her baby with particular formula rather than breast feed, this has an affects on her health too. - There is an increased risk of - 1- Breast cancer, Being overweight, Osteoporosis. 2- Rheumatoid arthritis, stress, anxiety, uterus cancer.		
Q11 write different disorders during embryonic development.		
<u>Answer:</u> Disorders during embryonic development: like wise all other disorders and abnormalities it may also occurs in embryonic period. These are following. <u>1: Rubella:</u> (ETEA-2018) <u>Introduction:-</u> Rubella infection generally occurs within the first 20-week of pregnancy. This disease is commonly known as German measles because it is discovered by German scientist. <u>Causal agent :-</u> Rubella is caused by Rubella-virus, which is spread by direct contact with nasal or throat secretion of infected individual.		

Symptoms of Rubella:

- 1: Rubella is an acute viral illness, causes only mild symptoms, including— a lower fever, swollen glands, joint pain, red rash on skin, sore throat, headache.
- 2: The child may born with congenital rubella syndrome (CRS) In CRS mostly— cardiac, cerebral, ophathalmic and— auditory defects occurs.
- 3: Beside the above symptoms, CRS also causes— low birth weight, Anemia, Hepatitis and pre-maturity.

Treatment: <prevention> vaccination against Rubella virus.

2: Abnormal neural tube:

Definition:- It is the defects of spinal cord or brain which generally occurs at early stage pregnancy (Embryonic period).

Types of neural disorders:- Abnormal neural tube develops the following conditions or abnormalities in nervous system.

1- spina bifidia:- Spines of vertebral column do not fuse and spinal cord remains exposed. It is common type neural disorders

2- Anencephaly:- A condition of incomplete or no development of brain.

3- Meningococcal meningitis:- A condition in which —
Inflammation of meninges occurs due to bacterial infection.

4- Encephalocele:- It is rare form of neural disorder in which brain and skull is affected.

Causes and risk factor of neural disorders:-

- 1: couples with a family history of neural disorders.

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2: Women who take certain anti-seizure medication.

3: obesity, diabetes, cigarette smoke, Lead, air pollution. etc.

Treatment :- <prevention>

Vitamin-B complex and folic-acid regularly use.

3: Thyroid gland abnormalities : <congenital hypothyroidism>

Definition :- The deficiency of thyroid gland hormone (thyroxine) at birth or even in embryonic period is ^{called} congenital hypothyroidism.

causes of congenital hypothyroidism:

- 1: Iodine deficiency in the mother's diet during pregnancy.
- 2: Defects in development of thyroid gland. <poorly formed>
- 3: Sometime mother's antibodies impair thyroid gland.
- 4: A genetic defect which affects thyroid hormone production.

Symptoms of congenital hypothyroidism:

1- lack of weight gain	2- Delayed skeleton maturation.
3- Hyper bilirubinemia.	4- Mental retardation.
5- Stunted growth.	6- Fatigue, lethargy,
7- poor feeding, constipation.	8- Thickened facial features.
9- Reflecting immaturity of bones and liver.	

Treatment :- congenital hypothyroidism is treated by - giving thyroid hormone medication in pill form. The tablet is crushed and given to the infant with a small amount of water or milk.

4: Limbs abnormalities:

Introduction :- These abnormalities occurs in Limbs and fingers in such a way that fingers are even missing or abnormally

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developed or reduced.		
<u>Causes of Limbs abnormalities:</u>		
1: The main cause for this abnormalities is the inheritance of defected genes from parents, therefore this disorder is genetical in nature.		
2: Exposure of the mother to certain medication, infections, smoking during early pregnancy (embryonic period)-		
<u>Symptoms of Limbs abnormalities:</u>		
1- Abnormally developed Limbs. 2- missing of finger.		
3- Reduce fingers size. 4- Limitation with certain movement.		
<u>Treatment of Limbs abnormalities:</u>		
Treatment can vary for each child. potential treatments including		
1: prosthetic (artificial Limb).		
2: othotis (Braces) 3:- Surgery.		
<u>5: spontaneous abortion:</u>		
<u>Definition :-</u> The loss of pregnancy before 20-weeks of gestation is called spontaneous abortion.		
<u>Causes of spontaneous abortion:</u>		
1: 50% abortions occurs due to chromosomal abnormalities.		
2: Extra chromosomes or missing of chromosome cause abortion or learning and mental retarding defects in born children.		
3: change in a single gene or several genes on chromosome.		
4: an inherited problems with the chromosomes can also cause it.		
5: less common causes are—maternal factors including infections		

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maternal illness, and intra-uterine anatomic abnormalities. 6: mutations like translocation on the chromosomes can also cause miscarriage or spontaneous abortion. <u>Treatment and prevention :</u> 1: Ultrasound , medical and surgical treatment. 2: Avoid certain chemical like- drugs, Alcohols and radiations. 3: Avoid certain medication during early pregnancy. 4: Regular use of Folic acid. <u>Detection of foetal developmental problems:</u> Foetal developmental problems can be detected through - different techniques and procedure. such as- 1: <u>Ultrasound</u> :- Ultrasound is one of the most important imaging technique by which we can detect any problem in the developing fetus. 2: <u>Aminocentesis</u> :- Amniotic fluid is taken and then analyzed for chromosomal defects like- Down's syndrome, Turner's Syndrome, Klinefelter syndrome and erythroblastosis fetalis. 3: <u>Chorionic villus sampling</u> :- cells are collected from the - placenta with a thin plastic tube inserted through the cervix and then analyzed for possible genetic disorders. <u>Treatment of foetal developmental problems:</u> - It may be- 1: <u>Fetal surgery</u> :- once a congenital abnormality has been - diagnosed the condition will be assessed to determine that the fetus is eligible for fetal surgery. Generally only the		

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most severe conditions which causes fetal death or — significant disability are treated with fetal surgery after the birth or inside the mother body. <u>Team in fetal surgery</u>:- Fetal surgery is a specialized — procedure that is offered at only in certain Hospitals around some countries of the world. Among those health care providers, who will have a role in the surgery are— A perinatal obstetrician, an ultrasonographer, a pediatric surgeon, a neonatologist and nurses. <u>2: Intra-uterine treatment</u>:- <without surgery> There are some defects or abnormalities which can be treated before birth inside mother's uterus without surgery. <u>For example</u>:- 1- Urinary tract infections (UTI). 2- Erythroblastosis fetalis <Rh blood group incompatibility>. <u>Risks with foetal surgery</u>: Some risks associated with fetal surgery including — infections, premature Labour and delivery, bleeding, Leakage of amniotic fluid, gestational diabetes and Infertility. <u>Q12</u> Differentiate b/w postnatal development and allometric growth. <u>Answer: 1: postnatal development</u>: <u>Definition</u>:- The development of child after birth is called postnatal development. <u>Explanation</u>:- postnatal development must be equal, —		

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Symmetrical and at uniform rate. sometimes postnatal development may be affected by allometric growth. <u>Allometric growth:</u> <u>Definition :-</u> The type of growth in which all body parts do not grow at equal rate is called allometric growth. <u>Explanation :-</u> usually all body parts do not grow symmetrically at equal rate. some parts grow faster than other. In humans not all the body parts grow or develop at same rate. so such type of growth is called allometric growth. <u>Example :-</u> An example of allometry is leg-length in human. i.e. The fetus and newborn baby have short chubby and ineffectual legs. The proportion of leg-length to body-length is low in such age. on the other hand, when once grows and matures then most of his body height is because of leg-length. This show that leg-length growth of adult is faster than fetus and — new born is called allometric growth.		
Q13 what is aging. write it process, symptoms and levels.		
<u>Answer: Aging :-</u> <u>Definition :-</u> The negative morphological and physiological changes which occurring in the body during life is called aging. <u>Gerontology :-</u> The scientific study of aging is called Gerontology. <u>Explanation :-</u> Soon after human is born, they gradually starts growing in size and strength. They becomes young		

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and reaches the age of puberty and then becomes adult. — after this stage, negative changes start occurring. — Resistance to diseases and stress decreases. System — cease functioning. Thus the person becomes weak. These negative changes in our body are identified as process of aging. <u>Causes of aging</u> :- factors which increases the risk of aging are— 1: aging may be occurs due to genetics of the person. 2: aging may also occurs due to environmental factors such as — no exercise, smoking, Excess fats, diseases, etc. <u>Types of aging</u> :- Depend on causes, aging may be — 1: <u>primary aging</u> :- primary aging is caused by genetics of a person which is associated with person life and can't stopped. That is why primary aging is also called programmed aging. 2: <u>secondary aging</u> :- secondary aging is caused by — environmental factors and is preventable by exercise and drugs. <u>process of aging</u> : In the body of human, all the progressive negative physiological processes is due to degenerative changes taking place in cells, tissues, organs and system. All these degenerative — changes causes aging process. But the rate of these — degenerative changes may be different in different persons even if they are the same age. as a result the individual of exactly same chronological age show difference in — functional decline rates. i.e.—		

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<u>1- physiological young :-</u> Those people or persons in which the rate of negative changes is slow and possess more functional capacity for long time are called physiological young. <u>2- physiological old :-</u> Those people or persons in which the rate of negative changes is fast and having less functional capacity even in young age are called physiological old. <u>Sign and symptoms :</u> sign and symptoms of aging is varies from individual to - individual, but some common symptoms are following. 1: Overall decrease in body energy and vigour. 2: Decreased of memory. 3: loss of vision and hearing. 4: change in sleeping patterns. 5: loss of hairs and elasticity of skin. 6: appearance of wrinkles and spot on skin. 7: sexual dysfunction and changes in menstrual cycle in female. 8: Inability to loss weight. (obesity in abdomin). 9: urinary problem. 10: General weakness and decreases body immunity. 11: Degeneration of organs and tissues may also take place. <u>level of aging :-</u> There are 2-level of aging. i.e - <u>1: Cell level changes in aging :-</u> This type of aging occurs in cells and tissue level. such as - 1- most cells become larger in size than normal size.		



- 2- Few cells become shrink.
- 3- The capacity of cellular division and reproduction decreases.
- 4- The ability of repairing declines in aging cells.
- 5- DNA become damage through the aging process and due to which changes occur in — cellular membrane, enzymes, transport of ions and nutrients and in the chromosomes of nucleus (i.e- shrinkage, fragmentation of chromosomes)
- 6- changing occurs in some organelles, like — mitochondria and lysosomes, and their number are reduced which — causing cells to function less efficiently.
- 7- Hormonal secretions of cells become decreases.
- 8- metabolism becomes decrease having the following effects.
 - i: Toleration of cold is less.
 - ii: A tendency to gain weight increase.
 - iii: Decrease in the body's use of glucose.
 - iv: collagen and elastin decrease in connective tissues.
 - v: changes in fats contents of tissues.
 - vi: Decrease in the amount of water in the body.

2: System level changes in aging:

This type of aging occurs in various physiological system of body. These include the following—

i-Digestive system :- Among the gastrointestinal tract, organ altered taste decrease, decrease in salivation, decrease in stomach acidity and decrease blood flow to liver.

ii- skeleton system :- Decrease in density of bones like - osteopenia and osteoporosis. Bones loss minerals and - decrease occur in matrix i.e. -

osteopenia: It is a condition in which mass of bones started to decline. It occurs between ages of 30-40 years.

Osteoporosis :- It is a condition in ^{which} loss of bone minerals as well as matrix occurs. It occurs in later life.

iii- Nervous system :- production of neurotransmitters is generally decrease and when loss reaches to 50% then - dementia occurs, which is a disorder in which a person loses memory and his overall behaviours changes. about 15% of elders have severe dementia.

iv : circulatory system :- The walls of blood vessels loss its elasticity. Fats accumulates in the vessels and valves of heart. That is why cardiovascular's aging occurs. The heart could be smaller than normal due to lack of nutrients , where as larger due to severe high blood pressure. usually aging causes left venticle wall to thicken.

v: Immune system :- Similarly aging occurs in immune system which is no longer as efficient as it was. This is because of poor blood circulation and poor intake of nutrients into the body. so infections may occur or prolonged due to deficiency in immune-system.

vi: muscular system :- muscles mass declines due to absence

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of regular exercise.

vii: Eyes :- Eyes lens begins to stiffen, resulting in difficulty focusing on near objects.

control of aging : < Health style tips >

Aging, being genetic in origin, is a non denying process. However the following tips can slow down aging process.

1: A balance diet.	2: regular exercise.
3: no smoking.	4: proper rest.
5: Stress free life.	6: Hydrate the body.
7: Eat vegetables.	8: Avoid excessive sugar or fats.

End

For Your Information:

By the end of the embryonic period, when the embryo is about 22 mm (slightly less than 1 inch) long from head to buttocks (referred to as the crown-rump measurement), all the adult organ systems are recognizable. It is truly amazing how much organogenesis occurs in such a short time in such a small amount of living matter.

For Your Information:

Ectopic pregnancy: A pregnancy in which the embryo implants in any site other than the uterus; most often the site is a uterine tube (tubal pregnancy). Since the uterine tube (as well as most other ectopic sites) is unable to establish a placenta or accommodate growth, the uterine tube ruptures unless the condition is diagnosed early, or the pregnancy spontaneously aborts.

Exercise

Exercise MCQs

A. Multiple Choice Questions (MCQs).

- The protective coat which surrounds the embryo is known as:
(a) amnion (b) chorion (c) allantois (d) chorio allantoic
- The outer layer of the blastocyst, which later attaches to the uterus is:
(a) Deciduas (b) Trophoblast
(c) Amnion (d) inner cell mass
- Identical twins result from the fertilization of;
(a) one ovum by one sperm (b) one ovum by two sperms
(c) two ova by two sperms (d) two ova by one sperm
- The most important hormone in initiating and maintaining lactation after birth is;
(a) estrogen (b) FSH (c) Prolactin (d) Oxytocin
- After fertilization the zygote goes through a rapid period of cell divisions called
(a) implantation (b) organogenesis
(c) blastulation (d) cleavage
- The process that transforms the embryo into a three-layered stage is:
(a) sedimentation (b) blastulation
(c) cleavage (d) gastrulation
- Which of the following structures is formed from ectodermal tissues?
(a) brain (b) muscles (c) skeleton (d) bones
- Which of the following is NOT a function of the placenta?
(a) respiratory gas transfer (b) urine formation
(c) hormone production (d) nutrient transfer
- The hormone that induces labour and controls labour via a positive feedback mechanism is:
(a) oxytocin (b) progesterone (c) estrogen (d) ADH
- Prolactin causes _____.
(a) myometrial contractions and milk let-down (b) uterine contractions only
(c) milk production by the breast tissue
(d) increased thyroxin excretion during the first month of pregnancy

Answer: (key)

1-a	2-b	3-a	4-c	5-d
6-d	7-a	8-b	9-a	10-c

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Short Questions		
Q1:	— Identify maternal hormones which can initiate labor pains and results in the birth of baby.	
	<u>Answer :- Maternal hormones vas Labour and birth :</u>	
	Four major hormonal systems active when mother's are in Labour and giving birth. These hormones are —	
	1: <u>Oxytocin</u> :- The love hormone.	
	2: <u>Endorphins</u> :- The hormone of pleasure and transcendence.	
	3: <u>Epinephrine and norepinephrine</u> :- The hormone of — excitement. < which can slow Labour >	
	4: <u>prolactin</u> :- The mothering hormone.	
Q2:	— The life span of the ovarian corpus luteum is extended for nearly 3-months after implantation, but otherwise it deteriorates. (a) — why this is so. (b) — why it is important that the corpus luteum remain functional following implantation	
	<u>Answer: Life span of corpus luteum :</u>	
	The life span of the ovarian corpus luteum is extended for nearly 3-months after implantation because —	
	1: The corpus luteum continues secrete progesterone — hormone which play important role in maintaining of preg;	
	2: progesterone also stops further ovulation after zygote formation or implantation.	
	3: after 3-months , the placenta then secrete progesterone	

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	which regulate the same function upto birth.	
Q3:	— What factors are believed to bring about uterine contractions at the termination of pregnancy.	
	<u>Answer</u> :- see Question No-6. (Topic - Birth: write only- Explanation of Birth topic in Question No-6).	
Q4:	— The placenta is a marvelous, but temporary organ. How it is an intimate part of both fetal and maternal anatomy and physiology during the gestation period.	
	<u>Answer</u> :- see Question No-6. (write only—placenta topic)	
Q5:	— what is importance of cleavage.	
	<u>Answer: importance of cleavage:</u>	
	1: Due to cleavage a unicellular zygote is divided — mitotically and produce a multicellular embryo which then developed into a complete organism.	
	2: cleavage differs from other form of cell division in that it increases the number of cells and nuclear mass without increasing the cytoplasmic mass. so cleavage maintains the cell size and nucleo-cytoplasmic ratio of the species.	
	3: cleavage produces large number of cells (blastomeres) required for the building of offspring's body.	
Q6:	— Differentiate between primary and secondary induction.	
	<u>Answer: primary and secondary induction:</u>	

primary induction :- primary embryonic induction is the first induction event that takes place during early - embryogenesis. Firstly, tissues interact to generate the neural tube. neural tube eventually forms the CNS.

Secondary induction :- Secondary embryonic induction is the development of various tissues and organs in - animal embryo. Therefore, in secondary induction, tissues interact in order to govern cell differentiation and - morphogenesis during embryonic development.

Long Questions

Q1: - Elaborate the role of fetal and maternal hormones initiating labour pain and culminating in the birth of baby

Answer: 1: Effect of fetal hormones on the uterus:

The fetus pituitary gland secretes increasing quantities of oxytocin, which might play a role in exciting the uterus. also the fetus adrenal glands secrete large quantities of cortisol, another possible uterine stimulant. In addition, the fetal - membranes release prostaglandins in high concentration at the time of labour. These, too, can increase the intensity of uterine contraction.

2: Effect of maternal Hormones on the uterus :- mother Hormone involve in initiating Labour pain is oxytocin. This

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hormone is released in response to low progesterone as well as due to pressure on sensor (receptors) in cervix of mother. These impulses are carried to brain, then brain send signals to posterior pituitary gland which start secreting oxytocin. This oxytocin hormone contract uterine muscles and cause Labour pain and help in birth of baby. → Thus both maternal and fetal Hormones play imp; in birth.		
Q2:	— List down the main events leading to gastrulation. <u>Answer:</u>— See Question No-1. (write only ① cleavage + Blastocyst, 2: Implantation and 3: gastrulation only).	
Q3:	— Give an account of the structure of placenta and umbilic^{cord}. <u>Answer:</u>— See Question No-6. (write only placenta, umbilic^{cord}).	
Q4:	— Explain why proper nourishment of the mother is imperative during the 3rd-trimester of pregnancy. <u>Answer:</u>— <u>Nourishment vs 3rd trimester:</u> <u>Introduction:</u>— Baby gains weight (28gm/day) quickly during the 3rd trimester and parts of their body — continues to form and grow. with all this stuff — happening, the food choices of mother make are — very important for the health of baby. <u>Explanation:</u>— To maintain a healthy pregnancy, — approximately 300–500 extra calories are needed each day. These calories should come from a balanced diet of protein, fruits, vegetable and whole grains. eating a	

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healthy, balanced diet will help mother feel good and provide every thing to mother and her baby need. <u>Importance of proper nourishment:</u> 1: A healthy, well balanced diet can also help to reduce some pregnancy symptoms such as—nausea, constipation 2: The food mother use (eat) is the main source of — nourishment for her baby. 3: Eating a nutritious diet during pregnancy is linked to good brain development and a healthy birth weight, and can reduce the risk of many birth defects. Q5: — Describe the process of early cleavage and blastocyst formation. <u>Answer:</u> — See Question No-1 (write only—cleavage and — blastocyst in Question No-1). Q6: — Explain the role of nucleus in the control of — development. <u>Answer:</u> — see Question No-2 (write only—Role of nucleus Q7: — Give a brief over view of the work done by Hans spemann in the discovery of embryonic induction. <u>Answer:</u> — See Question No-4. (write only embryonic induction and experiments in Question No-4). Q8: — Discuss the major events of human, embryonic — development during 1st—trimester. <u>Answer:</u> — See Question No-5. (write only 1st trimester) —End—		

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Previous Entry Test MCQ's of Biology Chapter No -21: (Development and Aging)		
2005 ETEA		
1. Which one of the following is the additional function of the embryonic membranes?	(a) Respiration and reproduction	(b) Reproduction and nourishment
	(c) Storage of waste products	(d) Respiration and storage of waste products
2. The mesodermal cell which give rise to urinary system in frog are called:	(a) Pincer cells	(b) Blastomers
	(c) Nephrostome	(d) Parietal
3. The transitory stage in between cleavage and gastrulation is:	(a) Organogenesis	(b) Blastula
	(c) Gastrula	(d) Development
2006 ETEA		
4. The cells that play vital role in the differentiation of various body parts are called:	(a) Ectodermal cells	(b) Mesodermal cells
	(c) Endodermal cells	(d) All of the above
5. The developing embryo is protected against the physical trauma by:	(a) Pericardial fluid	(b) Allantoic fluid
	(c) Amniotic fluid	(d) All of them
6. The individual with hare-lip shows with of the following condition?	(a) Hard palate	(b) Polydactyl
	(c) Cleft-palate	(d) Microcephale
	7. Two individuals formed when two eggs are fertilized of the same time results in twins that are genetically different are:	(a) Identical twins
		(b) Siamese twins
		(c) Fraternal twins
		(d) Double twins
2009 ETEA		
8. Cleavage differs from mitosis in that:	(a) It occurs in only zygote	(b) It occurs in all body cells
	(c) It results into haploid cells only	(d) It results into identical cells
2010 ETEA		
9. Which germinal layer develops in digestive system?	(a) Ectoderm	(b) Mesoderm
	(c) Epidermis	(d) Endoderm
10. During the development of chick peripheral part of the blastoderm lies unseparated from the yolk and from:	(a) Area pellucid	(b) Area apace
	(c) Notochord	(d) Primitive streak
2011 ETEA		
11. The organism developed with two heads and one trunk is called:	(a) Identical twins	(b) Siamese twins
	(c) Dizygotic twins	

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(d) Fraternal twins

12. All of the following are derived from mesoderm except:

(a) Muscles (b) Liver
(c) Gonads (d) Blood vessels

2013 ETEA

13. In chick development epiblast gives rise to:

(a) Ectoderm and endoderm
(b) Ectoderm and mesoderm
(c) Mesoderm and endoderm
(d) Mesoderm only

14. Muscles develop from:

(a) Ectoderm (b) Mesoderm
(c) Endoderm (d) All of them

2014 ETEA

15. Lungs are ----- in origin---

a) Ectodermal b) endodermal
(c) Mesodermal d) Performed

2015 ETEA

16. Implantation of zygote takes place in the -----

a). 2nd week b). 3rd week
(c). 4th week d). 5th week

17. Embryonic mass can generate all of the following except---

a). amnion b). chorion
(c). yolk sac d). allantois

2017 ETEA

18. Implantation of embryo takes place in which week of pregnancy?

(a) 1st (b) 2nd
(c) 3rd (d) 4th

19. Acetabularia mediterranea is:

(a) A fungus (b) An algae
(c) A protozoan (d) A prokaryote

20. The common name of rubella is:

(a) Whooping cough
(b) German measles
(c) African sleeping sickness
(d) Tay Sachs's Disease

21. The organism developed with two heads and one trunk is called:

(a) Identical twins
(b) Dizygotic twins
(c) Fraternal twins
(d) Siamese twins

2019 ETEA

22. To the end of first trimesters the embryo can now technically describe as a:

(a) Zygote (b) Infant
(c) older (d) Fetus

23. Acetabularia crenulata has a _____ shaped cap.

(a) Irregular (b) Umbrella
(c) Regular (d) Disc

Key: -

1.d	2.c	3.b	4.d	5.c	6.c
7.c	8.a	9.d	10.a	11.b	12.b
13.b	14.b	15.b	16.c	17.b	18.d
19.b	20.b	21.d	22.d	23.a	

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