# 2016

## M.Sc.

## 3rd Semester Examination

### HUMAN PHYSIOLOGY

**PAPER—PHY-304**

*Full Marks* : 40

*Time* : 2 Hours

*The figures in the right-hand margin indicate full marks.*

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

*Illustrate the answers wherever necessary.*

**[ *Microbiology and Immunology* ]**

**( Unit—31 )**

Answer all questions from the following :

1. (a) What are xenobiotic compounds ?

   (b) Mention the reasons of recalcitrant nature of these compounds.

(c) What are the possible enzymatic biodegradation of xenobiotics ? What is co-metabolism ?

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

*Or*

(a) What is bioleaching ?

(b) Mention the basic steps of microbial metal mobilization.

(c) State the important characteristics one leading bioleaching bacteria. 1+2+2

**2.** (a) What is meant by normal microbiotac of human host ? Name one flora of human skin.

(b) Differentiate parasitic and pathogenic flora.

(c) What is bacterial synergism ? Give example.

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

*Or*

(a) What is epidemiology ?

(b) Differentiate epidemic and endemic forms of diseases.

(c) Give a brief account of Invasiveness in pathogenesis.

(d) What is adhesin ? 1+(1+1)+1+1

3. (a) Why Calvin cycle is known as C3 cycle ? Mention the major phases of C3 cycle.

(b) Write down the reaction sequence of Calvin cycle for regeneration of RuBP. (1+1)+3

*Or*

(a) Write down the significance C4 cycle.

(b) Discuss in brief the regulatory features of Ribulose bis Phosphate Carboxylase oxygenase. 2+3

4. (a) Write down the importances of biological nitrogen fixation. Name different agents.

(b) Give a brief account of Mo-Fe protein of nitrogenase enzyme.

(c) State the importance of leghemoglobin. (1+1)+2+1

*Or*

(a) Mention the major steps in Nitrogen cycle including name of one microbe involved in each step.

(b) State the importance of denitrification. (2+2)+1

## ( Unit—32 )

Answer all questions from the following :

1. Discuss in brief the B-Cell signalling mechanism. 5

*Or*

(a) What do you mean by pattern recognition ?

(b) Write about the role of TLR in innate immune response against microbial infections. 1+4

2. (a) What is T-dependant and T-independant antigen ?

(b) Write down the biological significance of the MHC-I and II molecules. 2+3

*Or*

(a) Provide a brief note on cytosolic pathway of antigen processing and presentation.

(b) What is the importance of Ag presentation. 4+1

3. (a) Why do lymphocytes need to learn ?

(b) What constitutes "Thymic education" and "self MHC restriction" ? 2+3

*Or*

(a) Define allograft and xenograft.

(b) Differentiate between acute and chronic graft rejection.

2+3

**4.** Discuss the mechanism of V-D-T recombination. What is its significance ? 4+1

*Or*

(a) What is JAK-STAT Pathway ?

(b) Describe briefly the cytoxine receptor family. 2+3

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## [ *Ergonomics and Sports Physiology* ]

### ( Unit—31 )

Answer all questions from the following :

**1.** (a) What do you mean by short term anaerobic energy system ?

(b) State the control of energy source.

(c) What is allosteric effectors ? 2+2+1

*Or*

State the role of muscle spindle, propioceptors and vestibular apparatus in the involuntary control of muscular activity during exercise.

2. State the physiological criteria for recognizing anaerobic threshold (AT). Mention the significance of AT. 3+2

*Or*

State the limitation of indirect method for determining $VO_2$ max. Mention the steps for 12-min field test for measureing $VO_2$ -max. 2+3

3. State the role of Vit $B_1$ in exercise induced fatigue and congnitive functioning. Point out the importance of sodium supplementation during hyponatrimia. 3+2

*Or*

How carbohydrate supplementation can be made after the exercise ? State the importance of glycemic index during supplementation of carbohydrate in recovery period. 3+2

4. State the role of catecholamines and pancreatic hormones during exercise. How male hormone is changed during exercise ? 4+1

*Or*

State the effects of exercise on complement protein. How inherferon is related no exercise ? Mention the effects of exercise during infection. 2+1+2

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## ( Unit—32 )

Answer all questions from the following :

**1.** (a) Explain the following classes of somatotypes :

(i) Central somatotype ;

(ii) Balanced mesomorph ;

(iii) Mesomorph ecotomorph ;

(iv) Ectomorphic endomorph.

(b) How different components of somatotype are related to athletic performance ? 2+3

*Or*

What is interval training ? State the rationale of interval training. Mention the principle of Fartlek training. 1+2+2

**2.** What do you mean by traumatic and overuse injury in sports ? Write briefly the steps of healing process after injury. 2+3

*Or*

Discuss briefly the erythropoiesis stimulating technique for blood doping. Mention the side effects of blood doping. 3+2

3. (a) Example the effects of yoga on hand grip strength with experimental evidences.

(b) Mention the cognitive benefit of practicing yoga. 3+2

*Or*

Define arousal and anxiety. Mention how reaction time influences the athletic performance? 2+3

4. State with examples the principles of law of inertia applied in sports, What is kinematics? 4+1

*Or*

What is osteokinematics? Explain the following fundamental motions of Joints: circumduction. protraction, supination, ulnar deviation. 1+4

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(b) State diagrammatically the GPCR signal transduction mechanism involving phospholipase C.

(c) What is GRCR dimerization ? 2+2+1

3. (a) What are beta thymosin ?

(b) Describe the action binding and tissue regeneration action of thymosin $B_4$. 1+(2+2)

*Or*

Explain how does increased thyroid hormone secretion exert immunoenhancing effects during cold stress. 5

4. (a) Describe the apoptotic mechanism via the extrinsic pathway during male germ cell development.

(b) Correlate the role of hormones with male germ cell apoptosis. $2\frac{1}{2}+2\frac{1}{2}$

*Or*

Describe the role of aromatase inhibitors in endocrine responsive tumors.

## [ *Endocrinology Reproductive Physiology and Family welfare* ]

### ( Unit—31 )

Answer all questions from the following :

**1.** (a) Differentiate autocrine signaling from intracine signaling.

(b) Citing an suitable example describe how several hormones play in one function. 2+3

*Or*

(a) State how transcriptional regulation occurs by cyclic AMP.

(b) Mention the regulatory process of mRNA stability in protein hormone synthesis.

(c) What is alternative splicing ? 2+2+1

**2.** (a) Compare the techniques RIA and ELISA as utilized in measurement of hormones.

(b) Mention the advantages of ELISA. 3+2

*Or*

(a) Write down the GPCR types and subtypes.

## ( Unit—32 )

Answer all questions from the following :

**1.** (a) Describe the steps of Spermiogenesis.

(b) How do Sertoli Cells regulate the cycle of the seminiferous epithelium ? $2\frac{1}{2}+2\frac{1}{2}$

*Or*

Describe the process of development of germ cells in the ovary. 5

**2.** (a) What is genetic sex ?

(b) Describe the genetic control of testis determination. 1+4

*Or*

(a) Diagrammatically describe the molecular mechanism of steroid hormone action.

(b) How does StAR help in the process of steroidogenesis ? 3+2

**3.** (a) Elaborate the mechanisms of action of ROS in decreased sperm mobility and spermatozoa DNA damage.

(b) How ROS can be assessed by chemiluminescence ?

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

*Or*

Through immunomodulation how does estrogen receptor take part in genomic actions. 5

4. (a) What is IUI ?

(b) Mention the outcome of IUI in natural and FSH-stimulated cycles. 1+(2+2)

*Or*

(a) State the differences between GIFT and IVF ?

(b) Mention the complications of IVF procedure. 3+2