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MATHEMATICS

Pure Mathematics 4

Chapter 1 to 6 only.

IT

Unit 4: 17.1 Database applications (Practical Exam)

18.1 Structuring data

18.1.1 Be able to construct and amend relational databases in terms of:

a) tables
b) records
c) fields
d) relationships

18.1.2 Be able to use appropriate data types when structuring data:

a) text(limitedlength,unlimitedlength,memo)
b) number(byte,integer,longinteger,double,decimal)
c) date/time
d) currency
e) Boolean(yes/no,on/off,true/false).

18.1.3 Be able to format data types using common and customised formats.

18.1.4 Be able to evaluate the appropriateness and effectiveness of a data structure in relation to the requirements of given scenario.

18.2 **Relational data structures**

18.2.1 Understand the need for and function of relational data structures.

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18.2.2 Be able to implement the features and attributes of data relationships in terms of:

a. relationships(many-to-one,many-to-many,one-to-one)

b. primary,foreign and compositekeys

c. referential integrity.

18.2.3 Be able to evaluate the appropriateness and effectiveness of a relational data structure in relation to the requirements of given scenario.

18.3 Data entry and validation techniques

18.3.1 Understand the need to ensure that stored data is suitable for processing and the methods used to achieve it.

18.3.2 Be able to use validation techniques that can be used to ensure data accuracy:

- presencecheck
- rangecheck
- lookup check
- listcheck
- format check
- length of data check.

18.3.3 Be able to construct appropriate error messages that give users appropriate and helpful feedback as to the nature of the problem.

18.3.4 Be able to use techniques to aid and improve the quality of data entry:

1. userhelp
2. inputmasks
3. dropdown lists
4. radiobuttons
5. checkboxes
6. automated processes.

PHYSICS

Business Unit 4 Chapter 21 - Chapter 30

Unit 4:

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BUSINESS

- Chapters 21 - Chapter 30

CHEMISTRY

UNIT 5

- Redox equilibria
- Transition metals

ACCOUNTING

1. Standard Costing
2. Project Appraisal
3. Break Even Analysis
4. Marginal Costing & Absorption Costing

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ECONOMICS

Eco Unit 4 Chapters 21 to Chapter 30

BIOLOGY

Unit 4 (everything is included)

Unit 5 (following specifications will be included)

Topic 7 – Respiration, Muscles and the Internal Environment
7.1 (i) understand the overall reaction of aerobic respiration as splitting of the respiratory substrate to release carbon dioxide as a waste product and reuniting hydrogen with atmospheric oxygen with the release of large amounts of energy

(ii) understand that respiration is a stepped process, with each step controlled and catalysed by a specific intracellular enzyme. Names of specific enzymes are not required.

7.2 understand the roles of glycolysis in aerobic and anaerobic respiration, including the phosphorylation of hexoses, the production of ATP by substrate level phosphorylation, reduced coenzyme, pyruvate and lactate. Details of intermediate stages and compounds are not required.

7.3 understand the role of the link reaction and the Krebs cycle in the complete oxidation of glucose and formation of carbon dioxide (CO_2) by decarboxylation, ATP by substrate level phosphorylation, reduced NAD and reduced FAD by dehydrogenation (names of other compounds are not required) and that these steps take place in mitochondria, unlike glycolysis which occurs in the cytoplasm

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7.4 understand how ATP is synthesised by oxidative phosphorylation associated with the electron transport chain in mitochondria, including the role of chemiosmosis and ATP synthase

7.5 understand what happens to lactate after a period of anaerobic respiration in animals

7.6 understand what is meant by the term respiratory quotient (RQ)

7.9 know the way in which muscles, tendons, the skeleton and ligaments interact to enable movement, including antagonistic muscle pairs, extensors and flexors

7.10 (i) know the structure of a mammalian skeletal muscle fibre
(ii) understand the structural and physiological differences between fast and slow twitch muscle fibres

7.11 understand the process of contraction of skeletal muscle in terms of the sliding filament theory, including the role of actin, myosin, troponin, tropomyosin, calcium ions (Ca^{2+}), ATP and ATPase
7.12 (i) know the myogenic nature of cardiac muscle
(ii) understand how the normal electrical activity of the heart coordinates the heartbeat, including the roles of the sinoatrial node (SAN), the atrioventricular node (AVN), the bundle of His and the Purkyne fibres
(iii) understand how the use of electrocardiograms (ECGs) can aid in the diagnosis of abnormal heart rhythms
7.13 (i) be able to calculate cardiac output
(ii) understand how variations in ventilation and cardiac output enable rapid delivery of oxygen to tissues and the removal of carbon dioxide from them, including how the heart rate and ventilation rate are controlled and the roles of the cardiovascular control centre and the ventilation centre in the medulla oblongata
7.14 understand the role of adrenaline in the fight or flight response
7.16 (i) understand what is meant by the terms negative feedback and positive feedback control
(ii) understand the principle of negative feedback in maintaining systems within narrow limits
7.17 understand what is meant by the term homeostasis and its importance in maintaining the body in a state of dynamic equilibrium during exercise, including the role of the hypothalamus in thermoregulation
7.18 know the gross and microscopic structure of the mammalian kidney

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7.19 understand how urea is produced in the liver from excess amino acids (details of the ornithine cycle are not required) and how it is removed from the bloodstream by ultrafiltration
7.20 understand how solutes are selectively reabsorbed in the proximal tubule and how the loop of Henle acts as a countercurrent multiplier to increase the reabsorption of water
7.21 understand how the pituitary gland and osmoreceptors in the hypothalamus, combined with the action of antidiuretic hormone (ADH), bring about negative feedback control of mammalian plasma concentration and blood volume
7.22 understand how genes can be switched on and off by DNA transcription factors, including the role of peptide hormones acting extracellularly and steroid hormones acting intracellularly
Topic 8 – Coordination, Response and Gene Technology
8.1 know the structure and function of sensory, relay and motor neurones, including Schwann cells and myelination
8.2 understand how the nervous system of organisms can cause effectors to respond to a stimulus
8.3 know the structure and function of a spinal reflex arc, including grey matter and white matter of the spinal cord
8.4 understand how a nerve impulse (action potential) is conducted along an axon, including changes in membrane permeability to sodium and potassium ions
8.5 understand the role of myelination in saltatory conduction
8.6 (i) know the structure and function of synapses in nerve impulse transmission, including the role of neurotransmitters and acetylcholine
(ii) understand how the pupil dilates and contracts
8.7 understand how the effects of drugs can be caused by their influence on nerve impulse transmission, illustrated by nicotine, lidocaine and cobra venom alpha toxin, the use of L-DOPA in the treatment of Parkinson's disease and the action of MDMA (ecstasy)
8.8 understand how the nervous systems of organisms can detect stimuli with reference to rods in the retina of mammals, the roles of rhodopsin, opsin, retinal, sodium ions, cation channels and hyperpolarisation of rod cells in forming action potentials in the optic neurones
8.9 understand what is meant by the term habituation
8.10 know that the mammalian nervous system consists of the central and peripheral nervous systems
8.11 understand how phytochrome, auxin (IAA) and gibberellins bring about responses in plants, including their effects on transcription

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8.13 understand how coordination in animals is brought about through nervous and hormonal control

8.14 know the location and main functions of the cerebral hemispheres, hypothalamus, pituitary gland, cerebellum and medulla oblongata of the human brain

8.15 understand how magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET) and computed tomography (CT) are used in medical diagnosis and the investigation of brain structure and function