ZOS455: ADAPTATION BIOLOGY

Teaching hours **10hrs /Unit**

COURSE OUTCOME:

1. To learn biological rhythms in animals including humans.
2. To acquaint the students with different patterns of animal adaptations and chronobiology
3. To enable to get knowledge on animal responses to light and temperature.
4. Students are made to understand the importance of chronobiology and chrono medicine.
5. To learn importance of hibernation, aestivation and insect diapause.
6. Aspirants are made to appreciate the maternal, foetal and neonatal physiology.

UNIT-I

Types of adaptation, environmental variables, environmental conditions of aquatic, terrestrial and xeric habitats. Light condition-eclosion in insects. Biological rhythms, circadian rhythms,Introduction to Chronobiology: Historical developments in chronobiology; Biological oscillation: the concept of average, amplitude, phase and period. Biological clocks, Adaptive significance of biological clocks

UNIT-II

Evolution of biological timing system, clocks genes and evolution, Phase shift, Phase response curves (PRC) and phase transition curves (PTC);Photoreception and photo-transduction, The physiological clock and measurement of day length; Role of photic and non-photic cues in seasonality; Reversal of roles of principal and supplementary cues, The relevance of biological clocks for human welfare - Clock function (dysfunction)

UNIT-III

Photoperiod and regulation seasonal reproduction of vertebrates; Role of melatonin.Depleted oxygen availability and its effects.Anhydrobiosis and hibernation. Adaptation to deep sea living and diving. Physiology of insect diapauses. Inter tidal animals and their adaptations. Concepts of homeostasis, acclimation and acclimatization.Basic mechanisms of biochemical adaptation. Adaptation during physical exercise.

UNIT-IV

Temperature relations, Adaptations to temperature variations, molecular mechanisms of adaptations.Endothermy and ectothermy.Extremophiles varieties and their adaptations. Mechanisms of body temperature regulation, Fever. Heat shock proteins. Chronopharmacology, Chronomedicine, Chronotherapy.

UNIT-V

Alterations and adaptations in maternal physiology during pregnancy. Material and fetalprolactin.Placenta: Endocrine functions, transport mechanisms, Foetal physiology, growth and metabolism, Neonatal physiology. Lactation and Lactogenesis.

REFERENCES

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2. Hadley. F. (1975) Environmental physiology of Desert organisms, Dowden, Hutchinson & Ross, University of California.
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4. Jay, C. D., Jennifer. J. Loros, Patricia J. DeCoursey (ed), (2004) Chronobiology Biological Timekeeping: Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
5. Keele, C.A., Neil E.,Joels N.(1993) Sarson Wright's Applied Physiology.14th Edition, Oxford University Press.
6. Kumar, V. (2002) Biological Rhythms: Narosa Publishing House, Delhi/ Springer-Verlag, Germany.
7. Louw, G.N. (1993) Physiological Animal Ecology, Longman Scientific and Technical Publishers. U.K.
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9. Saunders, D.S. SteelC.G.H. andAfopoulou X., (2002) Insect Clocks (ed.) R.D. Lewis. (3rd Ed) Barens and Noble Inc. New York, USA.
10. Schmidt-NeilsenK. (1995) Animal physiology, Adaptation and Environment. Cambridge University Press.