

Scheme of Exam for Direct Recruitment of Post Graduate Teacher:

The written test is of 180 marks (180 objective type multiple choice questions) carrying 01 mark for each question. The duration of written test will be 180 minutes without any time limit for each part individually.

Section Name -Nature of Questions

Part I - Proficiency in Languages (20 marks):

A. General English-10 questions

B. General Hindi-10 questions

Part II – General awareness, Reasoning & Proficiency in Computers (20 marks)

1. General Awareness & Current Affairs(10 ques.)
2. Reasoning Ability (5 ques.)
3. Computer Literacy (5 ques.)

Part-III: Perspectives on Education and Leadership (40 questions)

- (a) Understanding the Learner-(15 questions)
- (b) Understanding Teaching Learning -(15 questions)
- (c) Creating Conducive Learning Environment
- (d) School Organization and Leadership- (10 questions)
- (e) Perspectives in Education

Part IV - Subject-specific Syllabus (100 marks) – Refer Annexure

Professional Competency Test:

The Professional Competency Test is of 60 marks (Demo Teaching -30 marks and Interview -30 Marks).

Note:

The weightage of Written Test & Professional Competency (Demo Teaching:15 and Interview:15) will be 70:30 Final merit list will be based on the performance of the candidate in Written Test & Professional Competency Test taken together.

Scheme & Syllabus of Exam for Direct Recruitment of PGTs:

Part I - Proficiency in Languages (20 marks):

(a) General English(10 questions)

Reading comprehension, word power, Grammar & usage

(b) General Hindi(10 questions)

पठन कौशल, शब्द सामर्थ्य, व्याकरण एवं प्रयुक्ति

Part II – General awareness, Reasoning & Proficiency in Computers

(20 marks):

(g) General Awareness& Current Affairs(10 questions)

(h) Reasoning Ability(5 questions)

(i) Computer Literacy(5 questions)

Part III -Perspectives on Education and Leadership

(40 marks):

(a) Understanding the Learner(15 questions)

- Concept of growth, maturation and development, principles and debates of development, development tasks and challenges
- Domains of Development: Physical, Cognitive, Socio-emotional, Moral etc., deviations in development and its implications.
- Understanding Adolescence: Needs, challenges and implications for designing institutional support.
- Role of Primary and Secondary Socialization agencies. Ensuring Home school continuity.

(b) Understanding Teaching Learning (15 questions)

- Theoretical perspectives on Learning -Behaviorism, Cognitivism and Constructivism with special reference to their implications for:
 - i. The role of teacher
 - ii. The role of learner
 - iii. Nature of teacher-student relationship
 - iv. Choice of teaching methods
 - v. Classroom environment
 - vi. Understanding of discipline, power etc.
- Factors affecting learning and their implications for:
 - i. Designing classroom instructions,
 - ii. Planning student activities and,
 - iii. Creating learning spaces in school.
- Planning and Organization of Teaching-Learning
 - i. Concept of Syllabus and Curriculum, Overt and Hidden Curriculum, Principles of curriculum organization
 - ii. Competency based Education, Experiential learning, etc.
 - iii. Instructional Plans: -Year Plan, Unit Plan, Lesson Plan
 - iv. Instructional material and resources

- v. Information and Communication Technology(ICT) for teaching-learning
 - vi. Evaluation: Purpose, types and limitations. Continuous and Comprehensive Evaluation, Characteristics of a good tool.
 - vii. Assessment of learning, for learning and as learning: Meaning, purpose and considerations in planning each.
- Enhancing Teaching Learning processes: Classroom Observation and Feedback, Reflections and Dialogues as a means of constructivist teaching

c.) Creating Conducive Learning Environment(04 questions)

- The concepts of Diversity, disability and Inclusion, implications of disability as social construct, types of disabilities-their identification and interventions
- Concept of School Mental Health, addressing the curative, preventive and promotive dimensions of mental health for all students and staff. Provisioning for guidance and counselling.
- Developing School and community as a learning resource.

(d) School Organization and Leadership(04 questions)

- Leader as reflective practitioner, team builder, initiator, coach and mentor.
- Perspectives on School Leadership: instructional, distributed and transformative
- Vision building, goal setting and creating a School development Plan
- Using School Processes and forums for strengthening teaching learning-Annual Calendar, time-tabling, parent teacher forums, school assembly, teacher development forums , using achievement data for improving teaching –learning, School Self Assessment and Improvement
- Creating partnerships with community , industry and other neighbouring schools and Higher Education Institutes – forming learning communities

(e) Perspectives in Education(02 questions)

- NEP-2020: Curriculum and Pedagogy in Schools: Holistic & Integrated Learning; Equitable and Inclusive Education: Learning for All; Competency based learning and Education.
- Guiding Principles for Child Rights, Protecting and provisioning for rights of children to safe and secure school environment, Right of Children to free and Compulsory Education Act, 2009,
- Historically studying the National Policies in education with special reference to school education;
- School Curriculum Principles: Perspective, Learning and Knowledge, Curricular Areas, School Stages, Pedagogy and Assessment

Part IV - Subject-specific Syllabus (100 marks): Refer Annexure

Note:

The Professional Competency Test (Demo Teaching and Interview), is of 60 marks. The weightage of Written Test & Professional Competency Test (Demo Teaching and Interview) will be in the ratio of 70:30.

Final merit list will be based on the performance of the candidate in Written Test, Professional Competency Test taken together.

Syllabus for the post of PGT -Computer Science

Subject specific syllabus includes the concepts of NCERT/CBSE syllabus and Text Books (Classes XI & XII), however, the questions will be testing the depth of understanding and application of these concepts at the level of Post- Graduation.

Computer Systems and Organisation

- Basic Computer Organisation : Introduction to computer system, hardware, software, input device, output device, CPU, memory (primary, cache and secondary), units of memory (Bit, Byte, KB, MB, GB, TB, PB)
- Types of software: system software (operating systems, system utilities, device drivers), programming tools and language translators (assembler, compiler & interpreter), application software
- Operating system (OS): functions of operating system, OS user interface
- Boolean logic: NOT, AND, OR, NAND, NOR, XOR, truth table, De Morgan's laws and logic circuits
- Number system: Binary, Octal, Decimal and Hexadecimal number system; conversion between number systems.
- Encoding schemes: ASCII, ISCII and UNICODE (UTF8, UTF32)

Computational Thinking and Programming

- Introduction to problem solving: Steps for problem solving (analysing the problem, developing an algorithm, coding, testing and debugging). representation of algorithms using flow chart and pseudo code, decomposition
- Familiarization with the basics of Python programming: Introduction to Python, features of Python, executing a simple "hello world" program, execution modes: interactive mode and script mode, Python character set, Python tokens (keyword, identifier, literal, operator, punctuator), variables, concept of l-value and r-value, use of comments
- Knowledge of data types: number (integer, floating point, complex), boolean, sequence (string, list, tuple), none, mapping (dictionary), mutable and immutable data types
- Operators: arithmetic operators, relational operators, logical operators, assignment operator, augmented assignment operators, identity operators (is, is not), membership operators (in, not in)
- Expressions, statement, type conversion & input/output: precedence of operators, expression, evaluation of expression, python statement, type conversion (explicit & implicit conversion), accepting data as input from the console and displaying output
- Errors: syntax errors, logical errors, runtime errors
- Flow of control: introduction, use of indentation, sequential flow, conditional and iterative flow control
- Conditional statements: if, if-else, if-elif-else, flowcharts, simple programs: e.g.: absolute value, sort 3 numbers and divisibility of a number
- Iterative statements: for loop, range function, while loop, flowcharts, break and continue statements, nested loops, suggested programs: generating pattern, summation of series, finding the factorial of a positive number etc
- Strings: introduction, indexing, string operations (concatenation, repetition, membership & slicing), traversing a string using loops, built-in functions: len(), capitalize(), title(), lower(), upper(), count(), find(), index(), endswith(), startswith(), isalnum(), isalpha(), isdigit(), islower(), isupper(), isspace(), lstrip(), rstrip(), strip(), replace(), join(), partition(), split()
- Lists: introduction, indexing, list operations (concatenation, repetition, membership & slicing), traversing a list using loops, built-in functions: len(), list(), append(), extend(), insert(), count(), index(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum(); nested lists, suggested programs: finding the maximum, minimum, mean of numeric values stored in a list; linear search on list of numbers and counting the frequency of elements in a list

- Tuples: introduction, indexing, tuple operations (concatenation, repetition, membership & slicing), built-in functions: len(), tuple(), count(), index(), sorted(), min(), max(), sum(); tuple assignment, nested tuple, suggested programs: finding the minimum, maximum, mean of values stored in a tuple; linear search on a tuple of numbers, counting the frequency of elements in a tuple
- Dictionary: introduction, accessing items in a dictionary using keys, mutability of dictionary (adding a new item, modifying an existing item), traversing a dictionary, built-in functions: len(), dict(), keys(), values(), items(), get(), update(), del(), clear(), fromkeys(), copy(), pop(), popitem(), setdefault(), max(), min(), count(), sorted(), copy(); suggested programs : count the number of times a character appears in a given string using a dictionary, create a dictionary with names of employees, their salary and access them
- Introduction to Python modules: Importing module using 'import ' and using from statement, Importing math module (pi, e, sqrt, ceil, floor, pow, fabs, sin, cos, tan); random module (random, randint, randrange), statistics module (mean, median, mode)

Society, Law and Ethics

- Digital Footprints
- Digital society and Netizen: net etiquettes, communication etiquettes, social media etiquettes
- Data protection: Intellectual Property Right (copyright, patent, trademark), violation of IPR (plagiarism, copyright infringement, trademark infringement), open source softwares and licensing (Creative Commons, GPL and Apache)
- Cyber-crime: definition, hacking, eavesdropping, phishing and fraud emails, ransomware, preventing cyber crime
- Cyber safety: safely browsing the web, identity protection, confidentiality, cyber trolls and bullying.
- Safely accessing web sites: malware, viruses, trojans, adware
- E-waste management: proper disposal of used electronic gadgets
- Indian Information Technology Act (IT Act)
- Technology & Society: Gender and disability issues while teaching and using computers

Computational Thinking and Programming - 2

- Functions: types of function (built-in functions, functions defined in module, user defined functions), creating user defined function, arguments and parameters, default parameters, positional parameters, function returning value(s), flow of execution, scope of a variable (global scope, local scope)
- Introduction to files, types of files (Text file, Binary file, CSV file), relative and absolute paths
- Text file: opening a text file, text file open modes (r, r+, w, w+, a, a+), closing a text file, opening a file using with clause, writing/ appending data to a text file using write() and writelines(), reading from a text file using read(), readline() and readlines(), seek and tell methods, manipulation of data in a text file
- Binary file: basic operations on a binary file: open using file open modes (rb, rb+, wb, wb+, ab, ab+), close a binary file, import pickle module, dump() and load() method, read, write/create, search, append and update operations in a binary file
- CSV file: import csv module, open / close csv file, write into a csv file using csv.writerow() and read from a csv file using csv.reader()

Computer Networks

- Evolution of networking: introduction to computer networks, evolution of networking (ARPANET, NSFNET, INTERNET)
- Data communication terminologies: concept of communication, components of data communication (sender, receiver, message, communication media, protocols), measuring capacity of communication media (bandwidth, data transfer rate), IP address, switching techniques (Circuit switching, Packet switching)
- Transmission media: Wired communication media (Twisted pair cable, Co-axial cable, Fiber-optic cable), Wireless media (Radio waves, Micro waves, Infrared waves)
- Network devices (Modem, Ethernet card, RJ45, Repeater, Hub, Switch, Router, Gateway, WIFI card)
- Network topologies and Network types: types of networks (PAN, LAN, MAN, WAN), networking topologies (Bus, Star, Tree)
- Network protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP, wireless/mobile communication protocol such as GSM, GPRS and WLL
- Introduction to web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML), domain names, URL, website, web browser, web servers, web hosting

Database Management

- Database concepts: introduction to database concepts and its need
- Relational data model: relation, attribute, tuple, domain, degree, cardinality, keys (candidate key, primary key, alternate key, foreign key)
- Structured Query Language: introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table, alter table (add and remove an attribute, add and remove primary key), drop table, insert, delete, select, operators (mathematical, relational and logical), aliasing, distinct clause, where clause, in, between, order by, meaning of null, is null, is not null, like, update command, delete command, aggregate functions (max, min, avg, sum, count), group by, having clause, joins: cartesian product on two tables, equi-join and natural join
- Interface of python with an SQL database: connecting SQL with Python, performing insert, update, delete queries using cursor, display data by using fetchone(), fetchall(), rowcount, creating database connectivity applications

Introduction to Computer System

- Introduction to computers and computing: evolution of computing devices, components of a computer system and their interconnections, Input/Output devices.
 - Computer Memory: Units of memory, types of memory - primary and secondary, data deletion, its recovery and related security concerns. Software: purpose and types - system and application software, generic and specific purpose software.

Introduction to Python

- Basics of Python programming, Python interpreter - interactive and script mode, the structure of a program, indentation, identifiers, keywords, constants, variables, types of operators, precedence of operators, data types, mutable and immutable data types, statements, expressions, evaluation of expressions, comments, input and output statements, data type conversion, debugging, control statements: if-else, for loop Lists: list operations - creating, initializing, traversing and manipulating lists, list methods and built-in functions.: len(), list(), append(), extend(), insert(), count(), find(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum()
- Dictionary: concept of key-value pair, creating, initializing, traversing, updating and deleting elements, dictionary methods and built-in functions: len(), dict(), keys(), values(), items(), get(), update(), clear(), del()

Database concepts and the Structured Query Language

- Database Concepts: Introduction to database concepts and its need, Database Management System. Relational data model: concept of attribute, domain, tuple, relation, candidate key, primary key, alternate key, foreign key.
- Advantages of using Structured Query Language, Data Definition Language, Data Query Language and Data Manipulation Language, Introduction to MySQL, creating a database using MySQL, Data Types
- Definition Commands: CREATE TABLE
- Data Query Commands: SELECT-FROM- WHERE
- Data Manipulation Commands: INSERT

Emerging Trends

Artificial Intelligence, Machine Learning, Natural Language Processing, Immersive experience (AR, VR), Robotics, Big data and its characteristics, Internet of Things (IoT), Sensors, Smart cities, Cloud Computing and Cloud Services (SaaS, IaaS, PaaS); Grid Computing, Block chain technology.

Data Handling using Pandas

- Introduction to Python libraries- Pandas, Matplotlib.
- Data structures in Pandas - Series and Data Frames.
- Series: Creation of Series from - ndarray, dictionary, scalar value; mathematical operations; Head and Tail functions; Selection, Indexing and Slicing.
- Data Frames: creation - from dictionary of Series, list of dictionaries, Text/CSV files; display; iteration; Operations on rows and columns: add, select, delete, rename; Head and Tail functions; Indexing using Labels, Boolean Indexing;
- Importing/Exporting Data between CSV files and Data Frames.
- Data Visualization Purpose of plotting; drawing and saving following types of plots using Matplotlib - line plot, bar graph, histogram Customizing plots: adding label, title, and legend in plots
-

Database Query using SQL

- Math functions: POWER (), ROUND (), MOD ().
- Text functions: UCASE ()/UPPER (), LCASE ()/LOWER (), MID ()/SUBSTRING ()/SUBSTR (), LENGTH (), LEFT (), RIGHT (), INSTR (), LTRIM (), RTRIM (), TRIM ().
- Date Functions: NOW (), DATE (), MONTH (), MONTHNAME (), YEAR (), DAY (), DAYNAME ().
- Aggregate Functions: MAX (), MIN (), AVG (), SUM (), COUNT (); using COUNT (*).
- Querying and manipulating data using Group by, Having, Order by.

Introduction to Computer Networks

- Introduction to networks, Types of network: LAN, MAN, WAN.
- Network Devices: modem, hub, switch, repeater, router, gateway
- Network Topologies: Star, Bus, Tree, Mesh.
- Introduction to Internet, URL, WWW, and its applications- Web, email, Chat, VoIP.
- Website: Introduction, difference between a website and webpage, static vs dynamic web page, web server and hosting of a website.
- Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

Societal Impacts

- Digital footprint, net and communication etiquettes, data protection, intellectual property rights (IPR), plagiarism, licensing and copyright, free and open source software (FOSS), cybercrime and cyber laws, hacking, phishing, cyber bullying, overview of Indian IT Act.
- E-waste: hazards and management.
- Awareness about health concerns related to the usage of technology.