2.1 Gamete Production and Fertilisation

1. **What are the two main functions of the testes?**
   Testosterone production and sperm production.
2. **Where are sperm cells produced?**
   In the seminiferous tubules.
3. **What do the prostate gland and seminal vesicles secrete?**
   Fluids that maintain sperm viability and mobility.
4. **What surrounds and nourishes a developing ovum?**
   The follicle.
5. **Where does fertilisation take place?**
   In the oviduct.
6. **What happens to the zygote immediately after fertilisation?**
   The zygote divides to form an embryo.
7. **How does the follicle support the ovum during development?**
   The follicle provides nutrients and hormonal support.

2.2 Hormonal Control of Reproduction

1. **Which gland releases FSH and LH?**
   The pituitary gland.
2. **What is the role of FSH in males and females?**
   It stimulates sperm production in males and follicle development in females.
3. **What hormone stimulates sperm production?**
   Interstitial Cell Stimulating Hormone (ICSH) in males.
4. **Which hormone triggers ovulation?**
   Luteinising Hormone (LH).
5. **What hormone stimulates the thickening of the endometrium?**
   Oestrogen.
6. **How does oestrogen affect cervical mucus?**
   Oestrogen makes cervical mucus thinner and more easily penetrated by sperm.
7. **What is the role of progesterone after ovulation?**
   Progesterone maintains the endometrium for implantation.
8. **How does negative feedback control regulate testosterone levels?**
   High levels of testosterone inhibit FSH and ICSH production.
9. **What happens to the corpus luteum if fertilisation does not occur?**
   It degenerates, causing a drop in progesterone levels.
10. **How do hormone levels change during the follicular phase of the menstrual cycle?**
    FSH rises, stimulating follicle development and oestrogen production.

2.3 The Biology of Controlling Fertility

1. **What is the difference between cyclical and continuous fertility?**
   Cyclical fertility is restricted to the fertile window in women, while continuous fertility means men produce sperm continuously.
2. **How do physical contraceptive methods prevent pregnancy?**
   They prevent sperm from meeting the egg (e.g., barriers, sterilisation).
3. **What hormones are found in the combined contraceptive pill?**
   Oestrogen and progesterone.
4. **How does the mini-pill differ from the combined pill?**
   It contains only progesterone, thickening cervical mucus to prevent sperm entry.

5. **What is the purpose of ovulation-stimulating drugs?**
   They stimulate the development and release of eggs.
6. **How does artificial insemination help couples with fertility issues?**
   It helps when the male has a low sperm count.
7. **What is ICSI, and when is it used?**
   ICSI involves injecting a single sperm directly into an egg, used for low sperm count or defective sperm.
8. **How does IVF work?**
   IVF involves fertilisation in a lab and implantation of embryos into the uterus.
9. **What is the role of pre-implantation genetic diagnosis (PGD)?**
   To detect single-gene or chromosomal disorders before implantation.
10. **What is a potential risk of using ovulation-stimulating drugs?**
   There is a risk of multiple births.

2.4 Antenatal and Postnatal Screening

1. **What is the purpose of antenatal screening?**
   To identify the risk of disorders in the fetus.
2. **When are dating scans and anomaly scans performed?**
   Dating scans: 8–14 weeks; anomaly scans: 18–20 weeks.
3. **What is a karyotype?**
   A visual display of chromosomes arranged in homologous pairs.
4. **What are the key differences between amniocentesis and CVS?**
   Amniocentesis is performed later (15–18 weeks) and has a lower miscarriage risk; CVS is earlier (10–12 weeks) but riskier.
5. **What is the main risk associated with CVS?**
   A higher risk of miscarriage.
6. **How can marker chemicals in blood tests help detect fetal abnormalities?**
   They indicate potential abnormalities but must be interpreted carefully.
7. **What can cause a false-positive result in screening tests?**
   Measuring marker chemicals at the wrong stage of pregnancy.
8. **What is the purpose of genetic counselling?**
   To advise individuals on the risks of genetic disorders.
9. **How are family histories used to predict genetic disorders?**
   By tracing the inheritance of conditions over three generations.
10. **How can ultrasound scans detect physical abnormalities in a fetus?**
   By identifying structural abnormalities like spina bifida.

(Continued in the next response due to length)

2.5 The Structure and Function of Arteries, Capillaries, and Veins

1. **What type of blood vessel carries blood away from the heart?**
   Arteries.
2. **Which blood vessel has the thinnest walls?**
   Capillaries.
3. **What is vasodilation, and how does it affect blood flow?**
   It widens blood vessels, increasing blood flow.
4. **What is vasoconstriction, and why is it important?**
   It narrows blood vessels, reducing blood flow, important for regulating blood pressure.

5. **What is the function of valves in veins?**
   To prevent backflow of blood.
6. **What is the role of pressure filtration in capillaries?**
   It forces plasma out of capillaries to form tissue fluid.
7. **How do tissue fluid and blood plasma differ in composition?**
   Tissue fluid lacks plasma proteins, which are too large to pass through capillary walls.
8. **What happens to excess tissue fluid in the body?**
   It is absorbed by lymphatic vessels and returned to the bloodstream.
9. **What structural differences exist between arteries and veins?**
   Arteries have thicker muscular walls and more elastic fibres than veins.
10. **Why do arteries have elastic walls?**
    To withstand the high pressure of blood pumped by the heart.

2.6 The Structure and Function of the Heart
1. **What are the three phases of the cardiac cycle?**
   Diastole, atrial systole, and ventricular systole.
2. **Where is the sino-atrial node (SAN) located?**
   In the wall of the right atrium.
3. **What is the function of the atrio-ventricular node (AVN)?**
   It transmits impulses from the SAN to the ventricles.
4. **What do the AV valves do during ventricular systole?**
   They close to prevent backflow of blood into the atria.
5. **What is the purpose of the semi-lunar valves?**
   To prevent backflow of blood into the ventricles.
6. **What does an ECG measure?**
   The electrical activity of the heart.
7. **What do the P wave, QRS complex, and T wave on an ECG represent?**
   P wave: atrial contraction, QRS complex: ventricular contraction, T wave: ventricular relaxation.
8. **How do the sympathetic and parasympathetic nervous systems affect heart rate?**
   The sympathetic system increases heart rate, while the parasympathetic system decreases it.
9. **What is a typical blood pressure reading for a young adult?**
   120/80 mmHg.
10. **How is cardiac output calculated?**
    Cardiac output = heart rate × stroke volume.
11. **What happens to the blood flow in diastole?**
    Blood flows into the atria and ventricles from the veins.
12. **Why do arteries experience higher pressure than veins?**
    Because arteries are closer to the heart and must handle the force of blood pumped by the heart.

2.7 Pathology of Cardiovascular Disease (CVD)
1. **What causes atherosclerosis?**
   The build-up of fatty material under the endothelium of arteries.
2. **What is an atheroma, and how does it form?**
   A fatty plaque that narrows the artery lumen, formed by cholesterol and fibrous material.

3. **What effect does an atheroma have on blood flow?**
   It restricts blood flow and increases blood pressure.
4. **What is thrombosis?**
   The formation of a blood clot in a blood vessel.
5. **How does prothrombin become thrombin?**
   Prothrombin is converted to thrombin by clotting factors.
6. **What role does fibrin play in clot formation?**
   It forms threads that trap blood cells, creating a clot.
7. **What is an embolus, and how does it cause damage?**
   A blood clot that breaks free and travels through the bloodstream, potentially blocking a vessel.
8. **What are the potential outcomes of a thrombosis in the coronary arteries?**
   It can cause a heart attack by blocking blood flow to the heart muscle.
9. **How does HDL protect against cardiovascular disease?**
   It removes excess cholesterol to the liver for elimination.
10. **What is the role of LDL receptors in cholesterol uptake?**
    They allow cells to take in LDL cholesterol from the blood.
11. **How do lifestyle factors influence HDL and LDL levels?**
    Exercise increases HDL levels, and a healthy diet reduces LDL levels.
12. **What are statins, and how do they reduce CVD risk?**
    Drugs that inhibit cholesterol synthesis in the liver, reducing blood cholesterol levels.
13. **What is peripheral vascular disease?**
    Narrowing of arteries outside the heart and brain, often in the legs.

2.8 Blood Glucose Levels and Obesity

1. **Which hormone lowers blood glucose levels?**
   Insulin.
2. **What is the function of glucagon?**
   It raises blood glucose levels by converting glycogen into glucose.
3. **How does adrenaline influence blood glucose levels?**
   It inhibits insulin and stimulates glucagon secretion.
4. **What is the main cause of Type 2 diabetes?**
   Insulin resistance due to reduced insulin receptor sensitivity.
5. **What is the difference between Type 1 and Type 2 diabetes?**
   Type 1: no insulin production; Type 2: reduced cell sensitivity to insulin.
6. **What is the glucose tolerance test used for?**
   To diagnose diabetes by measuring how the body responds to glucose intake.
7. **How does high blood glucose damage blood vessels?**
   It damages the endothelium of small blood vessels.
8. **What BMI value is used to indicate obesity?**
   A BMI of over 30.
9. **How can diet and exercise help reduce the risk of obesity?**
   By reducing fat levels, increasing energy expenditure, and improving cardiovascular health.
10. **What are the effects of chronic high blood glucose on the retina?**
    It can cause haemorrhaging and vision loss.
11. **How is glycogen involved in glucose regulation?**
    Glycogen is stored in the liver and broken down to maintain blood glucose levels.