# DPP - Daily Practice Problems

## Chapter-wise Sheets

**Date :** _____ **Start Time :** _____ **End Time :** _____

# BIOLOGY

CB22

**SYLLABUS :** Chemical Co-ordination and Integration

**Max. Marks : 180** **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

**1.** Which hormone possesses anti-insulin effect?
(a) Cortisol (b) Calcitonin
(c) Oxytocin (d) Aldosterone

**2.** Which of the following is both exocrine and endocrine gland ?
(a) Liver (b) Pancreas
(c) Thyroid (d) Adrenal

**3.** Chemically hormones are
(a) biogenic amines only
(b) proteins, steroids and biogenic amines
(c) proteins only
(d) steroids only

**4.** The blood calcium level is lowered by the deficiency of
(a) parathormone
(b) thyroxine
(c) both calcitonin and parathormone
(d) calcitonin

**5.** The technique used for estimation of minute amounts of hormones and drugs is called
(a) electrophoresis
(b) electroencephalogram
(c) fractionation
(d) radioimmunoassay

**6.** Testosterone is produced by
(a) sertoli cells (b) leydig's cells
(c) oxyntic cells (d) pituitary gland

**7.** Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency?
(a) Luteinizing - Failure of ovulation
(b) Insulin - Diabetes insipidus
(c) Thyroxine - Tetany
(d) Parathyroid - Diabetes mellitus

**8.** Which one of the following is not a second messenger in hormone action ?
(a) Calcium (b) Sodium
(c) cAMP (d) cGMP

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| **1.** ⓐⓑⓒⓓ | **2.** ⓐⓑⓒⓓ | **3.** ⓐⓑⓒⓓ | **4.** ⓐⓑⓒⓓ | **5.** ⓐⓑⓒⓓ |
| **6.** ⓐⓑⓒⓓ | **7.** ⓐⓑⓒⓓ | **8.** ⓐⓑⓒⓓ | | |

*Space for Rough Work*

**9.** Which of the following statements regarding glucagon is false?
(a) It is secreted by α-cells islets of Langerhans.
(b) It acts antagonistically to insulin.
(c) It decreases blood sugar level.
(d) The gland responsible for its secretion is heterocrine gland.

**10.** Which one of the following statements is correct?
(a) Neurons regulate endocrine activity, but not *vice versa*.
(b) Endocrine glands regulate neural activity and nervous system regulates endocrine glands.
(c) Neither hormones control neural activity nor the neurons control endocrine activity.
(d) Endocrine glands regulate neural activity but not *vice versa*.

**11.** Match the source gland with respective hormone as well as the function correctly.

| | Source gland | Hormone | Function |
|---|---|---|---|
| (a) | Anterior pituitary | Oxytocin | Contraction of uterus muscles during child birth |
| (b) | Posterior pituitary | Vasopressin | Stimulates reabsorption of water in the distal tubules in the nephron |
| (c) | Corpus luteum | Estrogen | Supports pregnancy |
| (d) | Thyroid | Thyroxine | Regulates blood calcium level |

**12.** Which of the following is incorrect?
(a) Iodine is needed for thyroxine formation.
(b) Calcium regulates the excitibility of nerve fibres.
(c) Potassium plays an important role in the regulation of acid base balance in cell.
(d) Phosphorus helps to maintain the osmotic pressure of the body fluids.

**13.** Sertoli cells are found in
(a) ovaries and secrete progesterone
(b) adrenal cortex and secrete adrenaline
(c) seminiferous tubules and provide nutrition to germ cells
(d) pancreas and secrete cholecystokinin

**14.** The phase of menstrual cycle in humans that lasts for 7-8 days, is
(a) follicular phase (b) ovulatory phase
(c) luteal phase (d) menstruation

**15.** Blood glucose level in man is regulated by:
(a) insulin
(b) adrenaline
(c) glucagon and insulin
(d) All of the above

**16.** Which of the following glands grows to the maximum size at puberty and then diminishes gradually?
(a) Thymus (b) Pituitary
(c) Thyroid (d) Adrenal

**17.** Hypoglycemic hormone is
(a) Insulin (b) Glucagon
(c) Thyroxine (d) Calcitonin

**18.** Which of the following diseases is caused by the under secretion of cortisol?
(a) Anaemia
(b) Addison's disease
(c) Hyperglycemia
(d) Mental illness or retardation

**19.** Glycogen is converted to glucose by
(a) Insulin
(b) Glucagon
(c) Galactose
(d) Both glucagons and insulin

**20.** A decrease in the level of oestrogen and progesterone causes
(a) Growth and dilation of myometrium
(b) Growth of endometrium
(c) Constriction of uterine blood vessels leading to sloughing of endometrium or uterine epithelium
(d) Release of ovum from the ovary.

**21.** Which of the following is a minerelocorticoid?
(a) Calciferol (b) Progesterone
(c) Adrenalin (d) Aldosterone

**22.** Which hormone interacts with membrane bound receptor and does not normally enter the target cell ?
(a) Follicle stimulating hormone
(b) Estrogen
(c) Thyroxin
(d) Cortisol

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **9.** (a)(b)(c)(d) | **10.** (a)(b)(c)(d) | **11.** (a)(b)(c)(d) | **12.** (a)(b)(c)(d) | **13.** (a)(b)(c)(d) |
| | **14.** (a)(b)(c)(d) | **15.** (a)(b)(c)(d) | **16.** (a)(b)(c)(d) | **17.** (a)(b)(c)(d) | **18.** (a)(b)(c)(d) |
| | **19.** (a)(b)(c)(d) | **20.** (a)(b)(c)(d) | **21.** (a)(b)(c)(d) | **22.** (a)(b)(c)(d) | |

*Space for Rough Work*

**23.** The 24 hour (diurnal) rhythm of our body such as the sleep-wake cycle is regulated by the hormone
(a) Adrenaline (b) Melatonin
(c) Calcitonin (d) Prolactin

**24.** Steroid hormones transmit their information by
(a) stimulating the receptors present on cell membrance
(b) entering into the cell and modifying cellular contents
(c) entering into the cell and modifying nuclear organization
(d) the help of an intracellular second messenger

**25.** Increase in bleeding time and delay in blood coagulation is due to the deficiency of which hormone?
(a) Adrenaline (b) Noradrenaline
(c) Parathormone (d) Thyroxine

**26.** Estrogen and testosterone are steroid hormones, and most likely bind to
(a) membrane ion channels
(b) enzyme-linked membrane reseptors
(c) G-protein coupled membrane receptors
(d) cytoplasmic receptors

**27.** The only unicellular exocrine glands in our body are
(a) Sweat glands
(b) Mucus secreting goblet cells
(c) Mammary glands
(d) Sebaceous glands

**28.** Steroid-based hormones are able to act inside the cell. This is possible because
(a) there are no receptors for hormones on the cell surface.
(b) hormones must interact with the nucleus to have an effect.
(c) proteins carry them into the cell.
(d) steroid-based hormones are hydrophobic molecules that can pass through the cell membrane.

**29.** Every time you eat a cookie or candy bar, your blood sugar increases. This triggers an increase in the hormone
(a) thyroxine. (b) epinephrine.
(c) glucagon. (d) insulin.

**30.** Target cells
(a) react specifically to a chemical messenger.
(b) have receptors for chemical messengers
(c) secrete hormones
(d) Both a and b

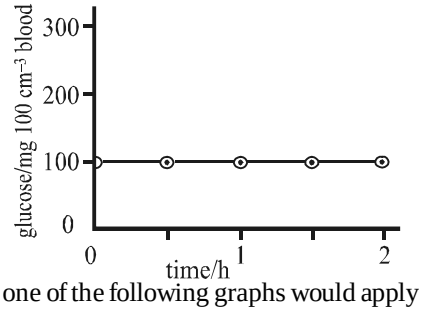
**31.** Researchers have found increased levels of hormones from the _____ in the blood of students preparing for final exams. These hormones are produced in response to stress.
(a) thyroid gland (b) pineal gland
(c) posterior pituitary (d) adrenal glands

**32.** Hormones generally cause a response in a cell by
(a) interacting directly with the cell's DNA.
(b) binding with a receptor and stimulating protein production.
(c) changing the polarity of the cell membrane and causing a cascade of events within the cell.
(d) halting all other cellular activity except the required response

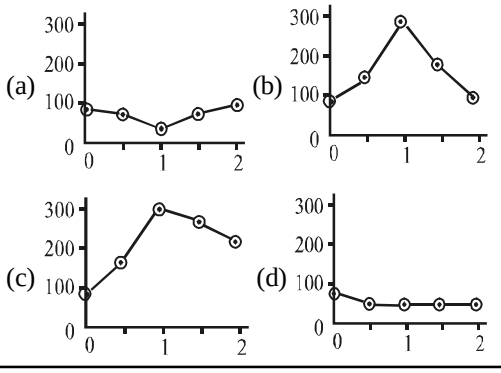
**33.** Hormones are produced at a particular centralized site and transported throughout the organism by means of
(a) a series of synapses
(b) an integrated neural pathway system.
(c) cellular communication
(d) an internal transport system

**34.** Injections of a hormone are sometimes given to strengthen contractions of the uterus during childbirth. What hormone might this be?
(a) adrenocorticotropic hormone (ACTH)
(b) thyroxine
(c) oxytocin (d) insulin

**35.** The graph below illustrates the changes in blood sugar concentration after a healthy man has drunk a glucose solution.




Which one of the following graphs would apply to a diabetic man in similar circumstances ?




| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **23.** ⓐⓑⓒⓓ | **24.** ⓐⓑⓒⓓ | **25.** ⓐⓑⓒⓓ | **26.** ⓐⓑⓒⓓ | **27.** ⓐⓑⓒⓓ |
| | **28.** ⓐⓑⓒⓓ | **29.** ⓐⓑⓒⓓ | **30.** ⓐⓑⓒⓓ | **31.** ⓐⓑⓒⓓ | **32.** ⓐⓑⓒⓓ |
| | **33.** ⓐⓑⓒⓓ | **34.** ⓐⓑⓒⓓ | **35.** ⓐⓑⓒⓓ | | |

*Space for Rough Work*

**36.** A paracrine hormone is
(a) a local hormone that acts on the cell that releases it.
(b) always acting on a wide variety of target tissues.
(c) a local hormone produced at one site but active at a different site in the body.
(d) none of the above

**37.** "Upregulation" of hormone receptors refers to
(a) increase in hormone receptor numbers with low hormone levels.
(b) increase in hormone receptor numbers with high neurotransmitter levels
(c) increase in hormone levels produced by increase in hormone receptor numbers
(d) decrease in hormone levels produced by decrease in hormone receptor numbers

**38.** In an experiment, researchers removed the ____ of young mice, and as a result, these mice were able to accept organ transplants without rejection.
(a) pineal glands (b) thymus glands
(c) thyroid glands (d) parathyroid glands

**39.** Which of the following is a common second messenger substance in hormone action ?
(a) Thyroid hormone (b) ADH
(c) Cyclic AMP (d) Epinephrine

**40.** Which of the following glands is considered the "master" endocrine gland in vertebrates ?
(a) Adrenal glands (b) Thyroid gland
(c) Hypothalamus (d) Pituitary gland

**41.** Through negative feedback, a hormone may shut off the secretion of an anterior pituitary hormone by :
(a) stimulating the release of a (hypothalamic) releasing hormone
(b) inhibiting the release of a (hypothalamic) inhibiting hormone
(c) inhibiting the release of a (hypothalamic) releasing hormone
(d) all of the preceding.

**42.** ANF is a peptide hormone and is secrected from
(a) Gastrointestinal tract (b) Kidney
(c) Post. Pituitary (d) None of these

**43.** Steroid hormones –
(a) have only cell surface receptors
(b) are lipophobic
(c) act through altering the activity of proteins in the target cell
(d) are produced by only adrenal cortex.

**44.** The hormones that initiate ejection of milk, stimulates milk production and growth of ovarian follicles are respectively known as
(a) PRL, OT and LH (b) OT, PRL and FSH
(c) LH, PRL and FSH (d) PRH, OT and LH

**45.** A pregnant female deliver a baby who suffers from stunted growth, mental retardation/low intelligence quotient and abnormal skin. This is the result of :
(a) Low secretion of growth hormone
(b) Cancer of the thyroid gland
(c) Over secretion of pars distalis
(d) Deficiency of iodine in diet

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **36.** ⓐⓑⓒⓓ | **37.** ⓐⓑⓒⓓ | **38.** ⓐⓑⓒⓓ | **39.** ⓐⓑⓒⓓ | **40.** ⓐⓑⓒⓓ |
| | **41.** ⓐⓑⓒⓓ | **42.** ⓐⓑⓒⓓ | **43.** ⓐⓑⓒⓓ | **44.** ⓐⓑⓒⓓ | **45.** ⓐⓑⓒⓓ |

*Space for Rough Work*

| DAILY PRACTICE PROBLEM DPP CHAPTERWISE 22 - BIOLOGY | | | |
|---|---|---|---|
| Total Questions | 45 | Total Marks | 180 |
| Attempted | | Correct | |
| Incorrect | | Net Score | |
| Cut-off Score | 40 | Qualifying Score | 50 |
| Success Gap = Net Score – Qualifying Score | | | |
| Net Score = (Correct × 4) – (Incorrect × 1) | | | |

# HINTS & SOLUTIONS

## DPP /CB22

**1. (a)** Cortisol is secreted by the middle region of adrenal cortex. It increases the blood glucose level (which is anti-insulin effect) by converting proteins & fats into glucose.

**2. (b)** Pancreas is a gland which is both exocrine and endocrine. Cells of acini are exocrine which secrete enzymes and islet of Langerhans part is endocrine which secretes hormones like insulin, glucagon, *etc*.

**3. (b)** Hormones are chemical messengers formed by endocrine cells. Chemically hormones are of the following types: Amines–composed of amino group e.g., Melatonin.
Amino acids – eg. thyroxine
Peptides –eg. insulin
Steroids –eg. aldosterone

**4. (a)** Parathamone is a peptide hormone secreted by the parathyroid gland in response to low levels of calcium in the blood. It acts to maintain normal blood levels of calcium by increasing the number of osteoclasts, which break down the bone matrix and release calcium into the blood. It also increases the reabsorption of calcium and magnesium ions in the kidney tubules, so that their concentration is maintained in the blood.

**5. (d)** Electroencephalogram is the recording of electric potentials originating from different parts of the brain in the form of waves. Fractionation is the technique of rupturing cells and separating their components especially cell organelles for studying their chemistry and functions. Electrophoresis is the technique of separation of charged solutes on the basis of their differential migration in an applied electric field.

**6. (b)**

**7. (a)** Luteinizing hormone (LH) stimulates ovulation. Deficiency of insulin causes diabetes mellitus. Deficiency of ADH or vasopressin causes diabetes insipidus. Deficiency of parathormone causes tetany. Deficiency of thyroxine causes cretinism in infants and myxoedema in adults.

**8. (b)** In heart cells AMP acts as secondary messenger which is made in the response of adrenaline and it stimulates $Ca^{2+}$ ions to come out from the sarcoplasmic reticulum of muscle fibres which causes muscle contraction.
cGMP (Cyclic Guanosine Monophosphate) which acts as secondary messenger works on the action of acetylcholine, increase in flow of $Ca^{2+}$ into muscle fibres & hence causes muscle relaxation. There is no role of sodium in hormonal action.

**9. (c)** Pancreas is a heterocrine gland comprising both endocrine and exocrine parts. Its endocrine part consists of small masses of hormone secreting cells called islets of Langerhans. The $\alpha$-cells of latter secrete glucagons and its $\beta$-cells secrete insulin. These two hormones have antagonistic effects on the glucose level in the blood which means that insulin decreases the blood glucose level while glucagon increases blood glucose level.

**10. (a)** Neurons regulate endocrine activity, but not *vice-versa*.Neurons in the hypothalamus secrete thyroid releasing hormone (TRH), which stimulates cells in the anterior pituitary to secrete thyroid-stimulating hormone (TSH).

**11. (b)** Posterior pituitary releases vasopressin which stimulates reabsorption of water in the distal tubules in nephron.

**12. (d)** Osmotic pressure of body fluids is mainly maintained by the plasma proteins (albumins, globulins) and electrolyte ions ($Na^+$, $K^+$ etc). Phosphorus has nothing to do with the osmotic pressure of body fluids.

**13. (c)** Sertoli cells are found in the walls of seminiferous tubules of the testes. They anchor and provide nutrition to the developing germ cells especially the spermatids.

**14. (b)** In menstrual cycle, menstrual phase lasts for 4 days, proliferating/ovulating phase for about 10 days and secretory phase for 14 days.

**15. (c)** **16.(a)** **17. (a)** **18. (b)** **19. (b)**

**20. (c)** **21.(d)** **22. (a)** **23. (b)** **24. (d)**

**25. (c)** Calcium plays an important role in blood clotting. Parathormone, a hormone released by parathyroid glands, increases calcium level in the blood. Therefore, deficiency of this hormone will decrease $Ca^{2+}$ level in the blood, thus leading to delay in blood clotting and increase in bleeding time.

**26. (d)** Estrogen and testosterone being steroid hormones are soluble in lipids, therefore they can cross the plasma membrane and bind to the cytoplasmic receptors to trigger their action.

**27. (b)**

**28. (d)** Hydrophobic molecules, such as steroid based hormones, can move easily through the plasma membrane.

**29. (d)** Insulin acts to lower blood sugar levels.

**30. (d)** Receptors on target cells react specifically to chemical messengers. The way they react will determine the cellular response.

**31. (d)** The adrenal glands secrete hormones in response to stress.

**32. (b)** Hormones typically act on a receptor in or on target cells to stimulate the production of proteins.

**33. (d)** The internal transport system may be the cardiovascular system in animals or the xylem and phloem in plants.

**34. (c)** Oxytocin stimulates muscle contractions during childbirth and milk letdown.

**35. (c)** In diabetics, the rise in blood glucose above the normal level of 80–90 mg/100ml fails to stimulate the production of insulin from the pancreatic $\beta$-cells of the islets of Langerhans. As a result, the glucose is not removed from the blood to be stored in muscle cells as glycogen, resulting in a high blood glucose level for a long period of time.

**36. (c)** Paracrine hormones act on local cells that are hormones act on the very same cells that secrete them.

**37. (a)** "Upregulation" of hormone receptors on a cell is the production of more receptors when the hormone is present over time in the blood or other fluids surrounding the cell.

**38. (b)** Thymic hormones stimulate T cell development.

**39. (c)** In many cases, hormones trigger cyclic AMP when they bind with the target cells. Cyclic AMP then carries out the action of the hormone within the cell as a second messenger.

**40. (d)** The pituitary gland is considered the master gland because it produces hormones that control endocrine glands throughout the body.

**41. (c)** Inhibited release of a releasing hormone will lead to a reduction in the secretion of a specific anterior pituitary hormone.

**42. (d)** **43. (c)** **44. (b)**

**45. (d)** Iodine is essential for the normal rate of hormone synthesis in the thyroid. Deficiency of iodine in our diet results in **hypothyroidism** and enlargement of the thyroid gland, commonly called **goitre**.
Hypothyroidism during pregnancy causes defective development and maturation of the growing baby leading to stunted growth (cretinism), mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc.