KISI-KISI

LKS SMK TINGKAT NASIONAL 24
MALANG - JATIM | 23 - 28 MEI 2016

BIDANG LOMBA :

ELECTRICAL APLICATION

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
DIREKTORAT JENDERAL PENDIDIKAN DASAR DAN MENENGAH
DIREKTORAT PEMBINAAN SEKOLAH MENENGAH KEJURUAN
Jalan Jenderal Sudirman, Senayan, Jakarta 10270 Gedung E Lantai 12 – 13
Telepon (021) 5725477 (Hunting) , 5725466-69, 5725471-75
Website: http://psmk.kemdikbud.go.id

INTRODUCTION

1.1. Name and Description of Skill

1.1.1. The name of the skill is Electronics.

1.1.2. Description of Skill

This skill involves manufacturing, testing and troubleshooting electronic equipment. Skilled technicians are able to build equipment and systems for electronics and other special applications.

They use the required hand tools, solders and measuring devices and computers. Since the manufacturing processes of modern mass-produced electronics are highly automated, technicians build prototypes before production, and maintain and repair systems.

Computers and embedded systems (computers for which a fixed programming environment is embedded in the processor) play a central role in this skill area since electronic devices are mainly built with the aid of programmed systems.

1.2. Scope of Application

1.2.1. Every Competitor must know this Technical Description.

1.2.2. In the event, English or Indonesian is official language.

1.3. Associated Documents

As this Technical Description contains only skill-specific information it must be used in association with the following:

- LKS- Competition Rules

2. COMPETENCY AND SCOPE OF WORK

2.1. Competency Specification

2.1.1. General Competency

- Creativity.
- Critical thinking.
- Honesty and integrity.
- Self motivation.
- Problem-solving skills.
- Work under pressure.
- Able to do environmentally friendly operation.

2.1.2. Competency for all modules

Skills to do measurements in electronic circuits (with DVM, scope, etc)

Skills to use materials and tools of electronics industry in ordinary servicing, installation and repair tasks (hand tools, different soldering

and de-soldering technique)
Knowledge in analysis and design of electric circuit, electronic circuit and digital logic circuit and sensor circuit.

Module 1 - Hardware Design

- Skills to design small modification to basic electronics blocks
- Skills to draw developed circuit by hand
- Skill to design of Printed Circuit Board using Altium design PCB Software
- Skill to assembling circuits and Printed Circuit Board into prototype

Module 2 - Embedded Systems Programming

- Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software.
- Skills and knowledge in programming of embedded systems by using C-language and Integrated Development Environments (Atmel Studio 7 Compiler and AVR Dude Downloader).

Module 3 - Fault finding, Repair, and Measurement

- Troubleshooting, determining causes of operating errors and deciding what to do about it.
- Adjust and replace defective or improperly functioning circuitry and electronics components, using hand tools and soldering iron
- Skills to test electronics units, using standard test equipment, and analyze results to evaluate performance and determine need for adjustment.

Module 4 – Assembly

- Skill in assembling and utilizing mechanical parts such as DC Motor, Fan Motor, Solenoids, bolt, nut, washer and etc.
- Skill in wiring and forming cables.
- Skill in assembling and using various types of parts and SMD part.

2.2. Theoretical Knowledge

2.2.1. Theoretical knowledge is required but not tested explicitly.

The Competitors' Theoretical knowledge should cover:

Fundamental Electronics Principles

- Basics of AC and DC technology.
- Two ports LRC network, resistive networks with up to three meshes.
- RC oscillators.

Components in Electronics

- Properties, behavior, characteristics and application (elementary circuits) of mechanically,
- Electrically and physically adjustable components i.e. Capacitors, Resistors, Variable Resistors ,Coils, Transformers and Diodes: Rectifying Diodes, Switch Diodes, Zener Diodes, Capacitive Diodes, PIN diodes Trigger components, Diac, Triac, Thyristor and Unijunction Transistors.

Multistage and Special Amplifier Circuits

- Basic amplifier circuits (AC, DC and power amplifiers)
- Differential amplifiers/operational amplifiers
- Ideal operational amplifier: (infinite input resistance, zero output resistance and infinite open loop gain) Basic circuits with operational amplifier, analogue adder and sub-tractor, differentiator, comparator, impedance transducer.
- Real operational amplifier: Offset voltage and offset current, compensation, common mode gain and rejection, temperature drift and frequency response.

Generators and Pulse Shaper

- Generators for sine wave voltage: RC, quartz, LC oscillators; Wien bridge generator, phase generator.
- Pulse shaper: Schmitt trigger, differentiator, and integrator.

Digital Electronics

- Basic logic gates:
- Level switching function, function table, pulse, diagram, circuit symbols (table in appendix)
- Properties of basic gates AND, OR, NOT, NAND, NOR, EXCLUSIVE OR and EXCLUSIVE NOR
- Substituting basic NAND or NOR gates for basic gates.
- Creating switching functions from given circuits and vice versa.
- Making function table from circuit diagrams and switching functions
- Simplifying switching networks using Karnaugh diagram or mathematical techniques.
- Flip-flops, RS Flip-flop, D Flip-flop and JK Master slave Flip-flop (especially counter circuits, shift register and frequency divider).

2.3. Practical Work

2.3.1. Hardware Design

Each Competitor will have to design a PCB. The Altium software will be used. The task board must be 100mm x 160mm. Single layer board to be used.

2.3.2. Embedded Systems Programming

Programming module using ATmega 16 (Atmel Studio 7) and AVR Dude downloader

2.3.3. Fault Finding, Repair and Measurement

The Competitors are expected to work with conventional measuring and testing equipment to locate, test and replace faulty electronic components on a printed circuit board, surface mount board or mixed technology board. All surface mount components to have no more than 20 pins. The Competitors should be able to document fault finding method/procedure with results. Only 5 faults on a single board. All test boards must have similar faults. They are further expected to record and analyze measured results. Boards must be pre-built before the Competition. The task board must be 100 mm x 160mm.

2.3.4. Assembly

The Competitors will be asked to assemble a project from a kit of parts. The standard to be reached is determined by IPC-A-610 issue D (International acceptability of electronic assemblies).

3. Time allowed for each module

Module	Time allowed (Hours)	Suggested
Hardware Design	6	D1, D3
Embedded Systems Programming	3	D2
Fault Finding, Repair, and Measurement	3	D2
Assembly	4	D3

4. ASSESSMENT

This section describes how the Jury will assess the Test Project / modules. It also specifies the assessment specifications and procedures and requirements for marking.

4.1. Assessment Criteria

This section defines the assessment criteria and the number of objective marks awarded. The total number of marks for all assessment criteria must be 100.

Module	Criterion	Marks		
		Subjective	Objective	Total
A	Hardware design	-	25	25
B	Embedded systems Programming	-	25	25
C	Fault finding, repair and measurement	-	25	25
D	Assembly	-	25	25
	Total		**100**	**100**

4.2. Skill Assessment Specification

Specific marking criteria for each project differ. However, major marking features for each project are as follows.

A. Hardware design - 25 marks
Development of given basic circuit - 7 marks
Design of PCB-board layout – 8 marks
Soldering - 5
Functionality of Designed PCB – 5 marks

B. Embedded Systems Programming - 25 marks
Software functionality - 25 marks

C. Fault finding, repair and measurement - 25 marks
Fault finding and evidence – 13 marks
Repair – 4 marks
Measurement – 8 marks

D. Assembly - 25 marks
Operating condition – 8 marks
Component Assembly – 9 marks
Wiring quality – 4 marks
Mechanical Assembly – 4 marks

5. SKILL-SPECIFIC SAFETY REQUIREMENTS

Skill-specific safety requirements:

- All Competitors must have safety glasses and Cotton Glove

6. MATERIALS & EQUIPMENT

6.1. Infrastructure List

The Infrastructure List contents all the information regarding to equipment, materials and facilities provided by the organizer / responsible and participant. Some standard components to be provided by organizer / responsible and participant.

Please always visit to website for update information from jury and Download software competition

Website : www.inaskills-electronics.com
Email : inaskills.electronics@gmail.com

LKS SMK

INA SKILLS ELECTRONICS

WE ARE FOR INDONESIA

JADWAL

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JADWAL LOMBA KOMPETENSI SISWA SMK 2016
KEJURUAN ELECTRONICS

HARI	WAKTU	KETERANGAN	TOTAL WAKTU
C - 1	10.00 – 17:00	Familiarisasi Alat	2 Jam
C +1	08.00 – 08.30	Briefing / membaca soal dan pemahaman	30 menit
	08.30 – 10.30	Kompetisi: Hardware Design Part 1	2 Jam
	10.30 – 10.45	Break	15 Menit
	10.45 – 12.45	Kompetisi: Hardware Design Part 1	2 Jam
	12.45 – 13.45	Istirahat	1 Jam
	13.45 – 14.15	Briefing / membaca soal dan pemahaman	30 Menit
	14.15 – 15.15	Kompetisi: Fault Finding Repair and measurement	1 jam
	15.15 – 15.30	Break	15 Menit
	15:30 – 17:30	Kompetisi: Fault Finding Repair and measurement	2 jam
C +2	08.00 – 08.30	Briefing / membaca soal dan pemahaman	30 menit
	08.30 – 10.30	Kompetisi: Assembly	2 Jam
	10.30 – 10.45	Break	15 Menit
	10.45 – 12.45	Kompetisi: Assembly	2 Jam
	12.45 – 13.45	Istirahat	1 Jam
	13.45 – 14.15	Briefing / membaca soal dan pemahaman	30 Menit
	14.15 – 15.15	Kompetisi: Embedded system Programming	1 jam
	15.15 – 15.30	Break	15 Menit
	15:30 – 17:30	Kompetisi: Embedded system Programming	2 jam
C +3	08.00 – 08.30	Briefing / membaca soal dan pemahaman	30 menit
	08.30 – 10.30	Kompetisi: Hardware Design Part 2	2 Jam
	11.30 - Selesai	Diskusi Next Competition 2017	

ALAT DAN BAHAN

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DAFTAR KEBUTUHAN ALAT PESERTA YANG WAJIB DI BAWA
LOMBA KOMPETENSI SISWA (LKS) SMK XXIV TAHUN 2016

Bidang Lomba : ELECTRONICS

NO.	NAMA ALAT	SPESIFIKASI	QTY	SATUAN	KETERANGAN
1	Osciloscope dual trace lengkap	Min freq 20Mhz	1	Unit	Yang Wajib Di Bawa Peserta
2	Laptop	Min i core, Ram 2Gb	1	unit	Yang Wajib Di Bawa Peserta
3	Multi tester	Analog or Digital	1	Unit	Yang Wajib Di Bawa Peserta
4	Solder	min Daya 30 W	1 or 2	pcs	Yang Wajib Di Bawa Peserta
5	Dudukan solder	Standard	1	pcs	Yang Wajib Di Bawa Peserta
6	Attractor	Standard	1	pcs	Yang Wajib Di Bawa Peserta
7	Tang potong	Standard	1	pcs	Yang Wajib Di Bawa Peserta
8	Tang buaya	Standard	1	pcs	Yang Wajib Di Bawa Peserta
9	Tang lancip / banding	Standard	1	pcs	Yang Wajib Di Bawa Peserta
10	Pinset	Standard	1	pcs	Yang Wajib Di Bawa Peserta
11	Obeng (+)	Standard	1	pcs	Yang Wajib Di Bawa Peserta
12	Obeng (-)	Standard	1	pcs	Yang Wajib Di Bawa Peserta
13	Obeng trim (-)	Standard	1	pcs	Yang Wajib Di Bawa Peserta
14	Penggaris	Standard 30 cm	1	pcs	Yang Wajib Di Bawa Peserta
15	Cutter	Standart	1	pcs	Yang Wajib Di Bawa Peserta
16	Protoboard	Standard	1	pcs	Yang Wajib Di Bawa Peserta
17	Pembersih Mata Solder/ Sponge	Standard	1	pcs	Yang Wajib Di Bawa Peserta
18	ect……				Tool lain-lain sesuai dengan kebutuhan