

Entrance Examination - 2025

PhD: Health Sciences: Subject: Optometry and Vision Sciences

Instructions

1. All the examination rules at the University of Hyderabad must be strictly followed.
 2. This paper consists of **70** questions:
Part A – Research Methodology: 35 Multiple Choice Questions (35 marks).
Part B – Optometry & Vision Sciences. 35 Multiple Choice Questions (35 marks)
 3. Answer all the questions in the OMR ONLY following the instructions.
 4. Write your Hall Ticket Number in the given OMR answer sheet.
 5. Hand over the OMR answer sheet to the invigilator at the end of the examination.
 6. There are NO negative markings.
 7. The duration of the written test: **2 hours**
 8. Non-programmable calculators may be used as per the UoH's approved list of calculators.
 9. No additional sheets will be provided. Rough work can be done in the question paper itself/space provided at the end of the booklet.
 5. This question paper consists of 14 pages, inclusive of the cover page
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PART - A

1. In a particular company, a study stated that “as a result of the employee training program, there will be a significant decrease in employee absenteeism.” The above statement is:
 - A. One-tailed hypothesis
 - B. Two-tailed hypothesis
 - C. Null hypothesis
 - D. None of the above
2. A person sees a woman making a driving error and concludes that women are terrible drivers. This is an example of:
 - A. Conclusion validity
 - B. Exception fallacy
 - C. Construct validity
 - D. Ecological fallacy
3. If you are studying individuals with drug addiction, you are not likely to be able to find good lists of drug addicts within a specific geographical area. If you go to that area, you may find that only a couple of them know about others with a drug addiction problem in their vicinity. Which one of the following sampling methods applies to the above example?
 - A. Systematic sampling
 - B. Quota sampling
 - C. Convenient sampling
 - D. Snowball sampling
4. Which of the following is not true about deductive reasoning?
 - A. Exploratory in nature
 - B. Top down approach
 - C. Tests hypothesis
 - D. Confirms hypothesis
5. A hypothesis cannot be stated in
 - A. Declarative terms
 - B. Null and question forms terms
 - C. General terms
 - D. Directional terms
6. If a researcher is studying the effect of competency based training among his new recruits to ascertain their merit and skill, he is likely conducting?
 - A. Basic research
 - B. Applied research
 - C. Experimental research
 - D. An evaluation

7. What is a research design?
- A. A way of conducting research that is not grounded in theory
 - B. The choice between using qualitative or quantitative methods
 - C. The style in which you present your research findings, e.g. a graph
 - D. A description of the collection and analysis of data at every stage of research
8. In an experimental study design, the dependent variable is:
- A. The one that is not manipulated and in which no changes are observed
 - B. The one that is manipulated in order to observe any effects on the other
 - C. A measure of the extent to which personal values affect research
 - D. An ambiguous concept whose meaning depends on how it is defined
9. When the number of deceased due to Covid-19 is expressed as a percentage of total deceased in a village, it is known as:
- A. Frequency
 - B. Rate
 - C. Ratio
 - D. Proportion
10. The number of females to thousand males is expressed as a
- A. Rate
 - B. Ratio
 - C. Frequency
 - D. Proportion
11. Quantitative Health Research is mostly:
- A. Theoretical
 - B. Empirical
 - C. Exploratory
 - D. Applied
12. Basic research is usually considered as _____
- A. A search for knowledge without a defined goal of utility or specific purpose
 - B. Is problem-oriented and is directed towards the solution of an existing problem
 - C. Is operational and action oriented
 - D. Is both A, B & C above
13. The Health Research Triangle comprises these three components except:
- A. Biomedical research
 - B. Health Services research
 - C. Behavioural research
 - D. Market research
14. Fundamental principles used in scientific inquiry include:
- A. Order and Inference
 - B. Chance and Probability
 - C. Hypothesis Generation and Testing
 - D. All of the above

15. Randomisation in a research study means resorting to:
- A. Haphazard selection
 - B. Consecutive selection
 - C. Ordered selection
 - D. Probability based selection
16. Ethical principles in human health research include all except:
- A. Benefits to the subjects (beneficence)
 - B. Suffer no harm (non-maleficence)
 - C. Financial support to participants (incentivisation)
 - D. Principle of justice (distributive justice)
17. The "FINER" criteria for a good research topic include all except:
- A. Feasibility & Interesting
 - B. Equity & Innovativeness
 - C. Ethical & Novel
 - D. Relevant
18. A case-series study design is:
- A. Numerator analysis
 - B. Proportion & Ratio analysis
 - C. Generalisable to the population
 - D. Requires a comparative group
19. The design effect in choosing a sample is to:
- A. Adjust for probability and non-probability sampling strategy
 - B. Adjust for simple random and stratified random sampling
 - C. Adjust for simple and cluster random sampling
 - D. Adjust for multi-stage and multi-phase sampling
20. The basic sequence in doing statistical analysis in a research study excludes:
- A. Descriptive analysis
 - B. Estimation
 - C. Modelling and forecasting
 - D. Inferential analysis
21. If the average of a series of values is 20 and their variance is 4, then the coefficient of variation is:
- A. 40%
 - B. 20%
 - C. 10%
 - D. 80%

22. The scatter plot is used to display
- A. Causality
 - B. Power
 - C. Type II error
 - D. Correlation
23. For a positively skewed curve, which measure of central tendency is largest?
- A. Median
 - B. Mean
 - C. Mode
 - D. All are equal
24. In a small sample survey on 11 male and 13 female students, the mean cholesterol levels were found to be 250 mg percent and 260 mg percent, respectively. Which of the following statistical tests is appropriate to find the significance of the difference in this Case?
- A. Chi-square test
 - B. ANOVA
 - C. Paired 't' test
 - D. Unpaired 't' test
25. A researcher has to represent the data regarding trends of malaria cases reported during 1965- 1980 throughout the world. Which of the following is applicable to represent his data?
- A. Line graph
 - B. Frequency polygon
 - C. Pie chart
 - D. Bar graph
26. What scale is the temperature usually measured on?
- A. Ratio scale
 - B. Nominal scale
 - C. Ordinal scale
 - D. Interval scale
27. What is the role of the moderator in a focus group?
- A. To ask leading questions and dominate the discussion
 - B. To stimulate discussion and keep the conversation on track
 - C. To sit away from the group and observe their behavior
 - D. To evaluate the group's performance on a particular task
28. All of the following are systematic techniques except:
- A. Free Listing
 - B. Social Mapping
 - C. Pile sorting
 - D. Rating scales

29. What is meant by the term "theoretical saturation"?
- Deciding on a theory and then testing it repeatedly
 - The problem of having used too many theories in one's data analysis
 - The point at which a concept is so well developed that no further data collection is necessary
 - A state of frustration caused by using every possible statistical test without finding any significant result.
30. A perspective of research that involves studying a phenomenon as an insider is termed as?
- An objective perspective
 - An emic perspective
 - A subjective perspective
 - An etic perspective
31. A researcher conducted a small-scale study on 30 IT professionals and manipulated the data to claim that over 3 lakh individuals in the industry are at high risk of glaucoma based on a single intraocular pressure reading. The media picked it up, leading to mass panic, mental distress, and even people quitting their jobs.
- Which core principle of research ethics has been MOST seriously violated in this scenario?
- Beneficence – because the study failed to provide any benefit to participants
 - Confidentiality – because the identity of participants was exposed
 - Scientific Integrity – because the data was exaggerated and misrepresented
 - Respect for Persons – because informed consent wasn't taken
32. Which foundational principle is the absolute FIRST requirement of the Nuremberg Code?
- Institutional approval
 - Voluntary informed consent of the human subject
 - Confidentiality maintenance
 - Minimization of financial costs
33. Raju, a researcher, invented a new optical vision device for coo. However, he was unable to register his idea or invention in time. Soon after, a multinational company (MNC) launched a similar instrument. During a conference, Raju approached the MNC to discuss his innovation, but after gathering information, the company neither collaborated nor acknowledged him.

Case scenario:

Given this situation, what would have been Raju's strongest first step to protect his optical vision invention *before* discussing it publicly at the conference?

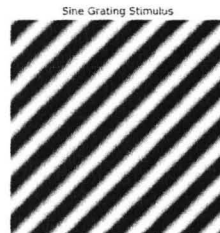
- Publish a paper immediately in an open-access journal
- File a provisional patent application
- Approach a conference organiser for help
- File a case against an MNC company

34. Which rule states that DNA from any cell of all organisms should have a 1:1 ratio of pyrimidine and purine bases, and, more specifically, the amount of guanine is equal to cytosine, and the amount of adenine is equal to thymine.
- A. Mendel's
 - B. Chargaff's
 - C. Shapiro-Wilk's
 - D. Miescher's
35. A researcher wants to study the relationship between near-work exposure during childhood and the later development of myopia in young adults. The data will be collected retrospectively through medical records and participant recall, without manipulating any variables. Which type of research design is most appropriate for this study?
- A. Experimental research
 - B. Descriptive cross-sectional study
 - C. Post facto (ex post facto) design
 - D. Prospective longitudinal study

-----END OF PART A-----

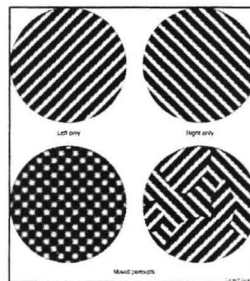
PART B

36. The sine grating stimulus below contains four complete cycles across a width of 1 degree of visual angle. In a psychophysical experiment, participants are instructed to adjust the contrast of the grating until they can just reliably perceive the orientation of the stripes (which are tilted at 45°).



Based on this task, which of the following statements is TRUE?

- A. The spatial frequency of the grating is 1 cycle per degree, and the task measures visual acuity.
 - B. The spatial frequency of the grating is 4 cycles per degree, and the task measures contrast sensitivity.
 - C. The spatial frequency of the grating is 4 cycles per degree, and the task measures temporal resolution.
 - D. The spatial frequency of the grating is 1 cycles per degree, and the task measures stereopsis.
37. During a binocular rivalry experiment, a subject views a left-eye grating at 45° and a right-eye grating at -45° . The participant reports perceiving only the left-eye stimulus for 30 seconds, only the right-eye stimulus for 20 seconds, and mixed percepts (piecemeal or fusion) for 10 seconds over a 60-second viewing period.



What is the dominance ratio (Left eye: Right eye), and what is the percentage of mixed percepts?

- A. 3:2; 16.7%
- B. 2:3; 10%
- C. 3:2; 10%
- D. 2:1; 20%

38. In a rivalry experiment, participants are shown gratings in each eye, and their perceptual dominance is recorded. A participant reports: *[Left-eye percept = 24 seconds Right-eye percept = 18 seconds Mixed percept = 18 seconds Total time = 60s]*

What is the conscious dominance index (CDI) of the left eye?

- A. 0.57
 - B. 0.50
 - C. 0.40
 - D. 0.67
39. The Face Inversion Effect in psychophysics refers to:
- A. Better detection of facial features in inverted images
 - B. Poorer recognition of faces when turned upside-down
 - C. The brain's ability to mirror facial expressions
 - D. Enhanced attention to inverted visual stimuli

40. Given the cone sensitivity matrix below, which light wavelength will likely stimulate M-cones the most?

Wavelength (nm)	S-cone Response	M-cone Response	L-cone Response
440	0.90	0.10	0.05
530	0.10	0.88	0.50
580	0.01	0.15	0.92

- A. 440 nm
 - B. 530 nm
 - C. 580 nm
 - D. 400 nm
41. Metamerism refers to:
- A. The perception of different colors from the same wavelength
 - B. Two lights that look the same but have different spectral compositions
 - C. The complete inability to discriminate colors
 - D. The matching of brightness, not hue, across visual fields
42. What is a major limitation of X-Chrome lenses?
- A. They fully restore trichromatic vision
 - B. They are approved by all aviation and defence sectors
 - C. They do not improve actual cone function or spectral sensitivity
 - D. They work better for blue-yellow deficiencies than red-green deficiencies
43. During a polygraph (lie detection) test, accommodation effort and eye movements are sometimes monitored alongside physiological measures. Which component of the polygraph would MOST likely correlate with increased visual stress?
- A. Galvanic Skin Response (GSR)
 - B. Respiratory belt
 - C. Blood pressure cuff
 - D. Eye-tracking EMR

44. If a subject fixates on an ambiguous image during a polygraph test and shows pupil dilation, erratic saccades, and unstable accommodation, what might this imply?
- A. The image was too bright
 - B. The person is lying
 - C. The subject is experiencing high cognitive or emotional load
 - D. The subject has optic atrophy
45. Which of the following occupations are MOST at risk for blue-light hazard?
- A. Welders
 - B. Office clerks
 - C. Truck drivers
 - D. Construction workers
46. Steven Pinker, in his work on visual cognition, proposed that mental imagery is best described as:
- A. Visual Abstract symbolic reasoning
 - B. A form of unconscious neural and visual feedback
 - C. A spatial medium with visual-like properties
 - D. A function of the occipital lobe only
47. Which Pinker-related finding challenges the idea that all knowledge is language-based?
- A. Semantic priming tasks
 - B. The McGurk effect
 - C. Spatial reasoning in congenitally blind individuals
 - D. Syntax-first parsing theories
48. *Suresh*, a 42-year-old accountant, was recently diagnosed with irreversible low vision due to macular dystrophy. He reports difficulty in daily tasks, emotional withdrawal, frustration, and loss of confidence in work. He has not yet used any assistive devices or undergone vision rehabilitation.

What is the most likely sequence of coping mechanisms Suresh may experience according to standard low vision psychological adaptation models (e.g., Livneh & Antonak or Kubler-Ross stages)?

- A. Denial → Anger → Depression → Acceptance → Adaptation
 - B. Anxiety → Anger → Rehabilitation → Grief → Acceptance
 - C. Rehabilitation → Depression → Motivation → Adaptation
 - D. Denial → Adaptation → Anger → Acceptance → Regression
49. In a 4×4 forced-choice signal detection experiment (16 trials), the subject is presented with a visual stimulus randomly in one of 4 spatial quadrants and has to identify the correct location. The stimulus is present in 12 of the 16 trials, and the subject correctly identifies it in 9 of those 12. In the remaining 4 catch trials (no stimulus), the subject incorrectly claims to see something in 2 of them.

What is the Hit Rate for this experiment?

- A. 0.75
 - B. 0.56
 - C. 0.60
 - D. 0.80
50. In the above 4×4 forced-choice task, if the subject randomly guesses every trial, what is the expected correct response probability per trial?
- A. 0.50
 - B. 0.25
 - C. 0.75
 - D. 0.16
51. Extra Sensory Perception (ESP) refers to:
- A. The heightened ability to perceive ordinary stimuli
 - B. Perception of information not gained through the recognized physical senses
 - C. Enhanced memory for emotional events
 - D. The ability to detect subliminal and visual decoded messages
52. Which tactile ability is usually enhanced in proficient Braille readers?
- A. Thermoreception
 - B. Two-point discrimination
 - C. Tactile sensitivity
 - D. Proprioception
53. If a subject can notice a difference between a 100 lux and a 110 lux light source, what is the Weber fraction?
- A. 0.01
 - B. 0.10
 - C. 0.05
 - D. 0.15
54. Stevens' Power Law relates the perceived intensity (Ψ) of a stimulus to its physical magnitude (I) by which formula?
- A. $\Psi = kI^2$
 - B. $\Psi = kI^n$
 - C. $\Psi = I + k$
 - D. $\Psi = k \log(I)$
55. In photometry, the unit lumen (lm) measures:
- A. Radiant energy
 - B. Photopic (light-visible) luminous flux
 - C. Illuminance over time
 - D. Irradiance in watts per square meter
56. Which of the following strategies helps decide the modified monovision correction option for presbyopes?
- A. Adding a minus to the near eye
 - B. Increasing the addition
 - C. Spectacle overcorrection
 - D. Residual cylinder

57. Which of the following strategies is not an option to treat lens binding?
- A. Posterior lens surface polishing
 - B. Enhance daily surfactant cleaning
 - C. Periodic enzymatic cleaning
 - D. Steepen the lens base curve
58. Which of the following is not a condition requiring contact lenses to control photophobia?
- A. Aniridia
 - B. Iris coloboma
 - C. Achromatopsia
 - D. Anisometropia
59. As per the DEWS II report, the following is not a criterion to define dry eye.
- A. Loss of homeostasis of the tear film
 - B. Hypoosmolality
 - C. Ocular surface inflammation
 - D. Neurosensory abnormalities
60. The following decentration of scleral lenses has been described based on daily practice observation
- A. Inferior temporal
 - B. Inferio nasal
 - C. Inferior
 - D. Temporal
61. Which one of the following factors doesn't influence the treatment zone diameter in orthokeratology lenses
- A. Back optic zone diameter
 - B. Reverse curve width
 - C. Mid-peripheral steepening
 - D. Compression factor
62. All the corneal topographers that are available can be considered to consist of the following, except
- A. Projection device
 - B. Elevation device
 - C. Acquisition device
 - D. Analytical device
63. An eye's refraction is -1.00 DSph, Keratometry readings are 44.50 D. If the trial contact lens base curve is 45.50 D and power is plano. What is the final contact lens power needed to correct the refractive error?
- A. -1.00
 - B. -2.00
 - C. -3.00
 - D. Plano

64. A patient's spectacle refractive is +15.00 DSph, and the vertex distance is 15.00 mm. If a clinician decides to prescribe contact lenses in this case, what is the estimated change in magnification when going from spectacles to contact lenses?
- 17%
 - 27%
 - 33%
 - 10%
65. A rigid gas-permeable contact lens has a base curve of 7.90 mm, central thickness of 0.15 mm, back vertex power of - 4.00 DSph, and refractive index of 1.47. What is this lens's back vertex focal length, and what would the front surface radius have to be for the lens to be of zero BVP?
- 250 mm & 7.95 mm
 - +253 mm & 7.95 mm
 - 200 mm & 7.90 mm
 - +200 mm & 7.90 mm
66. A patient is wearing a trial RGP contact lens with a base curve of 7.50 mm and power of -1.50 DSph. An over-refraction indicates the need for an additional -1.25 DSph, and the practitioner's analysis of the fit indicates that a base curve of 7.40 mm would be better. What refractive power is required if the BC is 7.40 mm & 7.55 mm, respectively?
- 3.36 DSph & -2.47 DSph
 - 2.75 DSph & -3.00 DSph
 - 1.50 DSph & -3.25 DSph
 - 1.25 DSph & -3.50 DSph
67. A cornea with an eccentricity of 0.63 is expected to have _____ DSph. of myopia reduction.
- 0.63 DSph.
 - 1.50 DSph.
 - 2.50 DSph.
 - 3.00 DSph.
68. Based on the toric transposition, what is the new sphere for the following prescription: +3.00 DSph. / +1.00 DCyl. X 90; Base Curve: -6.00 DSph.
- +4.00 DSph.
 - +3.00 DSph.
 - +10.00 DSph.
 - 6.00 DSph.
69. Which one of the following statements is incorrect?
- Epithelium is essentially affected in preservative-associated transient hyperfluorescence
 - Epithelial cell desquamation is reported in solution-induced corneal staining
 - In a superior epithelial arcuate lesion, a full-thickness epithelium splitting is noticed
 - In 3 & 9 o'clock corneal staining, epithelial disruption at the limbus is seen

70. The effect of the topical drop depends on the following, except:

- A. Size of the eye drop
- B. Volume of the conjunctival sac
- C. Health of the corneal epithelium
- D. Patient compliance

University of Hyderabad
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Ph.D. Admissions – July 2025 session

School/Department/Centre: Medical Sciences

Course: Ph.D.

Subject: Optometry & Vision Sciences

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	A	26	D	51	B
2	B	27	B	52	B
3	D	28	B	53	B
4	A	29	C	54	B
5	C	30	B	55	B
6	D	31	C	56	A
7	D	32	C	57	D
8	A	33	B	58	D
9	D	34	B	59	B
10	B	35	B	60	A
11	B	36	B	61	D
12	A	37	A	62	B
13	D	38	A	63	B
14	D	39	B	64	B
15	D	40	B	65	A
16	C	41	B	66	A
17	B	42	C	67	D
18	A	43	D	68	C
19	C	44	C	69	A
20	C	45	A	70	B
21	C	46	C		
22	D	47	C		
23	B	48	A		
24	D	49	A		
25	A	50	B		

Note/Remarks :

Signature
School/Department/Centre