



کد کنترل

133

B

صبح پنج‌شنبه

۹۷/۲/۶



«اگر دانشگاه اصلاح شود مملکت اصلاح می‌شود.»

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جمهوری اسلامی ایران
وزارت علوم، تحقیقات و فناوری
سازمان سنجش آموزش کشور

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تعداد سؤال: ۱۳۸

عنوان مواد امتحانی، تعداد و شماره سؤالات

ردیف	مواد امتحانی	تعداد سؤال	از شماره	تا شماره
۱	زبان عمومی و تخصصی (انگلیسی)	۳۰	۱	۳۰
۲	ریاضیات (معادلات دیفرانسیل، ریاضیات مهندسی، آمار و احتمال)	۱۵	۳۱	۴۵
۳	مدارهای الکتریکی (۲و۱)	۱۵	۴۶	۶۰
۴	الکترونیک (۲و۱) و سیستم‌های دیجیتال ۱	۱۵	۶۱	۷۵
۵	ماشین‌های الکتریکی (۲و۱) و تحلیل سیستم‌های انرژی الکتریکی ۱	۱۵	۷۶	۹۰
۶	سیستم‌های کنترل خطی	۱۲	۹۱	۱۰۲
۷	سیگنال‌ها و سیستم‌ها	۱۲	۱۰۳	۱۱۴
۸	الکترومغناطیس*	۱۲	۱۱۵	۱۲۶
۹	مقدمه‌ای بر مهندسی پزشکی*	۱۲	۱۲۷	۱۳۸

* برای داوطلبان رشته مهندسی پزشکی، انتخاب یکی از دروس ردیف ۸ یا ۹ به عنوان درس هشتم الزامی است.

استفاده از ماشین حساب مجاز نیست.

این آزمون نمره منفی دارد.

حل چاپه تکثیر و انتشار سؤالات به هر روش (الکترونیکی و...) پس از برگزاری آزمون، برای تمامی اشخاص حقیقی و حقوقی تنها با مجوز این سازمان مجاز می‌باشد و با متخلفین برابر مقررات رفتار می‌شود.

۱۳۹۷

* داوطلب گرامی، عدم درج مشخصات و امضا در مندرجات جدول ذیل، به منزله عدم حضور شما در جلسه آزمون است.

اینجانب با شماره داوطلبی در جلسه این آزمون شرکت می‌نمایم.

امضا:

زبان عمومی و تخصصی (انگلیسی):

PART A: Vocabulary

Directions: Choose the word or the phrase (1), (2), (3), or (4) that best completes the blank. Then mark the correct choice on your answer sheet.

- 1- Fierce winds and deadly waves were only one ----- many explorers like Christopher Columbus confronted when sailing to unknown lands.
1) suspension 2) obstacle 3) shortage 4) variation
- 2- In urban desert areas potable water supplies are stressed by increasing demands that leave water managers ----- to find new supplies.
1) discouraging 2) refusing 3) invading 4) struggling
- 3- The sense of smell diminishes with advancing age—much more so than the sensitivity to taste. This ----- may result from an accumulated loss of sensory cells in the nose.
1) decrease 2) merit 3) ambiguity 4) defense
- 4- True, all economic activities have environmental consequences. Nevertheless, the goal of shrimp producers should be to reduce the ----- effects on the environment as much as possible.
1) indigenous 2) competitive 3) deleterious 4) imaginary
- 5- Like most successful politicians, she is pertinacious and single-minded in the ----- of her goals.
1) pursuit 2) discipline 3) permanence 4) involvement
- 6- Knowing that everyone would ----- after graduation, she was worried that she would not see her friends anymore.
1) emerge 2) conflict 3) differentiate 4) diverge
- 7- Certain mental functions slow down with age, but the brain ----- in ways that can keep seniors just as sharp as youngsters.
1) composes 2) conveys 3) compensates 4) corrodes
- 8- It is argued by some that hypnosis is an effective intervention for ----- pain from cancer and other chronic conditions.
1) displacing 2) alleviating 3) exploring 4) hiding
- 9- Children who get ----- atmosphere at home for studies perform better than students who are brought up under tense and indifferent family atmosphere.
1) favorable 2) valid 3) obedient 4) traditional
- 10- The post office has promised to resume first class mail ----- to the area on Friday.
1) attention 2) progress 3) expression 4) delivery

PART B: Cloze Passage

Directions: Read the following passage and decide which choice (1), (2), (3), or (4) best fits each space. Then mark the correct choice on your answer sheet.

Colette began painting while she was still in her youth. (11) ----- 1970, she completed her first performance with *Hommage a Delacroix*, (12) ----- was the beginning of an artistic career (13) ----- to the oneness of art and life. (14) -----, actions and performances on streets and public squares, followed by her "living environments" and the "windows", (15) ----- in a selected pose with an elaborate arrangement of fabrics and lace.

- | | | | | |
|-----|--|--|--------------|-------------|
| 11- | 1) Since the year | 2) During a year of | | |
| | 3) For a year of | 4) In the year | | |
| 12- | 1) that it | 2) which | 3) that | 4) it |
| 13- | 1) devoted | 2) was devoted | 3) to devote | 4) devoting |
| 14- | 1) Street works then came | 2) Then came street works | | |
| | 3) There coming then street works with | 4) With street works then to come | | |
| 15- | 1) she remained motionless | 2) that in there she remained motionless | | |
| | 3) in which she remained motionless | 4) that in it motionless she remained | | |

PART C: Reading Comprehension:

Directions: Read the following three passages and answer the questions by choosing the best choice (1), (2), (3), or (4). Then mark the correct choice on your answer sheet.

PASSAGE 1:

There are a number of different electronic devices which tend to be called diodes. Although made differently, they all have three things in common: they have two leads like a resistor; the current they pass depends upon the voltage between the leads; and they do not obey Ohm's law.

A pn-junction is created by joining together two pieces of semiconductor, one doped n-type, the other p-type. This causes a depletion zone to form around the junction between the two materials. This zone controls the behavior of the diode. When we apply a potential difference between the two wires in one direction, we tend to pull the free electrons and holes away from the junction. This makes it even harder for them to cross the depletion zone. When we apply the voltage the other way around, we push electrons and holes towards the junction, helping to give them extra energy and giving them a chance to cross the junction.

Although diodes can be made by 'bringing together' two pieces of semiconductor, one n-type and the other p-type, real diodes are normally made by taking a single piece of pure material and doping two adjacent regions differently. This means that we do not actually have to 'glue together' two bits of silicon. However, some other forms of diode are created by depositing one material onto another, e.g. Schottky diodes are made by placing some metal in contact with a semiconductor. In general, whenever we join two different, very pure materials, we are likely to make some sort of diode.

Ordinary diodes can be split into two types: signal diodes which pass small currents of 100mA or less and rectifier diodes which can pass large currents. In addition, there are LEDs and Zener diodes.

Signal diodes are used to process information (electrical signals) in circuits, so they are only required to pass small currents of up to 100mA. General purpose signal diodes are made from silicon and have a forward voltage drop of 0.7V. Germanium diodes have a lower forward voltage drop of 0.2V and this makes them suitable to use in radio circuits as detectors which extract the audio signal from the weak radio signal. For general use, where the size of the forward voltage drop is less important, silicon diodes are better because they are less easily damaged by heat when soldering, they have a lower resistance when conducting, and they have very low leakage currents when a reverse voltage is applied.

- 16- It may be understood from paragraph 1 that -----.
- 1) all diodes are constructed in the same way and are of identical structure
 - 2) all diodes are similar in structure and operation
 - 3) diodes are Ohmic devices
 - 4) diodes are identified as such for their shared properties
- 17- Paragraph 3 mainly talks about -----.
- 1) doping to make n-type semiconductors
 - 2) properties of the pieces joined in a diode and the currents they pass
 - 3) alternative ways of making diodes and types of diodes
 - 4) the two types of signal and rectifier diodes
- 18- According to paragraph 4, silicon diodes seem preferable to germanium ones when -----.
- 1) they are used as detectors to extract audio signals from weak radio signals
 - 2) a lower forward voltage drop is required
 - 3) a higher resistance is required when conducting
 - 4) a reverse voltage is applied
- 19- The major differences between germanium and silicon diodes lies in -----.
- 1) their ease of construction
 - 2) the fact that the former is made of a doped material but the other is of a pure one
 - 3) their heat generation during soldering and the need for being coupled with a resistor
 - 4) their forward voltage drops which makes them suitable for different applications
- 20- According to paragraph 2, -----.
- 1) even when properly energized, electrons and holes fail to cross the depletion zone
 - 2) whether the electrons and holes cross the junction depends on the direction of the current applied
 - 3) it is never possible for electrons or holes to pass over the depletion zone
 - 4) the junction in a diode is the location where electrons and holes meet

PASSAGE 2:

Relays are generally used to switch smaller currents in a control circuit and do not usually control power consuming devices except for small motors and Solenoids that draw low amps. Nonetheless, relays can "control" larger voltages and amperes by having an amplifying effect because a small voltage applied to a relay's coil can result in a large voltage being switched by the contacts.

Protective relays can prevent equipment damage by detecting electrical abnormalities, including overcurrent, undercurrent, overloads, and reverse currents. In addition, relays are also widely used to switch starting coils, heating elements, pilot lights, and audible alarms.

In electromechanical relays (EMR), contacts are opened or closed by a magnetic force. With solid-state relays (SSR), there are no contacts and switching is totally electronic. The decision to use electromechanical or solid state relays depends on an application's electrical requirements, cost constraints, and life expectancy. Although solid-state relays have become very popular, electromechanical relays remain common. Many of the functions performed by heavy-duty equipment need the switching capabilities of electromechanical relays. SSRs switch the current using non-moving electronic devices such as silicon controlled rectifiers.

These differences in the two types of relays result in advantages and disadvantages with each system. Because solid state relays do not have to either energize a coil or open contacts, less voltage is required to "turn" Solid State Relays on or off. Similarly, SSRs turn on and off faster because there are no physical parts to move. Although the absence of contacts and moving parts means that Solid State Relays are not subject to arcing and do not wear out, contacts on electromechanical relays can be replaced, whereas entire solid state relays must be replaced when any part becomes defective. Because of the construction of SSRs, there is residual electrical resistance and/or current leakage whether switches are open or closed. The small voltage drops that are created are not usually a problem; however, electromechanical relays provide a cleaner ON or OFF condition because of the relatively large distance between contacts, which acts as a form of insulation.

- 21- Paragraphs 1 and 2 are similar in that they -----.
- 1) describe how relays prevent damage to equipment
 - 2) introduce different types and uses of relays
 - 3) introduce possible novel applications of relays
 - 4) explain why relays are used to prevent equipment damage
- 22- Paragraph 3 mentions all the following criteria for selecting electromechanical and electronic relays EXCEPT -----.
- 1) cost constraints and life expectancy
 - 2) electrical requirements of the application
 - 3) type of contact housing available
 - 4) the type of equipment to be served by the relay
- 23- The underlined 'which' in the last paragraph refers to -----.
- 1) contacts
 - 2) distance
 - 3) ON or OFF condition
 - 4) electromechanical relays
- 24- Paragraph 4 -----.
- 1) describes EMRs and SSRs
 - 2) explains how relays are employed to handle voltage variations
 - 3) gives reasons why EMRs are superior to SSRs
 - 4) juxtaposes SSRs' and EMRs' benefits and drawbacks

- 25- Among the advantages of the EMRs over SSRs, one can refer to the -----.
- 1) lower voltage required to turn them on or off
 - 2) cheaper cost of replacing worn out parts
 - 3) faster speed of switching them on and off
 - 4) insulation materials used in them

PASSAGE 3:

A clocked sequential circuit consists of a group of flip-flops and combinational gates. Combinational logic gates react to the values of the signals at their inputs and produce the value of the output signal, transforming binary information from the given input data to a required output data. The flip-flops (basic digital devices capable of storing one bit of information: 1 or 0) are essential because, in their absence, the circuit reduces to a purely combinational circuit (provided that there is no feedback among the gates). A circuit with flip-flops is considered a sequential circuit even in the absence of combinational gates. Circuits that include flip-flops are usually classified by the function they perform rather than by the name of the sequential circuit. Two such circuits are registers and counters.

A register is a group of flip-flops, each one of which shares a common clock and is capable of storing one bit of information. An n -bit register consists of a group of n flip-flops capable of storing n bits of binary information. In addition to the flip-flops, a register may have combinational gates that perform certain data-processing tasks. In its broadest definition, a register consists of a group of flip-flops together with gates that affect their operation. The flip-flops hold the binary information, and the gates determine how the information is transferred into the register.

- 26- How does a circuit with combinational gates remain a sequential one?
- 1) If flip-flops store more than one bit of information.
 - 2) If combinational gates fail to transform input data to output ones.
 - 3) Only if flip-flops are present in the circuit.
 - 4) When gates exchange no feedback.
- 27- According to paragraph 1, ----- are indeed information storing devices.
- 1) combinational circuits
 - 2) flip-flops
 - 3) circuits
 - 4) gates
- 28- It is true that -----.
- 1) registers and counters are not functionally different
 - 2) registers are circuits that never contain gates
 - 3) registers are combinational gates in sequential circuits
 - 4) counters are sequential circuits thus named based on their functions
- 29- The underlined 'their' in paragraph 2 refers to -----.
- 1) flip-flops
 - 2) registers
 - 3) groups
 - 4) gates
- 30- It is stated in paragraph 2 that the flip-flops in a register -----.
- 1) are governed by clocks that store binary information
 - 2) are individually connected to clocks
 - 3) all operate with a shared clock
 - 4) share their clocks with gates

پاسخ کلیدی سوالات آزمون کارشناسی ارشد ۹۷

مهندسی برق (کد ۱۲۵۱)

شماره سوال	گزینه صحیح	شماره سوال	گزینه صحیح	شماره سوال	گزینه صحیح	شماره سوال	گزینه صحیح	شماره سوال	گزینه صحیح
1	2	31	1	61	4	91	3	121	4
2	4	32	3	62	1	92	2	122	3
3	1	33	3	63	2	93	4	123	1
4	3	34	4	64	2	94	4	124	1
5	1	35	2	65	3	95	1	125	3
6	4	36	1	66	1	96	3	126	3
7	3	37	4	67	3	97	4	127	1
8	2	38	1	68	3	98	4	128	2
9	1	39	3	69	4	99	2	129	3
10	4	40	2	70	2	100	3	130	3
11	4	41	3	71	4	101	1	131	4
12	2	42	1	72	2	102	2	132	1
13	1	43	2	73	3	103	2	133	2
14	2	44	2	74	1	104	2	134	4
15	3	45	4	75	1	105	1	135	1
16	4	46	2	76	2	106	4	136	3
17	3	47	3	77	2	107	1	137	4
18	1	48	1	78	1	108	4	138	2
19	4	49	1	79	4	109	3	139	سفید
20	2	50	3	80	3	110	1	140	سفید
21	2	51	1	81	1	111	2	141	سفید
22	3	52	2	82	4	112	3	142	سفید
23	2	53	4	83	1	113	4	143	سفید
24	4	54	2	84	4	114	3	144	سفید
25	2	55	1	85	1	115	1	145	سفید
26	3	56	3	86	2	116	4	146	سفید
27	2	57	2	87	3	117	2	147	سفید
28	4	58	4	88	4	118	1	148	سفید
29	1	59	4	89	1	119	3	149	سفید
30	3	60	3	90	3	120	4	150	سفید