甘肃省高等教育自学考试
课程考试大纲

专业名称：轨道交通信号与控制（专升本）

专业代码：080802T

课程名称：轨道交通信号及控制专业英语（11935）

目 录

I. 能力考核要求

一、课程基本信息

课程代码	11935	课程名称	轨道交通信号及控制专业英语		
课程性质	统考课程	课程类别	专业教育	学分	7
适用专业	轨道交通信号与控制专业	修订人		武晓春	

二、课程简介

《轨道交通信号及控制专业英语》课程是轨道交通信号与控制专业选修的一门学科基础课，由专业英语阅读理解和专业英语写作两部分组成。阅读理解部分包含轨道交通信号及控制所涉及的电工电子基本理论及铁道信号基础理论常见的英语资料阅读和英文翻译；写作部分介绍在学位深造及专业论文写作中经常用到的英文书写方法。通过本课程的学习，使学生具有英文专业文献阅读能力和翻译能力，并能进行一定的专业文献写作，以满足轨道交通行业对高级工程技术人才英语阅读和书写能力的需求。

三、教学基本要求

1.掌握专业英语语法和专业词汇，并能阅读英文专业文献。

2.理解并掌握翻译的基本要求和技巧，提高翻译能力。

3.熟悉并掌握英语科技论文的写作模式。

四、课程考核目的和要求

本课程的考核目的在于检验考生掌握本课程的基本知识情况和运用所学方法阅读英文专业文献并能掌握英语科技论文的写作模式。

本课程要求考核识记、领会、简单应用、综合应用四种能力。四种能力层次解释为:

识记:要求考生知道本课程中的名词、概念、原理、知识的含义，并能够正确认识或识别。

领会:要求在识记的基础上，能够把握本课程中的基本概念、基本质理和基本方法，掌握有关概念、原理、方法的区别与联系。

简单应用:要求在领会的基础上，运用本课程中的基本概念、基本质理和基本方法中的少量知识点，分析和解决一般的'理论问题或实际问题。综合应用。要求考生在简单应用的基础上，运用学过的本课程规定的多个知识点，综合分析和

解决稍复杂的理论和实际问题。

五、建议教材与教学参考书

1.建议教材

《信息信号类专业英语》，沈瑜，江娜等　中国水利水电出版社，2019 年 9月

2.参考书目

[1]《专业英语》，党建武，刘晓娟，李国宁，兰州大学出版社，2002 年 1 月

[2]《城市轨道交通专业英语》，赵巍巍，人民交通出版社，2011 年 6 月

[3]《铁路运输与信号专业英语》，叶清贫，苏雪，华中科技大学出版社，2008年 8 月

[4]《科技英语》，刘晓娟，李国宁，党建武，兰州大学出版社，2001 年 8 月

II. 考试形式和试卷结构

考试要求：本课程考试采用闭卷考试方式，考试的时间为 150 分钟，试卷总分为 100 分，60 分为及格.考试时可以携带计算器。

考核范围：本大纲考试内容所规定知识点及知识点下的知识细目，都属于考核范围。

试卷分数比例：本课程在试卷中对不同能力层次要求的分数比例大致为：识记占 20%，领会占 30% ~40%，简单应用占 30%，综合应用占 10%~20%。

试卷难度：试卷中试题的难度可分为：易、较易、较难和难四个等级。每份试卷中不同难度试题的分数比例一般为：2:3:3:2。

试卷题型：课程考试命题的主要题型一般有:名词解释、填空题、单项选择题(四选一)、多项选择题(四选多)、简答题、论述题等。在命题工作中必须按照本课程大纲中规定的题型命题，考试试卷使用的题型可以略少，但不能超出大纲规定的范围。

III. 考试内容和考核要求

第一部分 Circuit Analysis

一、考试内容

1.Kirchhoff's Laws

（1）Basic concepts.

（2）Basic Principles.

2.Thevenin's Theorem

（1）Basic concepts.

（2）Basic Principles.

3.Norton's Theorem

（1）Basic concepts.

（2）Basic Principles.

4.Superposition Theorem

（1）Basic concepts.

（2）The use of Superposition Theorems.

5.Parallel Resonancee

（1）Comparison between parallel resonance and series resonance.

（2）Circuit analysis methods.

二、考核要求

1.Kirchhoff's Laws

识记：Basic concepts of Kirchhoff's Laws.

简单应用：Basic Principles of Kirchhoff's Laws.

2.Thevenin's Theorem

识记：Basic concepts of Thevenin's Theorem.

简单应用：Basic Principles of Thevenin's Theorem.

3.Norton's Theorem

识记：Basic concepts of Norton's Theorem.

简单应用：Basic Principles of Norton's Theorem.

4.Superposition Theorem

识记：Basic concepts of Superposition Theorem.

简单应用：The use of Superposition Theorems.

5.Parallel Resonancee

领会：Comparison between parallel resonance and series resonance.

简单应用：Circuit analysis methods.

第二部分 Analog Electronic Technology

一、考试内容

1.Single – stage Amplifier

（1）The Concept of Amplifiers.

（2）Performance Index of Amplifiers.

（3）Basic Transistor Amplifier Configuration.

（4）Common-Emitter Amplifier.

（5）Common-Collector Amplifier.

（6）Common-Base Amplifier.

（7）Three Basic Amplifier Summary and Comparison.

2.Differential Amplifier

（1）Basic BJT Differential - pair Configuration.

（2）Qualitative Description.

（3）The Input and Output Mode.

（4）Differential Input.

（5）Differential Gain.

（6）Common Input.

（7）Common - Mode Voltage Gain.

（8）Common - Mode Rejection Ratio.

（9）v_o.

3.Current Source Circuit

（1）Basic Current Mirror.

（2）Basic Three - Transistor Current Source.

（3）Proportional Current Mirror.

（4）Widlar Current Source.

（5）Multitransistor Current Source.

（6）Current Source Act as Active Load.

（7）FET Current Source.

4.The Frequency Characteristics of the Amplifier

（1）Amplifier Gain Versus Frequency.

（2）Equivalent Circuit.

（3）Frequency Response Analysis.

（4）High - Frequency Response of Transistor Circuits.

（5）Low - Frequency Equivalent Circuits.

5.Operational Amplifier

（1）Circuit Symbol.

（2）Circuit Description of 741.

（3）Op - Amp Parameters.

（4）Open - Loop Differential - Mode Voltage Gain.

二、考核要求

1.Single – stage Amplifier

识记：The Concept of Amplifiers.

领会：Performance Index of Amplifiers、Basic Transistor Amplifier Configuration.

简单应用：Common-Emitter Amplifier、Common-Collector Amplifier、Common-Base Amplifier、Three Basic Amplifier Summary and Comparison.

2.Differential Amplifier

识记：The Input and Output Mode.

领会：Basic BJT Differential - pair Configuration、Differential Input、Differential Gain、Common Input、Common - Mode Voltage Gain、Common - Mode Rejection Ratio、v_o.

简单应用：Qualitative Description.

3.Current Source Circuit

识记：Proportional Current Mirror、Widlar Current Source、Multitransistor Current Source、Current Source Act as Active Load、FET Current Source.

领会：Basic Current Mirror、Basic Three - Transistor Current Source.

4.The Frequency Characteristics of the Amplifier

识记：Equivalent Circuit.

领会：Amplifier Gain Versus Frequency、Frequency Response Analysis、High - Frequency Response of Transistor Circuits.

简单应用：Low - Frequency Equivalent Circuits.

5.Operational Amplifier

识记：Circuit Symbol、Circuit Description of 741.

领会：Op - Amp Parameters、Open - Loop Differential - Mode Voltage Gain.

第三部分 Signal and Systems

一、考试内容

1.What is a Signal

（1）Analog Signal.

（2）Digital Signal.

2.The Basic Conception of Signal and Systems

3.Time Domain Analysis of LTI Systems

（1）Continuous System Time Domain Analysis Model.

（2）Block Diagram of a Continuous System.

（3）Zero Input Response of Continuous System.

（4）Unit Impulse Response of Continuous System.

（5）Unit Step Response of Continuous System.

（6）Zero - state Response and Full Response of Continuous System.

4.Laplace Transform

5.Principle of Communication

（1）How does the z transformation come up? What does it do?

（2）What is the definition of a bilateral Z transform and a unilateral z transformation?

（3）What is the relationship between the z transform and the Laplace transform?

（4）How many ways are there to solve the inverse z transformation?

（5）Explains how to apply the shift property of z transform to solve the difference equation.

（6）How is the system function defined in linear time invariant discrete time

systems?

（7）How does the spectrum of discrete time signals be defined? What are its feature?

（8）How does the frequency response of a discrete time system be defined?

二、考核要求

1.What is a Signal

领会：Analog Signal、Digital Signal.

2.The Basic Conception of Signal and Systems

识记：The Basic Conception of Signal and Systems.

3.Time Domain Analysis of LTI Systems

识记：Continuous System Time Domain Analysis Model、Block Diagram of a Continuous System.

领会：Zero Input Response of Continuous System、Unit Impulse Response of Continuous System、Unit Step Response of Continuous System、Zero - state Response and Full Response of Continuous System.

4.Laplace Transform

简单运用：Laplace Transform.

5.Principle of Communication

识记：How does the z transformation come up? What does it do、What is the definition of a bilateral Z transform and a unilateral z transformation、How is the system function defined in linear time invariant discrete time systems、How does the spectrum of discrete time signals be defined? What are its feature、How does the frequency response of a discrete time system be defined.

领会：What is the relationship between the z transform and the Laplace transform、How many ways are there to solve the inverse z transformation.

简单运用：Explains how to apply the shift property of z transform to solve the difference equation.

第四部分 Principle of Communication

一、考试内容

1.Random Singal Analysis

（1）A Relative - frequency Description of Random Process.

（2）Stationarity.

（3）Partial Description of Random Processes: Ergodicity.

2.Digital Modulation

3.Principles of Baseband Digital Data Transmission

4.Error Control Coding

5.Pulse Modulation Coding

（1）Sampling.

（2）Quantization.

（3）Coding.

二、考核要求

1.Random Singal Analysis

识记：A Relative - frequency Description of Random Process.

领会：Stationarity、Partial Description of Random Processes: Ergodicity.

2.Digital Modulation

领会：Digital Modulation.

3.Principles of Baseband Digital Data Transmission

领会：Principles of Baseband Digital Data Transmission.

4.Error Control Coding

领会：Error Control Coding.

5.Pulse Modulation Coding

领会：Sampling、Quantization、Coding.

第五部分 Basic Theory of Computer

一、考试内容

1.Historical Development

2.Protection：Virtual Memory and Virtual Machine

（1）Protection via Virtual Memory.

（2）Protection via Virtual Machines.

3.Types of Memory

4.Introduction of Computer Software and Hardware

（1）The Meaning of Software.

（2）Characteristics of Software.

（3）Arithmetic and Logical Unit.

（4）Memory Unit.

（5）Control Unit.

（6）Input Device.

（7）Output Device.

5.Introduction of Function of CPU

（1）History of CPUs.

（2）Microprocessors.

（3）CPU Operation.

二、考核要求

1.Historical Development

识记：Historical Development.

2.Protection：Virtual Memory and Virtual Machine

识记：Protection via Virtual Memory、Protection via Virtual Machines.

3.Types of Memory

识记：Types of Memory.

4.Introduction of Computer Software and Hardware

识记：The Meaning of Software、Characteristics of Software、Arithmetic and Logical Unit、Memory Unit、Control Unit、Input Device、Output Device.

5.Introduction of Function of CPU

识记：History of CPUs、Microprocessors、CPU Operation.

第六部分 Centralized traffic control

一、考试内容

1.Interlocking

（1）Interlocking.

（2）Configuration and Use.

（3）Interlocking Types.

2.Centralized Traffic Control

（1）Background.

（2）Development and Techlogy.

（3）Signals and Controlled Points.

（4）Operation.

3.Automatic Train Control

（1）Background.

（2）Origins of Automation.

（3）The ATC Package.

4.Track Circuit

（1）Principles and Operation.

（2）The Basic Circuit.

（3）Circuit under Electrification.

（4）Jointless Track Circuits.

（5）DC Coded Track Circuits.

5.Communications - based Train Control

（1）Background.

（2）CBTC and Moving Block.

（3）Levels of Automation.

（5）Main Application.

（6）Main Benefits.

二、考核要求

1.Interlocking

领会：Interlocking、Configuration and Use、Interlocking Types.

2.Centralized Traffic Control

识记：Background、Development and Techlogy.

领会：Operation.

简单应用：Signals and Controlled Points.

3.Automatic Train Control

识记：Background、Origins of Automation.

简单应用：The ATC Package.

4.Track Circuit

领会：Circuit under Electrification、DC Coded Track Circuits.

简单应用：Principles and Operation、The Basic Circuit、Jointless Track Circuits.

5.Communications - based Train Control

识记：Background.

领会：Levels of Automation、Main Application、Main Benefits.

简单应用：CBTC and Moving Block.

Ⅳ．题型示例

一、单项选择题（每题 2 分，共 20 分）

1. The resistance and inductance components are connected in parallel, and their effective current values are 3A and 4A. Therefore, their total effective current value is （   ）.

A. 7A

B. 6A

C. 5A

D. 4A

2. ……

10.

二、多项选择题（每题 2 分，共 10 分，漏选错选均不得分）

1. Circuits typically have two states: （   ）, and （   ）.

A. Open circuit.

B. Connected.

C. Short circuit.

D. Broken.

2. ……

5.

三、名词解释（每题 4 分，共 20 分）

1. CBTC

2. ……

5.

四、简答题（每题 5 分，共 20 分）

1. What are the components of the urban rail transit signal system?

2. ……

4.

五、论述题（每题 15 分，共 30 分）

1. Discuss the role of train speed measurement and positioning technology in the CBTC system.

2.

V.参考答案及评分标准

一、单项选择题（每题 2 分，共 20 分）

1.C；2.;…10.。

二、多项选择题（每题 2 分，共 10 分，漏选错选均不得分）

1.A,C；2.;…5.。

三、名词解释（每题 4 分，共 20 分）

1. The full name of CBTC is "Communication Based Train Control", which refers to a communication based train control system. (1 分) It is a modern train operation control technology that uses wireless communication and computer technology for train control and monitoring. (1 分) The CBTC system can achieve functions such as automatic train operation, vehicle position determination, train speed control, and train interval control. (2 分)

2.….

5.。

四、简答题（每题 5 分，共 20 分）

1.The signal system of urban rail transit usually consists of two major parts: Automatic

Train Control system (ATC) and depot signal control system, used for train route control, train interval control, dispatch command, information management, equipment condition monitoring and maintenance management. (2 分)

The Automatic Train Control System (ATC) includes three subsystems: Automatic Train Supervision (ATS), Automatic Train Protection (ATP), and Automatic Train Operation (ATO). (2 分)

A separate set of interlocking equipment is set up in the urban rail transit depot to achieve route control within the depot, complete daily maintenance operations such as vehicle operation, parking maintenance, technical inspection of running trains, vehicle cleaning and washing, and exchange information with the train operation command center through the ATS depot extension. (1 分)

2….

4.。

五、论述题（每题 15 分，共 30 分）

1. Accurate and safe autonomous train speed measurement and positioning are the foundation for ensuring safe train operation and efficient tracking. The role of train speed measurement and positioning technology in the CBTC system is mainly reflected in the following aspects:

(1) The regional controller correctly sorts the trains along the entire line based on train position information, and assigns appropriate movement authorization to the trains based on the position information of adjacent trains and the arranged route information (i.e., determines appropriate tracking target points for the following trains) to ensure safe train operation. (4 分)

(2) The ATP on-board equipment calculates the Emergency Brake Intervention (EBI) speed curve based on the received movement authorization and train safety braking model, and compares the relationship between the current actual train speed and EBI speed in real-time, providing overspeed protection function for the train to avoid the train speed exceeding the maximum allowable operating speed or the train position exceeding the allowable operating range. (4 分)

(3) ATO equipment can calculate the optimal driving curve based on the position and

speed information of the train, operating objectives, and autonomous driving models, and adjust train control commands based on the curve. (4 分)

In summary, the speed and position information of trains are not only used for safety functions such as train interval protection, but also for operational needs such as automatic train operation. Therefore, it is necessary to ensure the safety and accuracy of train speed measurement and positioning. (3 分)

2.。