EXCRETION REVISION MK

**Question 40 (20 marks)**

1. The nephron is the primary structure concerned with the formation of urine. It is composed of a number of parts, including the:
   1. glomerulus
   2. proximal convoluted tubule
   3. distal convoluted tubule
   4. collecting duct.

Describe the role played by each of these nephron parts in the formation of urine.

(13 marks)

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| (i) | Glomerulus: |  |
| Acts as a filter | | 1 |
| Large molecules will not pass through | | 1 |
| such as proteins/red blood cells | | 1 |
| Small substances such as urea, glucose, water and salts pass through freely | | 1 |
| (ii) | Proximal convoluted tubule: |  |
| Reabsorption of some essential substances | | 1 |
| These include glucose, salts, amino acids etc. | | 1 |
| Reabsorption may be passive or active | | 1 |
| (iii) | Distal convoluted tubule: |  |
| Any 4 of: | |  |
| * Tubular secretion occurs * Substances such as creatinine/antibiotics are added to urine * Hydrogen ions may be added or removed * Na+ and K+ salts are added or removed * Under influence of aldosterone | | 1–4 |
| (iv) | Collecting duct: |  |
| Urine concentration is increased | | 1 |
| Amount of water retained under influence of ADH | | 1 |
| **Total** | | **13** |

1. To perform their function, regions along the nephron must move substances across a membrane. Processes that enable this to occur include:
   1. diffusion
   2. osmosis
   3. active transport.

Describe each of these processes. (7 marks)

|  |  |  |
| --- | --- | --- |
| **Description** | | **Marks** |
| (i) | Diffusion |  |
| Any 2 of: | | 1–2 |
| * Passive process * Moves substances from regions of high concentration to low concentration * Affected by size of substance/concentration difference | |
| (ii) | Osmosis |  |
| Any 3 of: | | 1–3 |
| * Movement of water * Passive process * Moves water from regions of low solute concentration to high solute concentration/movement of water from areas of high concentration to areas of low concentration * Affected by osmotic gradient | |
| (iii) | Active Transport |  |
| Any 2 of: | | 1–2 |
| * Active process/energy needed/ATP used * Moves substances from regions of low concentration to high concentration * Carrier molecules needed | |
| **Total** | | **7** |

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1. Identify the structures labelled ‘B’ and ‘C.’ (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| B – Proximal convoluted tubule | 1 |
| C – Loop of Henle | 1 |
| **Total** | **2** |

1. State the function of the structures labelled ‘A’ and ‘D’. (2 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| A – Filtration of the blood/ formation of filtrate | 1 |
| D – Reabsorption of salts/ water/ secretion of H,+, K+, creatinine, drugs | 1 |
| **Total** | **2** |

1. What function do the structures labelled ‘E’ and ‘F’ perform that affects the composition of urine? (4 marks)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| E – Secrete substances into urine/ secrete H+ ions/ creatinine into urine | 1 |
| E – Adjust potassium and sodium levels | 1 |
| F – Adjusts volume of urine | 1 |
| gF – Adjusts concentration of urine/ absorbs water | 1 |
| **Total** | **4** |

1. Name the organ of the body that produces urea. (1 mark)

|  |  |
| --- | --- |
| **Description** | **Marks** |
| Liver | 1 |
| **Total** | **1** |