(*b*) Mention the different groups of xenobiotic compounds.

(*c*) Name two common classes of microbial enzymes those are involved in biodegradation.

$\left(1\frac{1}{2}+1\frac{1}{2}\right)+1+1$

Or

(*a*) What is meant by Biomining ?

(*b*) How are microorganisms able to mobilize metals ?

(*c*) Mention the influencing microbiological parameters of bioleaching environment.

1 + 2 + 2

2. (*a*) Classify normal flora of human host.

(*b*) Mention the beneficial effects of normal flora to human host.

(*c*) Give a brief account of tissue specificity of normal flora. 1 + 2 + 2

Or

(*a*) What is infection ?

PG/IIIS/H.PHY-304/15

M.Sc. 3rd Semester Examination, 2015

HUMAN PHYSIOLOGY

PAPER – H.PHY-304 (Unit-31 & 32)

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

Write the answers to questions of each Group in separate books

(*Microbiology and Immunology*)

Answer **all** questions

UNIT – 31

1. (*a*) What do you understand by bioremediation ? Why do microbes play important role in bioremediation ?

(*b*) Highlighting host-parasite interaction, explain how does a microbial infection develop in human host.

(*c*) Explain the terminologies, "sporadic" and "endermic" infections. 1 + 2 + 2

3. What is RUBP ? Mention the role of RUBP in CO_2 fixation along with its features. 1 + 4

Or

(*a*) What is C-4 cycle ? Write down its significance.

(*b*) Mention one biochemical pathway by which oxaloacetate is generated in C-4 cycle. (2 + 1) + 2

4. (*a*) Describe the reaction sequences of Nitrification in nature and microbial involvement in it.

(*b*) Also mention the importance of Nitrification in nitrogen cycle.

(*c*) What are denitrifying bacteria ? (2 + 1) + 1 + 1

Or

(*a*) Give a brief account of the structure and mode of action of Nitrogenase enzyme in BNF.

(*b*) What is nif operon ? 4 + 1

UNIT – 32

1. What is immunological synapse ? Discuss in brief the TCR signalosome complex for T-cell activation. 1 + 4

Or

Write the different steps in B-cell development. 5

2. What do you mean by 'MHC restriction' ? Illustrate the general structure of MHC class I and II molecules indicating chains, domains and the regions forming the antigen-binding cleft. 1 + 4

(*Ergonomics and Sports Physiology*)

Answer **all** questions

UNIT – 31

1. Describe the contraction and metabolic properties of different types of muscle fiber. 5

Or

How can you determine the muscle fiber types by muscle biopsy method ? Also describe how can you do the same, by any indirect method. 3 + 2

2. What do you mean by VO_2-max and VO_2-peak ? Point out the Tread mill GXT protocol for determining VO_2-max. 1 + 4

Or

What is anaerobic capacity ? How can you improve anaerobic capacity ? 1 + 4

Or

Describe the endocytic pathway of antigen processing and presentation. 5

3. What is immunological tolerance ? Describe Hashimoto's thyroiditis and Rheumatoid arthritis with their mechanism of development and characteristic features. 1 + (2 + 2)

Or

(*a*) What are initiator and executioner caspases ?

(*b*) Describe briefly the mitochondrial pathway of apoptosis. 1 + 4

4. Write the mechanism of class switching with suitable diagram. 5

Or

What types of immune response is mediated by Th-I and Th-2 subset ? $2\frac{1}{2}+2\frac{1}{2}$

3. What are the causes of iron deficiency among athletes ? State the characteristics of different stages of sports anemia. 2 + 3

Or

(*a*) What is the recommended calorie intake for athletes ?

(*b*) State the importance of dietary protein for the athletes. 2 + 3

4. Discuss the effects of exercise on hypothalamus-pituitary-adrenal axis. State the role of beta-endorphin during exercise. 3 + 2

Or

State the effects of exercise on lymphocytes and immunoglobulins. 2 + 3

UNIT – 32

1. State the ectomorphic characteristics of skeleton, head and trunk. How do you determine ectomorphic component of somatotype ? 3 + 2

Or

State the principle of circuit training. What is detraining ? 3 + 2

2. What is AMI ? State the effects of menstrual cycle on sports performance. 3 + 2

Or

Discuss the biomechanical approach in reducing athletics injury. 5

3. Write the effects of practicing yoga on blood circulation. State the effects of breathing exercise ('pranayama' and 'kapalbhati') on circulation. 2 + 3

Or

How is anxilty and athletic performance related ? Mention the role of motivation on sports performance. $2\frac{1}{2}+2\frac{1}{2}$

4. State the areas of application of biomechanics in sports and exercise. Mention the advantages of biomechanics. 3 + 2

Or

How law of counterforce can be applied in sports ? 5

(Special Paper : *Endocrinology, Reproductive Physiology and Family Welfare*)

Answer **all** questions

UNIT – 31

1. Write the names of cupain hormone binding proteins mentioning their ligands. State the importance of binding proteins in hormone transport. 2 + 3

Or

What are homologous glycoprotein hormones ? Describe critically the post transcriptional modifications several hormones produced from one gene. $1\frac{1}{2}+3\frac{1}{2}$

2. Mention the principle of RIA. Describe the preparation, radiolabelling of the antigen and assay procedure of RIA. State the advantages of RIA over ELISA. 1 + 3 + 1

Or

Describe the structure of G protein-coupled receptors with some common features. What is G protein coupled receptor desensitization. 3 + 2

3. How does thymus gland interact with other organs and regulate immunity by its active biomolecules ? What is 'moonlighting' of thymosin β4 ? 3 + 2

Or

Describe the role of prolactin as endocrine modulator on immune system. 5

4. Describe the role of pro- and anti-apoptotic molecules in the process of apoptosis with reference to spermatogenesis, sperm differentiation and maturation. 5

Or

Describe the role of any two antiestrogens for the treatment of endocrine-responsive tumours. $2\frac{1}{2}+2\frac{1}{2}$

UNIT – 32

1. Describe germ cell development in spermatogenesis with suitable diagram. Write a note on Spermatogonial Stem Cells (SSCs). 3 + 2

Or

Discuss critically the hormonal involvement in oogenesis and follicular development. 5

2. Describe the Gonadal Steroid Synthetic Paths with special reference to the enzymes involved. What is Follicular-2-Cell Pathway ? 3 + 2

Or

What is a bipotential gonad ? Describe the genetic control of sex determination. 1 + 4

3. Describe the effects of oxidative stress on ovarian folliculogenesis and female infertility. 5

Or

Describe the role of estrogen on immune function. Write a note on estrogen as inflammatory mediator. $2\frac{1}{2}+2\frac{1}{2}$

4. Write notes on 'Gamate intrafallopin transfer (GIFT)' and 'In vitro fertilization'. $2\frac{1}{2}+2\frac{1}{2}$

Or

Discuss critically the super ovulation techniques. 5