

AUGUST 2011

[KZ 068]

Sub. Code: 1451

**DOCTORATE OF MEDICINE (D.M.) DEGREE EXAMINATION
(SUPER SPECIALITIES)**

BRANCH XI – NEONATOLOGY

**APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY
AND PERINOTOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

**Time : 3 hours
(180 Min)**

Maximum : 100 marks

Answer ALL questions in the same order.

I. Elaborate on :

**Pages Time Marks
(Max.) (Max.) (Max.)**

- | | | | |
|--|----|----|----|
| 1. Describe the surfactant metabolism and disorders resulting from its metabolism. | 11 | 35 | 15 |
| 2. Discuss various characteristics of a diagnostic test in research methodology. | 11 | 35 | 15 |

II. Write notes on :

- | | | | |
|--|---|----|---|
| 1. Write about the bilirubin metabolism and its handicaps in a newborn baby. | 4 | 10 | 7 |
| 2. What are the maternal analgesia & anesthesia influences on the fetus? | 4 | 10 | 7 |
| 3. Write the essential amino acids required for normal development of a preterm infant. | 4 | 10 | 7 |
| 4. What is the mechanism of action and clinical use of Methyl xanthines in a newborn. | 4 | 10 | 7 |
| 5. How Ductus arteriosus is formed and what is its fate after birth? | 4 | 10 | 7 |
| 6. Describe the embryological development of placenta and mention the factors that regulate placental circulation. | 4 | 10 | 7 |
| 7. Describe the development of diaphragm and its disorders. | 4 | 10 | 7 |
| 8. Write anatomical differences between the preterm skin and term skin. | 4 | 10 | 7 |
| 9. What is the physiological basis for the Transient Tachypnea of the Newborn? | 4 | 10 | 7 |
| 10. How is the amniotic fluid formed and monitored. | 4 | 10 | 7 |

AUGUST 2012

[LB 081]

Sub. Code: 1451

D.M – NEONATOLOGY

**Paper – I APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY
AND PERINOTOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

**Time: 3 hours
(180 Min)**

Maximum: 100 marks

Answer ALL questions in the same order.

I. Elaborate on:

**Pages Time Marks
(Max.)(Max.)(Max.)**

- | | | | |
|---|----|----|----|
| 1. Describe the development of the brain and the disorders of abnormal development. | 16 | 35 | 15 |
| 2. Elaborate the steps of thyroxine synthesis and conditions causing dyshormonogenesis. | 16 | 35 | 15 |

II. Write short notes on:

- | | | | |
|--|---|----|---|
| 1. Pathophysiology of apnea of prematurity. | 4 | 10 | 7 |
| 2. Surfactant synthesis and secretion. | 4 | 10 | 7 |
| 3. Mechanism of action of inhaled nitric oxide. | 4 | 10 | 7 |
| 4. Circulatory adjustments at birth. | 4 | 10 | 7 |
| 5. Management of fetal supra ventricular tachycardia. | 4 | 10 | 7 |
| 6. G6PD deficiency. | 4 | 10 | 7 |
| 7. Micro deletion syndromes. Describe any 1 in detail. | 4 | 10 | 7 |
| 8. MRSA. | 4 | 10 | 7 |
| 9. Forest plot. | 4 | 10 | 7 |
| 10. Antifungal prophylaxis in ELBW babies. | 4 | 10 | 7 |

LC 081

FEBRUARY 2013

Sub: Code:1451

D.M –NEONATOLOGY

**Paper – I APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY
AND PERINOTOLOGY:RESEARCH METHODS**

Q.P. Code : 161451

**Time : 3 hours
(180 Min.)**

Maximum : 100 marks

I. Elaborate on:

(2x15marks=30marks)

1. Various modes of Echocardiography useful in neonates and discuss the role of functional echocardiography in neonatal intensive care.
2. Assessment of foetal wellbeing during prenatal and natal period? What are its clinical implications?

II. Write short notes on :

(10x7 marks=70marks)

1. Endocrine functions of placenta
2. Auto regulation of cerebral blood flow in a neonate.
3. Influence of Breast feeding on neonatal brain development
4. Pathophysiology of hypoxic ischemic encephalopathy
5. Calculation of sample size in Medical research?
6. Retinal development and discuss the pathophysiology of Retinopathy of prematurity
7. Types of medication error possible in neonatal practice and its prevention.
8. Mechanism of bilirubin toxicity and its long term sequelae
9. Physiology of pain perception in new born and its management
10. Pharmacokinetics of drugs in preterm infants.

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(LD 081)

AUGUST 2013

Sub. Code:1451

D.M. – NEONATOLOGY
Paper – I APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINOTOLOGY; RESEARCH METHODS
Q.P.Code: 161451

Time: Three Hours

Maximum: 100 marks

I. Elaborate on:

(2X15=30)

1. The Approach to a neonate who presents with dehydration.
2. Overview of normal heart development and discuss mal-development leading to congenital cyanotic heart diseases.

II. Write notes on:

(10X7=70)

1. Dynamic compliance of lung and what are factors which influence it?
2. The host defense mechanisms against fungal infections in a neonate.
3. Evidence based medicine? Describe strength and weakness of evidence based medicine.
4. Intrauterine foetal growth restriction. How will you identify foetal growth restriction?
5. Development of skin & discuss the strategies to protect skin injury in very low birth weight infants.
6. Neuropathology of periventricular leukomalacia.
7. Growth factors in breast milk and their influence on the growth of the neonate.
8. Pharmacological role of dobutamine in neonatal shock management.
9. The role of chorionic villous sampling as a diagnostic modality for genetic diagnosis.
10. Calcium homeostasis in a neonate.

(LE 081)

FEBRUARY 2014

Sub. Code:1451

D.M. – NEONATOLOGY
Paper – I APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY AND
PERINOTOLOGY; RESEARCH METHODS

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 marks

I. Elaborate on:

(2X15=30)

1. Development of heart and congenital heart defects observed in neonates.
2. Physiology of calcium regulation and disorders of metabolism of calcium in a neonate.

II. Write notes on:

(10X7=70)

1. CSF dynamics and analysis.
2. Receiver operating characteristic curve (ROC).
3. Development and maturation of renal function.
4. Oxygen transport in neonates.
5. Pre and probiotics in preterm infants.
6. Drug therapy for perinatal HIV.
7. Prenatal counseling.
8. Steroidogenesis in the fetoplacental unit.
9. Behavioral states as an indicator of neural integrity.
10. Temperature regulation in preterm babies.

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Physiology of transition from fetal to neonatal circulation and pathophysiology of persistent pulmonary hypertension.
2. Control of breathing in neonates and pathogenesis of apnoea of prematurity.

II. Write notes on:

(10 x 7 = 70)

1. Newer insights into pathophysiology of PVL.
2. Management of foetal tachyarrhythmia.
3. Cellular mechanisms of antibiotic resistance and strategies for prevention.
4. Umbilical artery Doppler in the assessment of foetal growth restriction.
5. Adaptive responses to Neonatal hypoglycaemia.
6. Development of neonatal skin and its implications.
7. Cerebral function monitoring.
8. Prenatal work up of foetal hydrops.
9. ROC curve.
10. Metabolic acid base disorders in a neonate.

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Give a brief account of neural tube formation and related developmental defects. How will you manage a baby with neural tube defect in the lumbosacral region?
2. Discuss briefly various renal function tests and their utility in neonates. How will you manage a newborn with acute kidney injury?

II. Write notes on:

(10 x 7 = 70)

1. Indices of neonatal health care.
2. Randomized controlled trial.
3. Clinical application of gene therapy.
4. Informed consent.
5. Workup and management of neonatal fungal sepsis.
6. Use of probiotics in neonatal practice.
7. Role of zinc in neonatal care.
8. Pathophysiology of hyaline membrane disease.
9. Direct hyperbilirubinemia in newborn.
10. Hearing evaluation in newborn.

(LK 081)

FEBRUARY 2017

Sub. Code:1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Describe the development of the central nervous system. Add a note on open neural tube defects.
2. Describe the pathway of bilirubin metabolism. Mention the common disorders related to bilirubin metabolism in the first 3 days of life.

II. Write notes on:

(10 x 7 = 70)

1. Surfactant synthesis and disorders.
2. Patho Physiology of neonatal cyanosis.
3. Calcium metabolism in infants and metabolic bone disease.
4. Role of host defences in neonates' susceptibility to infection.
5. Mechanisms of placental transport.
6. Concept of standard deviation and percentiles.
7. Determination of biophysical profile in the foetus.
8. Aetiology and management of foetal bradycardia.
9. Importance of skin integrity in neonatal life.
10. Positive predictive value, Negative predictive value.

(LL 081)

AUGUST 2017

Sub. Code:1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Mention the steps in haemoglobin synthesis and breakdown in the foetal and neonatal period. What are the disorders related to haemoglobin synthesis that occur in the neonate?
2. Describe the development of the urogenital system. Add a note on cloacal defects.

II. Write notes on:

(10 x 7 = 70)

1. Role of zinc in neonates and deficiency disorders.
2. Twin reversed arterial perfusion sequence (TRAPS).
3. Normal distribution (Gaussian curve).
4. Mechanisms of antibiotic resistance.
5. Development of visual pathways.
6. Amniocentesis and its complications.
7. Uses and abuses of first trimester ultrasound.
8. Likelihood Ratio.
9. Common enzymatic disorders presenting in the first week of life.
10. Importance of perinatal mortality rate.

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Regional perinatal data base – Importance, organisation and challenges.
2. Discuss in detail the pathophysiology of hypoxic ischemic encephalopathy. Enlist possible neuroprotective strategies and their mechanism of action.

II. Write notes on:

(10 x 7 = 70)

1. Umbilical artery Doppler in assessment of fetal well being.
2. Fetal surgery.
3. Factors influencing fetal growth.
4. Predictors of preterm delivery.
5. Impact of maternal anaesthesia and analgesia on newborn.
6. Role of placenta as a fetal endocrine organ.
7. Discuss the bioactive factors in human milk.
8. Levels of evidence and GRADE of recommendation.
9. Quadruple screening test.
10. Fluorescence in situ hybridization (FISH).

(LN 081)

AUGUST 2018

Sub. Code: 1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P.Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Describe the various characteristics of a Diagnostic test. Discuss the utility of Receiver Operating curves and Likelihood ratios in clinical practice.
2. Discuss the pharmacodynamic and pharmacokinetic principles one should know for choosing antibiotics in neonatal sepsis. Explain various mechanisms of antibiotic resistance and ways to counter them.

II. Write notes on:

(10 x 7 = 70)

1. Ethical principles in Resuscitation of Preterm infants.
2. Glucose metabolism in IUGR.
3. Evaluation of stillborn.
4. PDSA cycle in quality improvement.
5. Physiological handicaps in Respiratory system of Neonates.
6. Transport across placental barrier and clinical implications.
7. Autoregulation of Neonatal cerebral circulation.
8. Principles behind methods for assessment of fetal well being.
9. Epidemiology and Pathophysiology of Retinopathy of Prematurity.
10. Amniotic fluid dynamics and its application in practice.

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Discuss maintenance of normal acid base balance. Describe in detail the management of metabolic acidosis in a neonate.
2. Describe in detail the various stages of development of lung. Describe one developmental anomaly/ neonatal morbidity occurring in any three stages.

II. Write notes on:

(10 x 7 = 70)

1. Draw a 2 X 2 table and describe how to calculate sensitivity, specificity, positive predictive value and negative predictive value for a diagnostic test.
2. C-reactive protein and its clinical utility in newborn care.
3. Advantages and disadvantages of single centre versus multi centre RCT's.
4. Bilirubin metabolism and physiological jaundice.
5. Compliance and resistance.
6. Classification of hypothermia in newborn. Management of temperature in a preterm born at 26 weeks.
7. Iron metabolism in fetus and newborn. Briefly describe anemia of prematurity.
8. Pathophysiology of metabolic bone disease.
9. Embryologic basis of multicystic dysplasia of kidney and posterior urethral valve.
10. Management of a Rh iso-immunised pregnant woman.

(LQ 081)

FEBRUARY 2020

Sub. Code: 1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. What are the various methods available for prenatal genetic diagnosis? Discuss in detail the utility and limitations of each method.
2. What is a systematic review? Enumerate and discuss the steps required in writing a good systematic review.

II. Write notes on:

(10 x 7 = 70)

1. Pathophysiology of New Bronchopulmonary Dysplasia.
2. Molecular diagnosis of Neonatal sepsis.
3. Regression Analysis.
4. Placental examination – A Neonatologist's tool.
5. Prostaglandin mediated chemical reactions relevant to neonatal practice.
6. Pathophysiology of primary and secondary brain injury in HIE and scope for interventions at each stage.
7. Nested case control study.
8. Basic science behind neuromigrational disorders.
9. Development of skin in newborns and strategies to minimise skin injuries in VLBW infants.
10. Soft markers in fetus in Antenatal Ultrasound.

(LR 081)

NOVEMBER 2020
(AUGUST 2020 SESSION)

Sub. Code: 1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Describe in detail the stages of development of heart. Elaborate on neonatal morbidity and management of transposition of great arteries.
2. Describe randomized control trial and discuss various randomization techniques and consort guidelines.

II. Write notes on:

(10 x 7 = 70)

1. Describe epigenetics and its application in antenatal and neonatal diseases.
2. Survival analysis and Kaplan Meier curve.
3. Describe placental development, endocrine and paracrine functions of placenta.
4. Surfactant synthesis and metabolism.
5. Control of breathing in neonate and pathogenesis of apnea of prematurity.
6. Describe the mechanism of action of pharmacological agents used in management of shock.
7. Discuss pharmacovigilance and strategies to prevent and report medication errors.
8. Cardio vascular changes at birth.
9. The uses and limitations of the biophysical profile of fetus.
10. Discuss the predictors of preterm labour.

(DM 0821)

AUGUST 2021

Sub. Code: 1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Foetal circulation; Transition from foetal to neonatal circulation; Pathophysiology of persistent pulmonary hypertension of the newborn (PPHN). Comment on various drugs used in treatment of PPHN.
2. What Is “CONSORT Statement”? What is the significance? Enumerate the major components of CONSORT Statement.

II. Write notes on:

(10 x 7 = 70)

1. Umbilical artery doppler in the assessment of fetal growth restriction.
2. Modified intention to treat analysis.
3. Physiology of lactation.
4. Pathophysiology of retinopathy of prematurity (ROP).
5. Antenatal assessment of a baby with congenital diaphragmatic hernia.
6. Fluorescence in situ hybridization (FISH).
7. Influence of breastfeeding on neonatal brain development.
8. Principles of fluid and electrolyte therapy in the newborn.
9. Delayed cord clamping.
10. Types of errors in medical research.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[DM 0222]

FEBRUARY 2022

Sub.Code :1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Describe the development of Diaphragm. Delineate on neonatal morbidity and management of Congenital Diaphragmatic Hernia.
2. Describe Meta analysis and how to conduct and analyze the Meta analysis.

II. Write notes on:

(10 x 7 = 70)

1. Human Genome Project and its impact in Neonatology.
2. Correlation coefficient and Pearson product-moment correlation coefficient.
3. Host defenses in neonates against infection.
4. Describe the mechanism of action of pulmonary vasodilators used in management of PPHN.
5. Development of urinary system and detection of its disorders in antenatal period.
6. Fetal surgery.
7. Describe the Antenatal Doppler indices and their clinical applications.
8. Intrapartum fetal monitoring.
9. Describe fetal blood circulation and the changes that occur at birth.
10. Describe the causes and prevention of stillbirth.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[DM 0822]

AUGUST 2022

Sub. Code :1451

D.M. – NEONATOLOGY

**Paper I – APPLIED BASIC SCIENCES AS APPLIED TO
NEONATOLOGY AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on: **(2 x 15 = 30)**

1. Briefly discuss the development of the Ventricles of brain, germinal matrix and its blood supply. Mention briefly the pathogenesis of preterm intraventricular haemorrhage its risk factors and clinical features. Write a note on neonatal care bundle for prevention of IVH.
2. Discuss on validation of diagnostic tests. Write briefly on the Receiver operating characteristic curves and likelihood in clinical practice.

II. Write notes on: **(10 x 7 = 70)**

1. Diagnosis of Fetal Growth Restriction and monitoring of FGR babies.
2. Write a note on Odds Ratio and Confidence Interval.
3. Discuss the auditory pathway and write a note on Brainstem Evoked Response Audiometry.
4. Discuss the Etiopathogenesis of apnoea of prematurity and its management.
5. Write a note on Bilirubin metabolism and discuss the diagnosis and management of Crigler Najjar Syndrome.
6. Discuss the management of antenatally diagnosed fetal pelvicalyceal dilatation.
7. Discuss the mechanisms of gas transport in ventilation using High Frequency Oscillatory ventilator. How will you alter the settings when ABG shows Hypercapnia?
8. What is Pedigree charting? Write briefly on degrees of Consanguinity.
9. Pathogenesis of Osteopenia of prematurity and its diagnosis.
10. Write briefly on Delivery point screening of Newborn for birth defects.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[DM 0823]

AUGUST 2023

Sub. Code :1451

D.M. – NEONATOLOGY

**PAPER I – APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY
AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on: **(2 x 15 = 30)**

1. Elaborate on the grade system of grading evidence and recommendations. What do you mean by ‘Strength of Recommendation’ and ‘Quality of Evidence’?
2. Elaborate the steps of Thyroxin Synthesis and conditions causing Congenital Hypothyroidism.

II. Write notes on: **(10 x 7 = 70)**

1. Pathophysiology of Periventricular Leucomalacia.
2. Medication error in Neonatal Practice and its prevention.
3. PDSA cycle in Quality Improvement.
4. Gut Microbiome.
5. Survival Analysis.
6. Forest Plot.
7. Regulation of Phosphorus Homeostasis in a Neonate.
8. Ethical Issues in Neonatal Resuscitation.
9. Mechanism of Placental Transport.
10. Research Priorities in Newborn Health.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[DM 0124]

JANUARY 2024

Sub. Code :1451

D.M. – NEONATOLOGY

**PAPER I – APPLIED BASIC SCIENCES AS APPLIED TO NEONATOLOGY
AND PERINATOLOGY; RESEARCH METHODS**

Q.P. Code: 161451

Time: Three Hours

Maximum: 100 Marks

I. Elaborate on:

(2 x 15 = 30)

1. Malrotation of intestines: Discuss Embryology, Aetiopathogenesis and Management.
2. Discuss Randomized Control Trial, various randomization techniques and major components of CONSORT statement.

II. Write notes on:

(10 x 7 = 70)

1. Discuss Evidence Based Medicine and its strength and weaknesses.
2. Kaplan Meier curve and Funnel plot.
3. Human Genome Project and its impact on clinical practice.
4. Surfactant synthesis and Metabolism.
5. Iron metabolism in fetus and newborn. Briefly describe anemia of prematurity.
6. Impact of maternal anaesthesia and analgesia on newborn.
7. Cellular mechanisms of antibiotic resistance and strategies for prevention.
8. Discuss stillbirth audit and list the enablers and barriers for implementing still birth audit.
9. Enumerate the methods for assessing intrapartum fetal well being and discuss their interpretation.
10. Describe the antenatal management of a pregnant woman presenting at 10 weeks of gestation to antenatal clinic and whose previous baby had salt losing congenital adrenal hyperplasia.
