2023

ZOOLOGY — HONOURS

Paper : DSCC-1

(Cell Biology)

Full Marks : 75

The figures in the margin indicate full marks.

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

Section - A

1. Answer ***any ten*** questions : 2×10

(a) What are vSNARE and tSNARE?

(b) What do you mean by mitochondrial bottleneck?

(c) What is fixative? Mention its one use.

(d) State the functional importance of kinetochore.

(e) What is MTOC?

(f) Define second messenger. Give one example.

(g) What is MPF?

(h) What do you mean by primary cell culture?

(i) Write down the basic principle of FRAP.

(j) State two fundamental differences between phase contrast and standard bright-field microscope.

(k) What do you mean by primary and secondary lysosomes?

(l) What is apoptosome?

(m) Distinguish between endocrine and paracrine modes of cell signaling.

(n) Why mitochondria is referred as a semi-autonomous organelle?

(o) What do you mean by facultative heterochromatin? Give one example.

Section - B

2. Write short notes on ***any three*** of the following : 5×3

(a) Structure and function of Peroxisome

(b) JAK / STAT pathway

(c) Freeze fracture and freeze etching

(d) Rb gene is the 'master brake' of the cell cycle

(e) Nuclear pore complex.

Section - C

Answer *any four* questions.

3. (a) Briefly discuss the experiment of Frye and Edidin to prove mobility of proteins in the plasma membrane.

(b) Distinguish between an ion channel and transporter with example.

(c) Mention the role of COP I, COP II and clathrin coated vesicles in intracellular transport. 3½+2+(1½+1½+1½)

4. (a) What is 'signal hypothesis'?

(b) Describe co-translational protein translocation into the endoplasmic reticulum with suitable diagram.

(c) Briefly discuss the chemiosmotic hypothesis of ATP synthesis. 2+(3+2)+3

5. (a) Write a note on 'Endosymbiotic hypothesis'.

(b) Distinguish between intermediate filaments and actin filaments.

(c) Give an account on the major classes of macromolecules that constitute the extracellular matrix. 3+2+5

6. (a) 'Dynamic instability of microtubules is controlled by GTP hydrolysis.'– Explain with suitable diagram.

(b) Discuss the different levels of chromatin packaging with suitable diagram. (3+1)+(4+2)

7. (a) Briefly describe the chemical nature of lipids in plasma membrane.

(b) Describe the regulation of DNA replication during S-phase of a cell cycle with suitable diagram.

(c) Distinguish between proto-oncogene and tumour suppressor gene with example. 3+(3+1)+3

8. (a) Describe the extrinsic pathway of apoptosis with suitable diagram.

(b) Briefly narrate the position effect variegation with example.

(c) What is numerical aperture of a microscope? Calculate the minimum limit of resolution possible for a light microscope, if maximum value of numerical aperture is 1.25 and wavelength of light is 450 nm. (3+1)+3+(1+2)

9. (a) Discuss the role of P_{53} in DNA damage checkpoint.

(b) Explain signal transduction through GPCR-adenylyl cyclase-cAMP pathway with suitable diagram.

(c) What do you mean by cryofixation? 3+(3+2)+2

2023

ZOOLOGY — HONOURS

Paper : SEC-1

(Applied Entomology)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to write the correct option.

Section - A

Answer ***any twenty-five*** questions. 1×25

1. In grasshoppers, the sclerite on the front of the head located between the frons and the labrum is
   (A) clypeus (B) maxilla
   (C) gena (D) vertex.
2. The modified hindwings in flies used for balance are called
   (A) elytra (B) halteres
   (C) hamuli (D) tegmina.
3. An insect leg used for walking is called
   (A) ambulatory (B) fossorial
   (C) cursorial (D) saltatorial.
4. The order hemiptera contains
   (A) bedbugs and stinkbugs (B) chewing and sucking lice
   (C) roaches and mantids (D) cricket and grasshoppers.
5. Largest insect order is
   (A) Diptera (B) Coleoptera
   (C) Hemiptera (D) Orthoptera.
6. Prognathous mouthparts are projected
   (A) forward (B) downward
   (C) backward (D) none of these.
7. Which one is a social insect?
   (A) Silk Moth (B) Lac Insect
   (C) Honeybees (D) Housefly.

8. Biological method for controlling mosquito is

(A) use of larvicides
(B) spraying insecticides
(C) cultivation of *Gambusia* sp.
(D) use of mosquito net.

9. The time between death and corpse discovery is

(A) Post Mortem Investigation
(B) Post Modern Interval
(C) Post Mortem Interval
(D) Post Management Interval.

10. Insects that appear first on a dead body—

(A) Beetles
(B) Ants
(C) Mites
(D) Flies.

11. The causative agent of Japanese encephalitis is

(A) *Demodex* sp.
(B) *Ixodes* spp.
(C) *Dermacentor* sp.
(D) *Argus* sp.

12. Find out the hydraulic sprayer from the following :

(A) Pressure retaining pumps
(B) Hand compression sprayer
(C) Knapsack sprayer
(D) Tractor mounted sprayer.

13. *Scirpophaga incertulas* is a _____ pest.

(A) Monophagous
(B) Oligophagous
(C) Polyphagous
(D) Sporadic.

14. An insecticide that kills insect when they touch is called a

(A) contact insecticide
(B) fumigant
(C) stomach poison
(D) dessicant.

15. The control strategy which is likely to have the greatest impact on non-target organism?

(A) Chemical control
(B) Cultural control
(C) Biological control
(D) Physical/mechanical control.

16. Quarantine of an insect pest involves

(A) eradication of the pest
(B) limit the movement of the pest
(C) cooperation of the public
(D) both (B) and (C).

17. Drone in a bee colony is

(A) haploid
(B) diploid
(C) formed from unfertilized egg.
(D) both (A) and (C).

18. Which organ is used to store food?

(A) Gizzard
(B) Intestine
(C) Crop
(D) None of these.

19. Non-mulberry silk includes
(A) tasar
(B) eri
(C) muga
(D) all of these.

20. Which is correct about sericin protein of silk?
(A) It is a gelatinous protein.
(B) It forms the inner core of silk filament.
(C) It is secreted from the anterior part of silk gland.
(D) Does not contain pigment.

21. The life cycle of silkworm larva completes through
(A) egg-nymph-adult
(B) egg-larva-adult
(C) egg-larva-prepupa (cocoon)-pupa-adult
(D) egg-larva (cocoon)-prepupa-pupa-adult.

22. Silk secretion contain
(A) 60-70% fibroin, 20-25% sericin
(B) 20-25% fibroin, 60-70% sericin
(C) 50% fibroin, 50% sericin
(D) 99% sericin, 1% fibroin.

23. First part of an insect leg is called
(A) Femur
(B) Coxa
(C) Trochanter
(D) Tibia.

24. Lyonnet's gland is found in which stage of silk moth?
(A) Larva
(B) Pupa
(C) Adult
(D) All of these.

25. Which is called giant honeybee?
(A) *Apis indica*
(B) *A. florea*
(C) *A. dorsata*
(D) *A. mellifera.*

26. Swarming occurs during
(A) Spring
(B) Winter
(C) Summer
(D) All of these.

27. The cells of the honeycomb is _____ in structure.
(A) round
(B) hexagonal
(C) pentagonal
(D) square.

28. The largest cell in the honeycomb is
(A) storage cell
(B) drone cell
(C) queen cell
(D) worker cell.

29. Cockroach belongs to order
(A) Hemiptera (B) Coleoptera
(C) Orthoptera (D) Diptera.

30. Beewax is secreted by
(A) worker (B) drone
(C) queen (D) all of these.

Section - B

Answer *any twenty-five* questions. 2×25

31. A line of weakness between adjacent sclerites that breaks during moulting is called an
(A) apodeme (B) ecdysial suture
(C) apophysis (D) epistomal suture.

32. Which structure is not found in the head capsule of insect?
(A) pleural suture (B) subgenal suture
(C) epistomal suture (D) frontal suture.

33. An ommatidium is best defined as a
(A) subdivision of the ventral nerve cord (B) functional unit of the compound eye
(C) mechanoreceptor used for proprioceptions (D) ventral lobe of insect's brain.

34. Which structure would be found on an insect's pretarsus?
(A) Trochanter (B) Furca
(C) Empodium (D) All of these.

35. Which mouthpart lies between the labrum and maxillae?
(A) Labium (B) Palps
(C) Mandible (D) Epipharynx.

36. Which structure is always associated with Hymenoptera?
(A) Furcula (B) Hamuli
(C) Collophore (D) Elytra.

37. Pollen basket is present in honeybee on
(A) abdominal tip (B) proleg
(C) metaleg (D) antenna.

38. Housefly does not play role in the spreading of
(A) thyphoid (B) shigellosis
(C) dengue (D) dysentry.

39. Hepatitis-B is carried by

(A) *Culex* sp.
(B) *Cimex* sp.
(C) *Periplaneta* sp.
(D) *Rattus* sp.

40. Which drug is not used to treat filariasis?

(A) Ivermectin
(B) Diethyl carbamazine
(C) Combination of (A) and (B)
(D) Chloroquine.

41. The mode through which malaria infection is not possible :

(A) injecting emulsion of salivary glands of female anopheline mosquitoes containing sporozoites.
(B) infected people are used as donors, malaria occurs after blood transfusion.
(C) bites of *Aedes* mosquitoes.
(D) transplacental transmission.

42. The disease causing agents transferred through ovum between generations, is called _____ transmission.

(A) cyclo-developmental
(B) transovarian
(C) cyclo-propagative
(D) propagative.

43. The disease not included in Rickettial complex :

(A) Rocky mountain spotted fever
(B) Siberian tick typhus
(C) Queensland tick typhus
(D) Russian spring summer encephalitis.

44. The modified forewings in beetles is known as

(A) elytra
(B) hamuli
(C) halteres
(D) tegmina.

45. Agricultural aircrafts include

(A) light aircraft with a single engine of 90-125 hp.
(B) medium aircraft with a single engine of 100-450 hp.
(C) heavy aircraft usually with two engines of 125-500 hp.
(D) all of these.

46. The density of pest at which control measures should be applied to prevent it from reaching the economic injury level.

(A) Economic threshold level
(B) General equilibrium level
(C) Toxicity level
(D) None of these.

47. The average population density of an insect population over a long period of time :

(A) Economic injury level
(B) Economic thershold level
(C) General equilibrium level
(D) Toxicity level.

48. Rope dragging in the field is an idle control measure that belong to
(A) cultural control
(B) biological control
(C) mechanical control
(D) chemical control.

49. *Trichogramma japonicum* is the—parasitoid :
(A) Egg parasitoid of brinjal fruit and shoot borer
(B) Larval parasitoid of yellow stem borer
(C) Egg parasitoid of yellow stem borer
(D) Pupal parasitoid of jute semi-looper.

50. Voltinism is
(A) number of generation in a year
(B) single generation in a year
(C) two generations in a year
(D) number of molting in a year.

51. *Scirpophaga incertulas* can be identified through their wing features of
(A) the adult moths have a wing expanse of 25-45 mm
(B) the females have bright yellowish brown forewings with black spot
(C) males are smaller with pale yellow forewings
(D) all of the above.

52. Male mosquitoes have
(A) filiform antenna
(B) plumose antenna
(C) clavate antenna
(D) serrate antenna.

53. Nectar is converted into honey in
(A) Alimentary canal of queen
(B) Alimentary canal of worker bees
(C) Royal chamber
(D) Special hive cells.

54. Hind leg of grasshopper is
(A) cursorial
(B) saltatorial
(C) clasporial
(D) natatorial.

55. The revolutionary change in the construction of modern beehive is the use of
(A) moveable frame
(B) metal reef
(C) smoke
(D) bee brush.

56. A honeybee colony is termed weak/strong on the basis of number of
(A) comb
(B) worker bee
(C) drone
(D) queen.

57. Supersedure is replacement of old

(A) drone
(B) worker bee
(C) queen
(D) all of these.

58. Which of the following is made up of wax?

(A) Foundation sheet
(B) Drone trap
(C) Queen excluder
(D) All of these.

59. In which part of the honeycomb, storage cells are generally built?

(A) Margin of the comb
(B) Top of the comb
(C) Centre of the comb
(D) Both (A) and (B).

60. Antenna found in cockroach is

(A) Filiform
(B) Clavate
(C) Pilose
(D) Plumose.

61. Crushing of food in insects is done by

(A) Green cells
(B) Rectal papilla
(C) Proventriculus
(D) Crop.

62. Which is *not* correct about silk and silkworm?

(A) The bulk of the commercial silk produced in the world comes from tasar silkworm.
(B) Tasar is copperish colour, coarse silk mainly used for furnishing and interiors.
(C) The tasar silk is generated by the silkworm *Antheraea mylitta.*
(D) The silk moth is available in China, Sri Lanka, India.

63. Which of the following is not disinfectant?

(A) Formalin
(B) RKO
(C) Labex
(D) PIB (polyhedric inclusion bodies).

64. Idle rearing of silkworm does not include

(A) low humidity
(B) free from light
(C) highly aerated
(D) maintenance of temperature at 22°C.

65. Which is the incorrect match?

(A) Leishmaniasis — *Anopheles culicifacies*
(B) Dengue fever — *Aedes aegypti*
(C) Filariasis — *Culex pipiens*
(D) Sleeping sickness — *Glossina palpalis.*