PASTEUR INSTITUTE OF INDIA, COONOOR 643 103, THE NILGIRIS

ADDENDUM TO THE NOTICE FOR INVITING APPLICATIONS FROM ELIGIBLE STUDENTS TO IMPART INTERNSHIP PROGRAMME IN THE VACCINE PRODUCTION AND ITS ALLIED AREAS

The Written Examination and Personal Discussion will be held on 29th and 30th March, 2021 instead of 2nd and 3rd April, 2021.

The Questions will be Multiple Choice Questions

Total Questions: 60 questions (including 15 Aptitude Questions); No negative marks.

Time Duration: 45 minutes

The Syllabus for each discipline are as follows. Tentative topics covered for the written examinations.

SYLLABUS FOR INTERNSHIP EXAMINATION

For Life Sciences candidates:

Biochemistry: Basic concepts and regulation of metabolism of carbohydrates, lipids, amino acids and nucleic acids

Microbiology: General Microbiology (Bacteriology, Virology, Mycoplasma, rickettia and Mycology), Different microbiological techniques used for isolation and identification of pathogens, Different types of communicable diseases.

Immunology: Definitions of different immunological terms, Different types of immunity, different types of immune responses, cells involved in immune responses, Different types of antibodies, Antigen and Antibody structure and Antigen-Antibody interactions; Types of hypersensitivity reactions, different generations and types of vaccines, their advantages and disadvantages, Mode

of actions of vaccines, Different type of immunological techniques. Monoclonal antibodies.

Genetics and Evolutionary Biology: Microbial genetics – transformation, transduction and conjugation.

Cell Biology: Prokaryotic and eukaryotic cell structure; Cell cycle and cell growth control; Post-translational modifications

Molecular Biology: Mutations and mutagenesis; Nucleic acid – replication, transcription, splicing, translation and their regulatory mechanisms, Different molecular biology techniques.

Process involved in vaccine manufacturing: Media formulation and optimization; Sterilization of air and media; Filtration – membrane filtration, ultrafiltration; Centrifugation – high speed and ultra; Cell disruption; Principles of chromatography – ion exchange, gel filtration, hydrophobic interaction, affinity, GC, HPLC and FPLC; Extraction, adsorption and drying; Fermentation – Batch, Fed-batch and continuous processes; Microbial and enzyme reactors; Optimization and scale up.

Analytical tools: Principles of microscopy – light, electron, fluorescent and confocal; Principles of spectroscopy – UV, visible, CD, IR, fluorescence, FT-IR, MS, NMR; Electrophoresis; Microarrays; Enzymatic assays; Immunoassays – ELISA, RIA, immunohistochemistry; immunoblotting; Flow cytometry; Whole genome and ChIP sequencing.

Recombinant DNA technology: Vectors – plasmids, bacteriophage and other viral vectors, Gene isolation and cloning, strategies for production of recombinant proteins; Vaccine technology and recombinant vaccines.

Good manufacturing practices and Quality Assurance:

Principles and importance of GMP – Definition of GMP, Quality Assurance, Quality Management systems, Infrastructure (cleanrooms), Personnel, Good Documentation practices, Risk management, Quality control, Audits, validation, calibrations, sterility assurance, Regulatory bodies and guidelines.

Bioprocess Technology:

Introduction to Bioprocess Technology; History of fermentation industry – Fermentation process; various types of fermentors designing, General requirement and product range; Microbial biomass, microbial enzymes, microbial metabolites, recombinant products, transformation processes. Media for industrial fermentation: Essential criteria for media, Media components, Media formulation, Media optimization.

Different Sterilization methods:

Microbial growth kinetics: Phases of cell growth, Factors affecting cell growth, Kinetic model for cell growth;

Mammalian cell culture: Definition of Different terms used in cell culture techniques, Different types of cell culture, techniques involved in cell propagation, maintenance and preservation of cells, immortalization of cells, advantages of cell culture in comparisons with animals, different cell lines used in vaccine manufacturing, quality control of cell lines, Cell based assays.

Basics of PCT studies and clinical trial and Bioethics and Biosafety

For Master of Business Administration (MBA) candidates

ACCOUNTING FOR MANAGEMENT

FINANCIAL ACCOUNTING - Introduction to Financial, Cost and Management Accounting- Generally accepted accounting principles, Conventions and Concepts- Balance sheet and related concepts- Profit and Loss account and related concepts - Introduction to inflation accounting- Introduction to human resources accounting.

COMPANY ACCOUNTS - Meaning of Company -Maintenance of Books of Account- Statutory Books- Profit or Loss Prior to incorporation- Final Accounts of Company. Employees stock option- Buyback of securities.

ANALYSIS OF FINANCIAL STATEMENTS - Analysis of financial statements – Financial ratio analysis, cash flow (as per Accounting Standard 3) and funds flow statement analysis.

COST ACCOUNTING - Cost Accounts - Classification of manufacturing costs - Accounting for manufacturing costs. Cost Accounting Systems: Job order costing - Process costing- Activity Based Costing. Costing and the value chain- Target costing

MANAGEMENT ACCOUNTING - Marginal costing including decision making- Budgetary Control & Variance Analysis - Standard cost system.

HUMAN RESOURCE MANAGEMENT

PERCEPTIVE IN HUMAN RESOURCE MANAGEMENT - Evolution of human resource management – The importance of the human factor – Objectives of human resource management – Inclusive growth and affirmative action - Role of human resource manager – Human resource policies – Computer applications in human resource management – Human resource accounting and audit.

THE CONCEPT OF BEST FIT EMPLOYEE - Importance of Human Resource Planning – Forecasting human resource requirement – Internal and External sources. Selection process screening – Tests - Validation – Interview - Medical examination – Recruitment introduction – Importance – Practices – Socialization benefits.

TRAINING AND EXECUTIVE DEVELOPMENT - Types of training methods purpose benefits resistance. Executive development programmes – Common practices - Benefits – Self development – Knowledge management.

SUSTAINING EMPLOYEE INTEREST - Compensation plan – Reward – Motivation – Theories of motivation – Career management – Development of mentor – Protégé relationships.

PERFORMANCE EVALUATION AND CONTROL PROCESS - Method of performance evaluation – Feedback – Industry practices. Promotion, Demotion, Transfer and Separation – Implication of job change. The control process – Importance – Methods – Requirement of effective control systems grievances – Causes – Implications – Redressal methods.

MATERIALS MANAGEMENT

INTRODUCTION - Operating environment-aggregate planning-role, need, strategies, costs techniques, approaches-master scheduling-manufacturing planning and control system-manufacturing resource planning-enterprise resource planning-making the production plan

MATERIALS PLANNING - Materials requirements planning-bill of materials- resource requirement planning-manufacturing resource planning-capacity management- scheduling orders-production activity control-codification.

INVENTORY MANAGEMENT - Policy Decisions–objectives-control - Retail Discounting Model, Newsvendor Model; EOQ and EBQ models for uniform and variable demand With and without shortages -Quantity discount models. Probabilistic inventory models.

PURCHASING MANAGEMENT - Establishing specifications-selecting suppliers- price determination-forward buying-mixed buying strategy-price forecasting-buying seasonal commodities-purchasing under uncertainty-demand management-price forecasting-purchasing under uncertainty-purchasing of capital equipment-international purchasing

WAREHOUSE MANAGEMENT - Stores management-stores systems and procedures-incoming materials control-stores accounting and stock verification- Obsolete, surplus and scrap-value analysis-material handling-transportation and traffic management -operational efficiency-productivity-cost effectiveness-performance measurement

For Zoology candidates

(i) Vertebrate Biology related to Laboratory Animals

(ii) Bioinstrumentation and Biological techniques

(iii) Biotechnology & Genetic Engineering

(iv) Animal Behavior

(v) Basic Microbiology

(vi) Developmental Biology

(vii) Basic Immunology

(viii) Biochemistry Animal Physiology & Endocrinology

(ix) Basic Cell and Molecular Biology

(x) Genetics and

(xi) Bioethics

For Engineering candidates

Electronics and communication Engineering (ECE):

1. Digital Electronics
2. Signals and Systems
3. Electrical Devices and Circuits
4. Microprocessor and Microcontrollers
5. Circuit Analysis
6. Communication Theory
7. Electromagnetic Fields
8. Digital Communication
9. Digital Signal Processing
10. Linear Integrated Circuits
11. VLSI Design
12. Embedded and Real Time Systems

Electrical and Electronics Engineering (EEE):

1. Machines I and II
2. Control System
3. Digital Logic Circuits
4. Drives and Controls
5. Circuit Theory
6. Measurements & Instruments
7. Power Electronics
8. Transmission and Distribution
9. Power System Analysis
10. Microprocessor & Controls
11. Embedded System
12. Special Electrical Machines

Instrumentation and Control Engineering (ICE):

1. Electrical Devices And Circuits
2. Transducer Engineering
3. Electrical Circuit Laboratory
4. Digital Logic Circuits
5. Electrical Measurements
6. Control System and Advanced Control System
7. Analytical Instruments
8. Process Control

9. Industrial Instrumentation I And II
10. Applied Thermodynamics and Fluid Mechanics
11. Biomedical Instrumentation
12. Microprocessor and Microcontrollers

Civil Engineering

1. Fluid Mechanics
2. Solid Mechanics
3. Road Safety Technology
4. Concrete Technology
5. Survey
6. Structural Analysis
7. Project Management
8. Foundation Engineering
9. Waste Water Management
10. Hydrology and Water Resource Engineering
11. Construction Techniques And Infra Structure Engineering
12. Environmental Engineering

Biomedical Engineering:

1. Human Anatomy and Physiology
2. Bio Chemistry
3. Microbiology and Pathology
4. Medical Instrumentation I & II
5. Bio Sensors and Measurements
6. Radiological Equipments and Nuclear Medicine
7. Bio Materials and Artificial Organs
8. Biomechanics
9. Bioinformatics and Drug Design
10. Rehabilitation Engineering
11. Tissue Engineering
12. Biomems and Medical Micro Device

Mechanical Engineering:

1. Thermodynamics
2. Fluid Mechanics
3. Kinematics and Machinery
4. Manufacturing Technology
5. Strength of Materials

6. Heat and Mass Transfer
7. Finite Element Analysis
8. Thermal engineering
9. Hydraulics & Pneumatics

Industrial safety:

1. Environmental safety
2. Fire and explosion controls
3. Electrical safety
4. Safety in chemical Industries
5. Occupational health & Industrial hygiene
6. Industrial safety

Computer Science/Information Technology:

Assembling & Dissembling of PCs/Servicing/Computer Management

- Assembling and dissembling PCs
- Introduction to BIOS/CMOS Setup, POST (Power On Self- Test)
- Introduction to Operationg System
- Computer Management
- Partitioning
- Installation of Drivers and Software
- CPU
- Mother Board
- RAM/ROM
- Hard Disk Drive
- Optical Drive
- Keyboard
- Mouse
- Monitor
- Printer
- Scanner

Computer Virus/ Trouble shooting

- Virus/ Malwares
- Trouble shooting

Software installation and booting

Net Working

- Net Working
- Virtualization

Internet

- Internet network
- Laptop servicing
- CC Camera settings and installation
- PC Hardware and Components
- PC Architecture
- Advanced Networks and Networking Peripherals
- Operating System, Software & Tools
- Devices and Applications