5/12/2025

CBCS SCHEME

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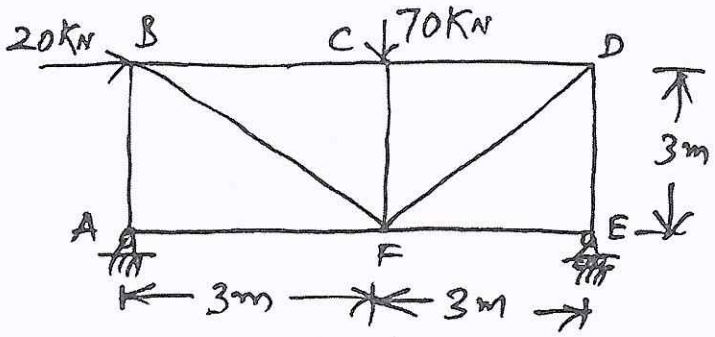
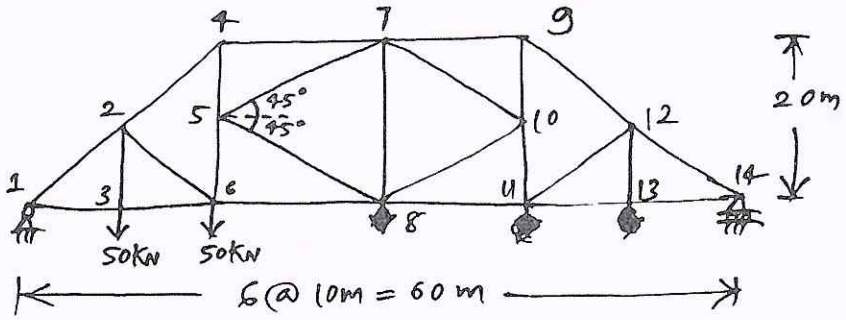
BCV401

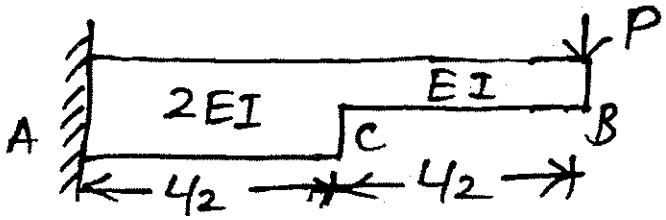
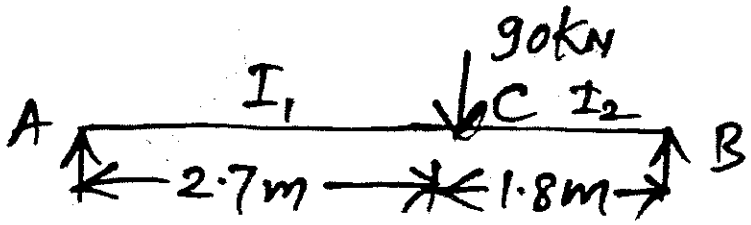
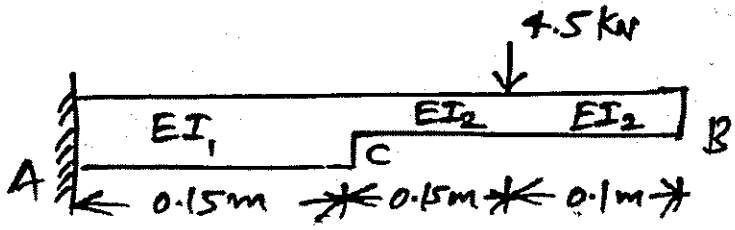
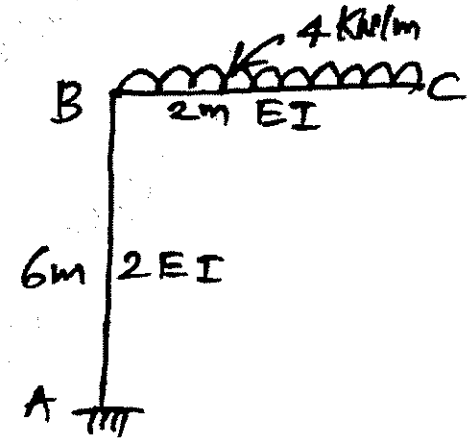
Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Analysis of Structures

Time: 3 hrs. Max. Marks: 100

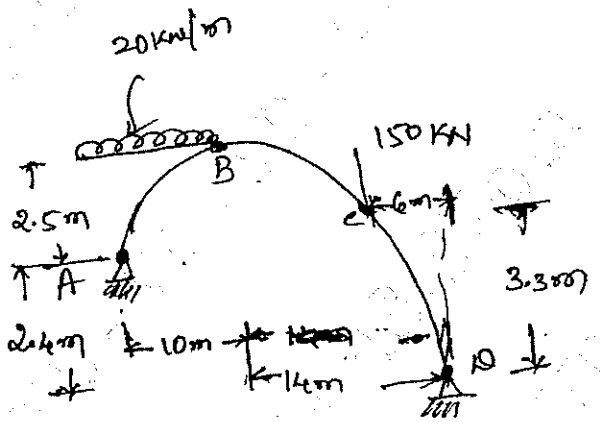
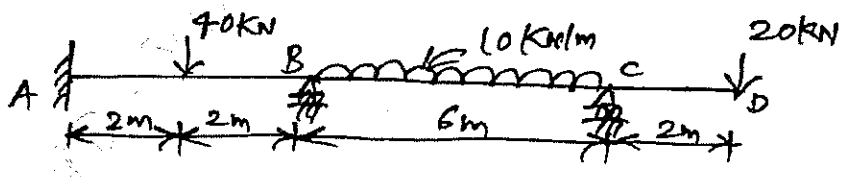
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain with examples : i. Structural forms ii. Degree of freedom.	5	L1	CO1
	b.	Determine the forces in members of the truss as shown in Fig.Q1(b) by method of joints.  Fig.Q1(b)	15	L3	CO1
		OR			
Q.2	a.	Explain : i. Conditions of equilibrium ii. Compatibility conditions.	5	L1	CO1
	b.	Compute the forces in members meeting at joint 5 of the truss as shown in Fig.2(b) by Method of sections.  Fig.Q2(b)	15	L3	CO1

Module – 2

Q.3	**a.**	Determine the slope and deflection at free end of the Cantilever beam as shown in Fig.Q3(a) by Moment Area method.  Fig.Q3(a)	**10**	**L3**	**CO2**
	b.	Determine the deflection under the load for the beam as shown in Fig.Q3(b) by Castigliano's Method. $EI_1 = 33600$ KN-m^2, $EI_2 = 25200$ KN-m^2.  Fig.Q3(b)	**10**	**L3**	**CO2**
		OR			
Q.4	**a.**	Determine the slope and deflection at free end of the cantilever beam as shown in Fig.Q4(a) by Moment Area Method $EI_1 = 140$ KN-m^2, $EI_2 = 28$ KN-m^2.  Fig.Q4(a)	**10**	**L3**	**CO2**
	b.	Determine the vertical deflection at free end of the frame as shown in Fig.Q4(b) by Castigliano's Method. EI = 2050 KN-m^2.  Fig.Q4(b)	**10**	**L3**	**CO2**

Module – 3

Q.5	**a.**	The equation of three-hinged parabolic arch with origin x^2 at its left support is $y = x - \frac{x^2}{40}$. The span of the arch is 48m. Find the normal thrust and radial shear force at a section 6m form the left support, when the arch is carrying UDL of 20 KN/m over the left half of span.	**10**	**L3**	**CO3**
	b.	A suspension cable 150 m span and 15 m central dip carries a load of 2 KN/m (two Kilo-Newton/meter). Calculate the max and minimum tension in the cable. Find the horizontal and vertical forces in each pier under the following conditions : i. If the cable passes over a frictionless rollers on top of piers ii. If the cable is firmly clamped to saddles carried on frictionless rollers on top of the piers. In each case the back stay is inclined at 30° with horizontal.	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Determine the reaction components at supports A and D and the internal forces just to the right of point C for a three-hinged arch as shown in Fig.Q6(a).  Fig.6(a)	**10**	**L3**	**CO3**
	b.	A suspension bridge of 110 m span has two three hinged stiffening girders supported by two cables having a central dip of 12 m. The roadway has a width of 6m. The dead load on bridge is 5 KN/m^2 and the live load 8 KN/m^2 which acts on left half of the span. Determine the shear force and bending moment in the girder at 25 m from left end. Find also the maximum tension in the cable for this position of live load.	**10**	**L3**	**CO3**
		Module – 4			
Q.7		A continuous beam is supported and loaded as shown in Fig.Q7. During loading support B sinks by 10 mm. Analyze the beam for support moments and reactions. E = 200,000 MPa and I = 100 × 10^6 mm^4 constant throughout, using slope–deflection method.  Fig.Q7	**20**	**L4**	**CO4**

OR

Q.8		Determine the end moments of the members of the frame with lateral translation of joints as shown in Fig.8. The relative EI values for each member are indicated along the members, by slop–deflection method.	**20**	**L4**	**CO4**

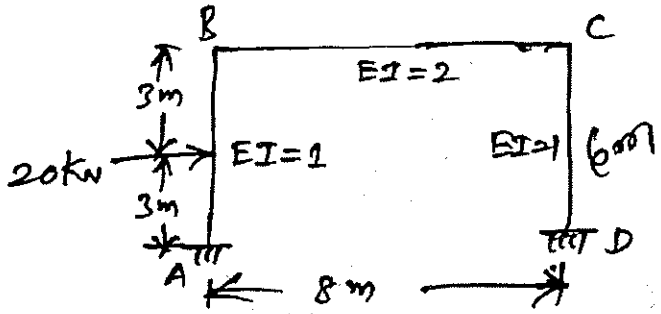


Fig.Q8

Module – 5

Q.9		Analyse the continuous beam as shown in Fig.Q9 by moment distribution method. EI is same throughout the span.	**20**	**L4**	**CO5**

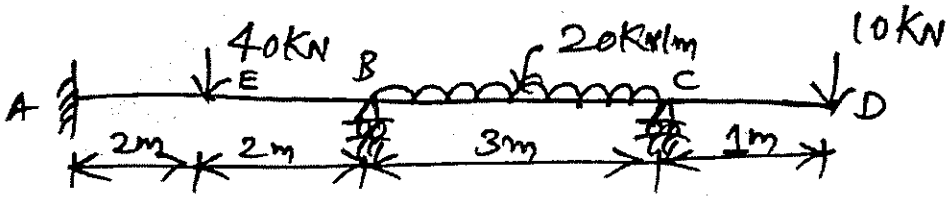


Fig.Q9

OR

Q.10		Determine the end moments of the members of the frame as shown in Fig.Q10 with lateral translation of joints by moment distribution method. EI is same for all the members. Draw the BMD.	**20**	**L4**	**CO5**

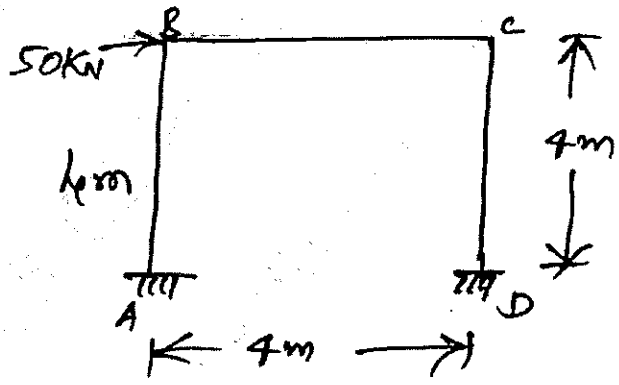


Fig.Q10

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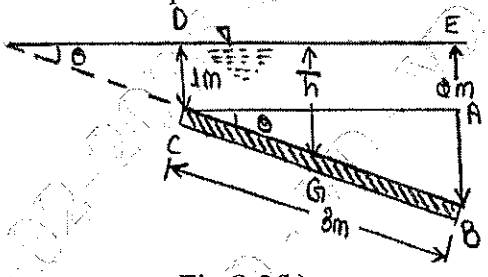
BCV402

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Fluid Mechanics and Hydraulics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is Surface Tension? Explain the phenomenon of surface tension with help of sketch.	6	L1	CO1
	b.	State and prove Pascal's law.	7	L1	CO1
	c.	A Utube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipeline. Its left limb is connected to the pipe and the right limb is open to the atmosphere. The centre of pipe is 100 mm below the level of mercury (sp.gr = 13.6) in the right limb. If the difference of mercury levels in the right limb and the left limb is 160 mm. Determine the pressure of oil in the pipe.	7	L4	CO1
		OR			
Q.2	a.	Derive the expression for total pressure and centre of pressure on a vertical plane surface.	10	L3	CO1
	b.	A circular plate 3 meter diameter is submerged in water as shown in Fig.Q.2(b). Its greatest and least depths are below the surfaces being 2 m and 1 m respectively. Find : i) The total pressure on front face of the plate ii) The position of centre of pressure.  Fig.Q.2(b)	10	L4	CO1
		Module – 2			
Q.3	a.	Distinguish between : i) Steady flow and Unsteady flow ii) Uniform flow and Non uniform flow iii) Laminar flow and Turbulent flow	6	L1	CO2
	b.	Derive the 3 dimensional continuity equation in Cartesian co-ordinates for a steady incompressible flow.	7	L3	CO2

	c.	A 300 mm × 150 mm venturimeter is provided in a vertical pipeline carrying oil of specific gravity 0.9, flow being upward. The difference in elevation of the throat section and entrance section of the venturimeter is 300 mm. The differential Utube mercury manometer shows a gauge deflection of 250 mm. Calculate: i) The discharge of oil ii) The pressure difference between the entrance section and the throat section Take the co-efficient of meter as 0.98 and specific gravity of mercury as 13.6.	7	L4	CO2
		OR			
Q.4	**a.**	Derive Bernoulli's equation from Eulers equation of fluid motion.	**8**	**L2**	**CO2**
	b.	The water is flowing through a taper pipe of length 100 m having diameter 600 mm at the upper end and 300 mm at the lower end, at the rate of 50 liters/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2.	**6**	**L4**	**CO2**
	c.	A stream function is given by $\psi = 5x - 6y$. Calculate the velocity components and also magnitude and direction of resultant velocity at any point.	**6**	**L4**	**CO2**
		Module – 3			
Q.5	**a.**	Classify orifice (any three). Explain briefly.	**6**	**L1**	**CO3**
	b.	Derive an expression for discharge over a triangular notch.	**7**	**L2**	**CO3**
	c.	A valve is provided at the end of a cast iron pipe of diameter 150 mm and of thickness 10 mm. The water is flowing through the pipe, which is suddenly stopped by closing the valve. Find the maximum velocity of water, when the rise of pressure due to sudden closure of valve is 196.2 N/cm^2. Take K for water as 19.62×10^4 N/cm^2 and E for cast iron pipe as 11.772×10^6 N/cm^2.	**7**	**L4**	**CO3**
		OR			
Q.6	**a.**	Define the following hydraulic coefficients: i) Coefficient of velocity ii) Coefficient of discharge iii) Coefficient of contraction	**6**	**L1**	**CO3**
	b.	An oil of specific gravity 0.7 is flowing through a pipe of diameter 300 mm at the rate of 500 liters/s. Find the head lost due to friction and power required to maintain the flow for a length of 1000 m. Take $\nu = 0.29$ stokes.	**6**	**L4**	**CO3**
	c.	Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths 450 m, 255 m and 315 m respectively are connected in series. The difference in water surface levels in two tanks is 18 m. Determine the rate of flow of water if co-efficients of friction are 0.0075, 0.0078 and 0.0072 respectively neglecting minor losses.	**8**	**L4**	**CO3**

		Module – 4			
Q.7	**a.**	What is specific energy curve? With help of a neat sketch, explain the characteristics of specific energy curve.	**8**	**L1**	**CO4**
	b.	A rectangular channel carries water at the rate of 400 lit/s when bed slope is 1 in 2000. Find the most economical dimensions of the channel if C = 50.	**6**	**L3**	**CO4**
	c.	A concrete lined circular channel of diameter 3 m and has a bed slope of 1 in 500. Work out the velocity and flow rate for the maximum velocity conditions. Assume Chezy's constant C = 50.	**6**	**L4**	**CO4**
		OR			
Q.8	**a.**	Derive the conditions for most economical triangular channel section.	**8**	**L1**	**CO4**
	b.	The depth of flow of water, at a certain section of a rectangular channel of 2m wide is 0.3 m. The discharge through the channel is 1.5 m^3/s. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy per kg of water.	**7**	**L4**	**CO4**
	c.	Find the critical depth and critical velocity of the water flowing through a rectangular channel of width 5 m, when discharge is 15 m^3/s.	**5**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	State impulse momentum equation. Mention its applications.	**6**	**L1**	**CO5**
	b.	Explain the various heads and efficiencies of centrifugal pump.	**7**	**L2**	**CO5**
	c.	Show that the maximum efficiency of jet striking at the centre of series of symmetrical curve vanes is $\eta_{max} = \frac{1}{2}(1+\cos\theta)$	**7**	**L3**	**CO5**
		OR			
Q.10	**a.**	Draw a neat sketch of Francis Turbine and explain its components.	**7**	**L2**	**CO5**
	b.	Write a note on multistage centrifugal pumps for high discharge.	**6**	**L3**	**CO5**
	c.	A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 rpm. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1 m^3/s, find : i) Power available at the nozzle ii) Hydraulic efficiency of the turbine.	**7**	**L4**	**CO5**

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BBOK407

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Biology for Engineers

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain Eukaryotic and Prokaryotic cell structures with neat diagrams.	10	L2	CO1
	b.	What are Stem Cells? Explain their applications and classification in detail.	10	L2	CO1
		OR			
Q.2	a.	Explain the properties and functions of the following biomolecules i) Proteins ii) Lipids.	10	L2	CO1
	b.	Illustrate different types of vitamins mentioning its significance and deficiency disorders.	10	L2	CO1
		Module – 2			
Q.3	a.	Applying the knowledge of nucleic acids, explain the role of DNA in preparation of Rabies vaccine with necessary diagrams.	10	L3	CO2
	b.	Outline the role of carbohydrates in making of PLA's and PHA's bioplastics with necessary diagram.	10	L4	CO2
		OR			
Q.4	a.	Describe all the key characteristics, advantages and limitations of cellulose based water filter.	10	L2	CO2
	b.	Evaluate the role of lipids in the production of biodiesel with neat diagram.	10	L4	CO2
		Module – 3			
Q.5	a.	Compare the architecture of human brain with CPU using necessary tabulations.	10	L3	CO2
	b.	Explain the architecture of lungs as purification system with necessary diagrams, including the gas exchange mechanism.	10	L2	CO2

		OR			
Q.6	**a.**	Draw human eye and label its parts and explain the rods and cone cells in detail.	**10**	**L2**	**CO2**
	b.	Describe the design of stents and also explain the reasons for blockages of blood vessels.	**10**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Apply the concept of echolocation to ultrasonography and sonar technology.	**10**	**L3**	**CO3**
	b.	Illustrate the following bioinspired materials and mechanisms. i. Photo voltaic cell ii. Bionic leaf iii. GPS technology with bird flying and aircraft.	**10**	**L2**	**CO3**
		OR			
Q.8	**a.**	Articulate Human blood substitutes using HBOC's and PFC's.	**10**	**L3**	**CO3**
	b.	Apply the concept of lotus leaf effect to explain super hydrophobic and self cleaning surfaces.	**10**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Evaluate the role of Bio imaging and Artificial Intelligence for disease diagnosis.	**10**	**L4**	**CO4**
	b.	Describe with necessary diagrams the concepts of DNA Origami and Biocomputing.	**10**	**L2**	**CO4**
		OR			
Q.10	**a.**	Write short notes on : i. Bioremediation ii. Biomining via microbial surface adsorption.	**10**	**L2**	**CO4**
	b.	Develop some of the bioengineering solutions for muscular dystrophy and osteoporosis with necessary diagrams.	**10**	**L3**	**CO4**

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CBCS SCHEME

BUHK408

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Question Paper Version : A

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Universal Human Values

Time: 1 hr. Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the OMR sheets are strictly prohibited.

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1. Which of the following is not a basic guideline for value education?
   a) Universal b) Rational c) Natural d) Sectarian

2. What is the process used in value education to verify proposals?
   a) Self–exploration b) External validation
   c) Peer review d) Mediation

3. Continuous happiness and prosperity can be achieved by
   a) Wealth accumulation
   b) Physical health only
   c) Right understanding , relationship and physical facility
   d) Technological advancement

4. The content of value education primarily focuses on
   a) Economic growth b) Physical well–being
   c) Materialistic achievements d) Right understanding and relationships

5. Self–exploration leads to
   a) Understanding human needs b) Acquiring wealth
   c) Pursuing individual desires d) Technological skills

6. Which among the following is essential for holistic development?
   a) Right understanding b) Only physical facilities
   c) Social status d) Technological skills

7. Which of the following is true about happiness in value education?
   a) Temporary satisfaction b) Continuous state of harmony
   c) Accumulation of wealth d) Absence of problems

8. The basic human aspirations are :
   a) Wealth and power b) Continuous happiness and prosperity
   c) Fame and recognition d) Technological advancement

9. Value education emphasizes on :
   a) Competitive spirit b) Individual achievements
   c) Mutual fulfillment and harmony d) All of these

10. The method to fulfill basic human aspirations :
    a) Ignoring societal norms b) Self–exploration and understanding
    c) Only material gains d) None of these

11. The human being is the co-existence of :
    a) Mind and body b) Self and body
    c) Heart and mind d) Soul and body

12. The need of self is
    a) Wealth b) Food c) Respect d) Shelter

13. The Body's needs are fulfilled by
    a) Emotional support b) Physical facility
    c) Moral values d) Spiritual practices

14. Continuous happiness is achieved through
    a) Accumulating wealth b) Achieving power
    c) Living in harmony d) Pursuing pleasure

15. Which of the following is quantitative need?
    a) Respect b) Trust c) Food d) Friendship

16. The response of the body is based on
    a) Knowing and assuming b) Recognizing and fulfilling
    c) Feeling and thinking d) Deciding and acting

17. Which need is continuous for the self?
    a) Food b) Shelter c) Respect d) Clothes

18. Right understanding in the self leads to
    a) Wealth b) Happiness c) Confusion d) Ignorance

19. Activities of the self are
    a) Temporary b) Continuous c) Periods d) Sporadic

20. The process of fulfillment for the self includes :
    a) Physical work b) Accumulation of resources
    c) Right understanding d) None of these

21. What is the foundation value in a relationship?
    a) Affection b) Respect c) Trust d) Love

22. Which of the following is naturally acceptable in a relationship?
a) Disrespect b) Mistrust c) Jealousy d) Respect

23. Which feeling is recognized as the complete value in relationship?
a) Care b) Glory c) Gratitude d) Love

24. How many feelings are there in a relationship?
a) Seven b) Nine c) Eleven d) Thirteen

25. Which feeling is considered the foundation of all relationship?
a) Care b) Trust c) Respect d) Affection

26. Trust is to be assured that the other intends to make me
a) Happy and prosperous b) Wealthy
c) Powerful d) Famous

27. What is the first step in understanding relationship?
a) Creating it b) Fulfilling it c) Recognizing it d) Neglecting it

28. Which of the following is not a feeling in relationship?
a) Jealousy b) Care c) Respect d) Affection

29. Relationship exists between
a) Oneself and another self b) One body and another body
c) Self and body d) Body and environment

30. Trust, Respect and Affection are :
a) Essential for relationship b) Naturally acceptable
c) Lead to mutual happiness d) All of these

31. Nature is a collection of which of the following?
a) Units b) Species c) Atoms d) Molecules

32. The physical order includes units like :
a) Plants b) Animals c) Soil d) Humans

33. Which order in nature includes grass, plants and trees?
a) Physical b) Bio c) Animal d) Human

34. Animals and birds help to spread the seeds of plants from :
a) One place to another b) One tree to another
c) One forest to another d) One species to another

35. The process of soil getting converted into plants and plants getting converted back into soil is an example of :
a) Linear process b) Cyclic process
c) Random process d) Unidirectional process

36. Which of the following is a unit of animal order?
a) Soil b) Trees c) Birds d) Water

37. What enriches the soil by acting as very good manure?
a) Dead leaves b) Water c) Air d) Animal dung

38. The activity of respiration is specific to which order?
a) Physical b) Bio c) Animal d) Human

39. Units of the bio order participate in the
a) Water cycle b) Oxygen cycle c) Nitrogen cycle d) All of these

40. The natural outcome of understanding harmony in nature leads to
a) Exploitation b) Dominance c) Mutual fulfillment d) Conflict

41. Which of the following is a Universal human value?
a) Trust b) Wealth c) Power d) Fame

42. What is the basic characteristic of ethical human conduct?
a) Variability b) Certainty c) Inconsistency d) Ambiguity

43. What ensures harmony at all levels of human participation?
a) Universal Human Values b) Wealth
c) Power d) Fame

44. Which of the following is NOT a human value?
a) Trust b) Respect c) Greed d) Love

45. What leads to harmonious coexistence?
a) Right understanding b) Power
c) Wealth d) Fame

46. Which one of the following is a typical case study for holistic production systems?
a) Modern Technologies b) Ancient Technologies
c) Sustainable farming d) Industrial farming

47. Which value is essential in human – to – human relationship?
a) Trust b) Wealth c) Power d) Fame

48. The process of ensuring value – based living is achieved through
a) Fear b) Greed c) Right understanding d) Enforcement

49. What is the result of right utilization of resources?
a) Prosperity b) Poverty c) Waste d) None of these

50. The foundation of humanistic education is based on
a) Wealth b) Right understanding c) Power d) Fame

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