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40 YEARS OF TEACHING EXCELLENCE
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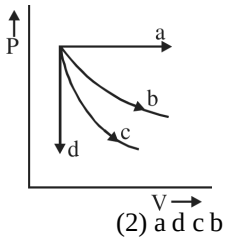
PRABAL TEST PAPER

Time : 1 : 00 Hr. **Question : 50**

PHYSICS

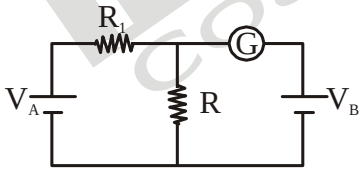
01. The given diagram shows four processes i.e., isobaric, isochoric, isothermal and adiabatic. The correct assignment of the processes, in the same order is given by :



(1) d a c b (2) a d c b
(3) a d b c (4) d a b c

02. In a thermodynamic process pressure of a fixed mass of a gas is changed in such a manner that the gas release 25 joules of heat and 8 joules of work was done on the gas. If the initial internal energy of the gas was 59 joules, then the final internal energy will be :
(1) 2 J (2) 42 J (3) 18 J (4) 58 J

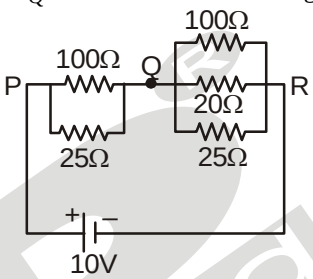
03. In the circuit shown the cells A and B have negligible resistances. For $V_A = 12$ V, $R_1 = 500\ \Omega$ and $R = 100\ \Omega$ the galvanometer (G) shows no deflection. The value of V_B is:



(1) 12 V (2) 6 V
(3) 4 V (4) 2 V

04. A black body is at a temperature of 2880 K . The energy of radiation emitted by this object with wavelength between 499 nm and 500 nm is U_1 , between 999 nm and 1000 nm is U_2 and between 1499 nm and 1500 nm is U_3. The Wein's constant $b = 2.88 \times 10^6$ nmK . Then
(1) $U_1 = 0$ (2) $U_3 = 0$
(3) $U_1 > U_2$ (4) $U_2 > U_1$

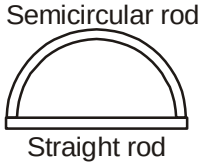
05. Find $V_P - V_Q$ in the circuit shown in figure



(1) 6.66 V (2) 8 V (3) 3.33 V (4) 7 V

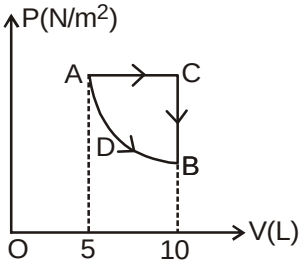
06. A metal ball immersed in alcohol weighs W_1 at 0°C and W_2 at 59°C. The coefficient of cubical expansion of the metal is less than that of alcohol. Assuming that the density of metal is large compared to that of alcohol, it can be shown that
(1) $W_1 > W_2$ (2) $W_1 = W_2$
(3) $W_1 < W_2$ (4) $W_2 = (W_1/2)$

07. Two rods (one semi-circular and other straight) of same material and of same cross-sectional area are joined as shown in the figure. The points A and B are maintained at different temperature. The ratio of the heat transferred through a cross-section of a semicircular rod to the heat transferred through a cross section of the straight rod in a given time is



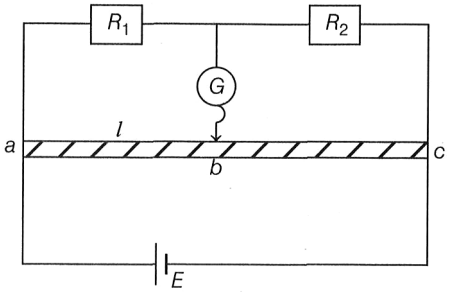
(1) 2 : π (2) 1 : 2 (3) π : 2 (4) 3 : 2

08. In given diagram ADB is an isotherm. The ratio of work done by gas in process ACB and ADB is



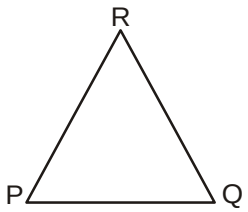
(1) 2 (2) ln2
(3) ln3 (4) 1/ln2

09. Figure shows rough sketch of meter bridge (G) deflects zero at length l cm. Now, R_1 and R_2 are interchanged, then balancing length increases by 20 cm. Find R_1/R_2.



(1) 3/5 (2) 2/5 (3) 2/3 (4) 5/2

10. Three rods of equal length l are joined to form an equilateral triangle PQR. O is the mid point of PQ. Distance OR remains same for small change in temperature. Coefficient of linear expansion for PR and RQ is same i.e. α_2 but that for PQ is α_1. Then



(1) $\alpha_2 = 3\alpha_1$ (2) $\alpha_2 = 4\alpha_1$
(3) $\alpha_1 = 3\alpha_2$ (4) $\alpha_1 = 4\alpha_2$

CHEMISTRY

11. What will be the balanced equation in acidic medium for the given reaction?

$Cr_2O_{7(aq)}^{2-} + SO_{2(g)} \rightarrow Cr_{(aq)}^{3+} + SO_{4(aq)}^{2-}$

(1) $Cr_2O_{7(aq)}^{2-} + 3SO_{2(g)} + 2H_{(aq)}^{+} \rightarrow 2Cr_{(aq)}^{3+} + 3SO_{4(aq)}^{2-} + H_2O_{(l)}$

(2) $2Cr_2O_{7(aq)}^{2-} + 3SO_{2(g)} + 4H_{(aq)}^{+} \rightarrow 4Cr_{(aq)}^{3+} + 3SO_{4(aq)}^{2-} + 2H_2O_{(l)}$

(3) $Cr_2O_{7(aq)}^{2-} + 3SO_{2(g)} + 14H_{(aq)}^{+} \rightarrow 2Cr_{(aq)}^{3+} + 3SO_{4(aq)}^{2-} + 7H_2O_{(l)}$

(4) $Cr_2O_{7(aq)}^{2-} + 6SO_{2(g)} + 7H_{(aq)}^{+} \rightarrow 2Cr_{(aq)}^{3+} + 6SO_{4(aq)}^{2-} + 7H_2O_{(l)}$

12. The oxidation number of an element in a compound is evaluated on the basis of certain rules.
Which of the following rules is not correct in this respect?
(1) The oxidation number of hydrogen is always +1.
(2) The algebraic sum of all the oxidation numbers in the compound is zero.
(3) An element in the free or the uncombined state bears oxidation number zero.
(4) In all its compounds, the oxidation number of fluorine is – 1.

13. **Assertion :** In the species, $S_4O_6^{2-}$ each of the two extreme sulphurs exhibits oxidation state of +5 and the two middle sulphurs as zero.
Reason: The average of four oxidation numbers of sulphurs of the $S_4O_6^{2-}$ is 2.5.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true and reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

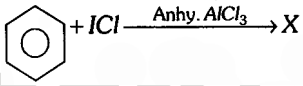
14. Which alkane is produced when sodium salt of butanoic acid is heated with soda lime ?
(1) CH_3CH_3 (2) $CH_3CH_2CH_2CH_3$
(3) CH_4 (4) $CH_3CH_2CH_3$

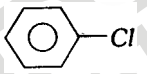
15. Rank the following in decreasing order of heat of hydrogenation :

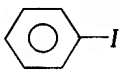
(i)  (ii)  (iii) 

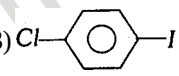
(1) i > ii > iii (2) ii > iii > i
(3) i > iii > ii (4) iii > i > ii

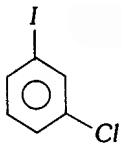
16. The compound X in the reaction.



(1) 

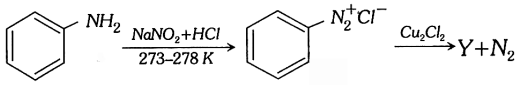
(2) 

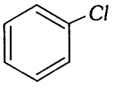
(3) 

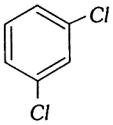
(4) 

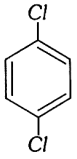
17. In the following reaction $C_6H_5CH_2Br \xrightarrow[2.H_3O^+]{1.Mg,Ether}$ X, the product 'X' is
(1) $C_6H_5CH_2OCH_2C_6H_5$
(2) $C_6H_5CH_2OH$
(3) $C_6H_5CH_3$
(4) $C_6H_5CH_2CH_2C_6H_5$

18. Identify the compound Y in the following reaction



(1) 

(2) 
(3) 

(4) 

19. **Assertion :** The dipole moment of CH_3F is greater than CH_3Cl.
Reason : C–F bond is less polar than C–Cl bond.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion' and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If both assertion and reason are false.

20. The oxidation states of metal in the compounds $Fe_{0.94}O$ and $[Cr(PPh_3)_3(CO)_3]$ respectively are.
(1) $\frac{200}{94}$, 0 (2) 0, $\frac{40}{200}$
(3) 2, 1 (4) 1, $\frac{200}{94}$

BOTANY

21. A true breeding line is characterised by the presence of
(1) stable trait inheritance due to the continuous self-pollination
(2) variable traits in different generations due to the cross pollination
(3) appearance of single trait in all the generations due to allogamy
(4) varying trait inheritance in a single generation due to geitonogamy

22. Out of 7 pairs of contrasting traits selected by Mendel, how many traits were dominant and recessive?
(1) 7 and 7 (2) 8 and 6
(3) 6 and 8 (4) 5 and 9

23. The proportion of plants that were dwarf and tall, respectively, in F_2-generation of Mendel's experiment was
(1) $\frac{1}{4}$th and $\frac{3}{4}$th (2) $\frac{3}{4}$th and $\frac{1}{4}$th
(3) $\frac{2}{3}$rd and $\frac{1}{3}$rd (4) $\frac{1}{3}$rd and $\frac{4}{3}$rd

24. Choose the incorrect statement.
(1) Genes pass down stably from parents to offspring through gametes
(2) Alleles are the different forms of the same gene
(3) In Mendel's notion, capital letter represents the genotype when used for a gene
(4) If an organism has genotype TT for height, it will express dominant trait

25. The genotypic ratio of a monohybrid cross in F_2-generation is
(1) 3 : 1 (2) 1 : 2 : 1
(3) 2 : 1 : 1 (4) 9 : 3 : 3 : 1

26. Which of the following statements is wrong?
(1) Pollen grains remain viable for several months because their outer covering is made of sporopollenin.
(2) No enzyme can degrade sporopollenin.
(3) Pollen grains have variety of shape and design
(4) Pollen grain radius is 12.5 to 25 μm.

27. Monosporic development is referred to as
(1) Single megaspore developing in embryo sac.
(2) Single megaspore mother cell undergoing meiosis.
(3) Presence of single ovule in ovary,
(4) None of these.

28. What is correct for anemophily?
(a) Shown by coconut
(b) Wasteful method and non-directional
(c) Edible pollens
(d) Sticky substance is present around the pollen grains
(1) (b) and (d) (2) (a), (b) and (d)
(3) (b), (c) and (d) (4) (a) and (b)

29. Self-incompatibility
(1) Works the same way in all plants.
(2) Does not have potential agricultural applications.
(3) Maintains variations
(4) Works on the same mechanism of transplant rejection seen in animal.

30. Female plant is diploid and male plant is tetraploid. Find out the correct match.
(1) Embryo–3n; Endosperm–4n; Integument–2n; Egg–n; Pollen–2n; Aleurone layer–4n
(2) Embryo–2n; Endosperm–6n; Integument–2n; Egg–4n; Pollen–4n; Aleurone layer–2n
(3) Embryo–2n; Endosperm–3n; Integument–2n; Egg–4n; Pollen–n; Aleurone layer–3n
(4) Embryo–6n; Endosperm–4n; Integument–3n; Egg–n; Pollen–2n; Aleurone layer–n

31. Refer to the given contrasting traits in pea plants studied by Mendel. In which of the following options traits are incorrectly placed?
(1) Characters–Pod colour; Dominant traits–Green; Recessive traits–Yellow
(2) Characters–Flower colour; Dominant traits–Violet; Recessive traits–White
(3) Characters–Pod shape; Dominant traits–Inflated; Recessive traits–Constricted
(4) Characters–Seed colour; Dominant traits–Green; Recessive traits–Yellow

32. How many nuclei are usually present in mature pollen?
(1) One (2) Two (3) Three (4) Four

33. What is the ploidy of perisperm and epiblast respectively?
(1) n, 2n (2) 2n, n
(3) n, n (4) 2n, 2n

34. Mendel crossed tall and dwarf plants. In F_2-generation, the observed ratio was 3 : 1 (tall dwarf), From this result, he deduced
I. law of dorninance.
II. law of independent assortment.
III. law of segregation.
IV. incomplete dominance.
Choose the correct option.
(1) I, II, III and IV (2) I and III
(3) II, III and IV (4) I, II and III

35. There are 10 flowers in one individual plant of Crotalaria. Each flower has 10 stamens. In each microsporangium of every stamen of all the flowers, there are 30 microspore mother cells. How many pollen grains are formed from that plant?
(1) 4,000 (2) 10,000
(3) 24,000 (4) 48,000

ZOOLOGY

36. Inflammatory responses in allergy are caused by the release of one of the following chemical by mast cells:
(1) Histamines (2) Antibodies
(3) Antigens (4) Interferons

37. Which of the following is not a secondary lymphoid organ?
(1) Lymph nodes (2) Payer's patches
(3) Vermiform appendix (4) Thymus gland

38. The antigen binding site of an antibody is present at
(1) The constant region
(2) The C-terminal
(3) Variable region
(4) Between constant and variable region.

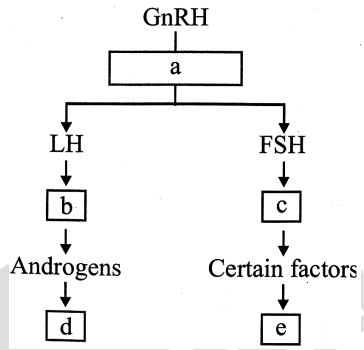
39. To which type of barriers under innate immunity, the saliva in the mouth and the tears from the eyes belong?
(1) Cellular barriers (2) Physiological barriers
(3) Physical barriers (4) Cytokine barriers

40. Short-lived immunity acquired from mother to fetus across placenta or through mother's milk to the infant is categorized as
(1) Active immunity
(2) Passive immunity
(3) Cellular immunity
(4) Innate non-specific immunity

41. Which one of the following acts as a physical barrier to prevent entry of microorganisms in human body?
(1) Bile juice in duodenum
(2) HCl in stomach
(3) Tears from eye
(4) Stratum corneum of epidermis

42. **Assertion:** PMNL are type of lymphocytes and natural killer cells are type of neutrophils.
Reason: Macrophages in the tissues are physiological barriers.
(1) Assertion and reason are true and the reason is the correct explanation of the assertion.
(2) Assertion and reason are true but reason is not the correct explanation of the assertion.
(3) Assertion is true but reason is false.
(4) Assertion and reason are false.

43. Recognise the figure and find out the correct matching.



(1) a-anterior pituitary, b-Sertoli cell, c-Leydig cell, d-spermiogenesis, e-spermatogenesis
(2) a-posterior pituitary, b-Leydig cell, c-Sertoli cell, d-spermiogenesis, e-spermatogenesis
(3) a-anterior pituitary, b-Leydig cell, c-Sertoli cell, d-spermatogenesis, e-spermiogenesis
(4) a-anterior pituitary, b-Leydig cell, c-Sertoli cell, d-spermiogenesis, e-spermatogenesis

44. Which of following is not a correct match?
(1) Proliferative phase - Rapid regeneration of myometrium and maturation of Graafian follicle
(2) Secretory phase - Development of corpus luteum and increased secretion of progesterone
(3) Menstruation - Breakdown of endometrium
(4) Ovulation - LH and FSH attain peak and causes repture of Graafian follicle increased LH

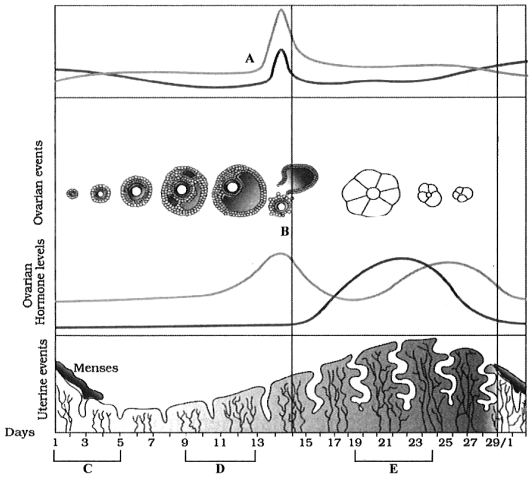
45. In the later phase of pregnancy, which hormone is also secreted by the ovary?
(1) Relaxin (2) Estrogen
(3) Oxytocin (4) Progesterone

46. Match between the following representing parts of the sperm and their functions and choose the correct option.

	Column-I		Column-II
a.	Head	1.	Enzymes
b.	Middle piece	2.	Sperm motility
c.	Acrosome	3.	Energy
d.	Tail	4.	Genetic material

(1) A–2; B–4; C–1; D–3 (2) A–4; B–3; C–1; D–2
(3) A–4; B–1; C–2; D–3 (4) A–2; B–1; C–3; D–4

47. Study the figure given below which shows the various events during a menstrual cycle with few structures labeled as A, B, C and D. Which of the following options shows the correct labeling?



(1) A → LH, B → Ovulation, C → Menstruation, D → Proliferative, E → Luteal
(2) A → FSH, B → Implantation, C → Follicular, D → Menstruation, E → Luteal
(3) A → Estrogen, B → Parturition, C → Luteal, D → Follicular, E → Follicular
(4) A → Progesterone, B → Fertilization, C → Menstruation, D → Secretory, E → Secretory

48. When do most of the major organ systems develop in the foetus?
(1) First month of pregnancy
(2) Fifth month of pregnancy
(3) Ninth month of pregnancy
(4) Twelth week of pregnancy

49. Which of the following statements are incorrect?
(a) Oxytocin has no role in parturition.
(b) Oxytocin acts on the skeletal muscles.
(c) Oxytocin initiates menstruation.
(d) Oxytocin acts on the uterine museles and causes stronger uterine contractions.
(1) (a), (b) and (c) (2) (c) and (d)
(3) (b) and (d) (4) (a), (c) and (d)

50. Which of the following is a cushion of fatty tissue covered by skin and pubic hair in female external genitalia?
(1) Labia majora (2) Mons pubis
(3) Labia minora (4) Hymen