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سایت کنکور

هر آنچه در دوران تحصیل به آن نیاز دارید

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پاسخ به همه سوالات شما در تمامی مقاطع تحصیلی، در انجمن کنکور

مدیریت سایت کنکور : آراز و فراز رهبر

دفترچه شماره ۱
عصر جمعه
۸۷/۱۱/۲۵

اگر دانشگاه اصلاح شود مملکت اصلاح می‌شود.
امام خمینی (ره)

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

A
کد دفترچه

آزمون ورودی
دوره‌های کارشناسی ارشد ناپیوسته داخل
سال ۱۳۸۸

مجموعه مهندسی برق
(کد ۱۲۵۱)

نام و نام خانوادگی داوطلب:	شماره داوطلبی:
تعداد سؤال: ۳۰	مدت پاسخگویی: ۳۰ دقیقه

عنوان مواد امتحانی، تعداد و شماره سؤالات

ردیف	مواد امتحانی	تعداد سؤال	از شماره	تا شماره
۱	زبان عمومی و تخصصی	۳۰	۱	۳۰

بهمن ماه سال ۱۳۸۷

استفاده از ماشین حساب مجاز نمی‌باشد.

PART A: Vocabulary

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

1- It is not possible for human beings to ---------- precisely the time of death.
1) elicit 2) enumerate 3) invoke 4) pinpoint

2- Educational standards are ---------- year by year because of a lack of funds.
1) preceding 2) overlapping 3) degenerating 4) restricting

3- Your success is a ---------- to all your hard work.
1) testimony 2) partnership 3) requisite 4) compliment

4- Statistical ---------- can make it difficult to compare data from one year to the next.
1) versions 2) anomalies 3) simulations 4) proportions

5- These chemicals are ---------- to the environment.
1) exhaustive 2) contrastive 3) detrimental 4) forthcoming

6- After doing this project, we will ---------- a new project later this year.
1) bear on 2) break up 3) stand out 4) embark on

7- The soil in this part of the world is not rich enough to ---------- a large population.
1) survive 2) sustain 3) suspend 4) submit

8- He felt that graduating from the university was a real ---------- in his life.
1) enormity 2) milestone 3) coherence 4) orientation

9- They purchased a(n) ---------- of 3,000 shares in the company.
1) welfare 2) revenue 3) aggregate 4) quantification

10- Do you think that these higher-than-average temperatures are ---------- to global warming?
1) attributable 2) expansive 3) convertible 4) substitutional

PART B: Grammar

***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.*

Are some people born clever and others born stupid? Or is intelligence developed by our environment and our experience? (11) ----------, the answer to both of these questions is yes. To some extent, our intelligence is given us at birth, and (12) ---------- special education can make a genius (13) ---------- a child born with low intelligence. On the other hand, a child who lives in a boring environment will develop his intelligence (14) ---------- one who lives in rich and varied surroundings. Thus, the limits of a person's intelligence are fixed at birth, but (15) ---------- he reaches those limits will depend on his environment. This view, now held by most experts, can be supported in a number of ways.

11- 1) Too strange 2) Too strangely 3) Strangely enough 4) Strange enough
12- 1) no amount of 2) amount of no 3) there is amount of no 4) there is not amount of
13- 1) to be 2) out of 3) of 4) in order to be
14- 1) if 2) so that 3) rather than 4) less than
15- 1) whether 2) what 3) how long 4) as soon as

Part C. Reading Comprehension

Directions: Read the following passages and choose the best choice (1), (2), (3), or (4). Then mark it on your answer sheet.

PASSAGE 1:

NASA May not return to the moon for another 10 years, but that's not stopping the U.S. space agency from conducting lunar expedition.

In June, research teams from seven NASA centers gathered at Moses Lake, in central Washington state, to test prototypes for new moon-worthy robots, vehicles, and spacesuits. During the two-week-long field test, the teams and their machines replicated logistical and scientific operations that might be carried out on the moon.

It was the first time that all the centers were involved in such a test, which gave the teams a chance to see how well the equipment they'd designed played with others.

The field test also offered a "much broader area to stretch your legs," says Bill Bluethmann, a robotics engineer at NASA's Johnson Space Center, in Houston, who served as the expedition's leader. Moses Lake boasts 1200 hectares of sand dunes, popular with the off-road crowd. NASA liked the spot, too, because the loose sand and treeless horizon roughly simulated the lunar surface.

Among the vehicles fielded was a gold-toned, six-wheeled lunar truck called Chariot.

Intended to carry up to four suited astronauts, Chariot has an active suspension that lets any part of the truck be lifted and lowered independently.

"If one wheel fails, we can just pick it up and continue the mission," says Lucien Junkin, the vehicle's chief engineer. Chariot was designed and built in just 12 months. Under such a compressed schedule, he says, the team became experts at "5-minute design reviews." Also on hand was a four-wheeled lunar prospecting robot called Scarab, which can operate in daylight as well as at night, Built by the Robotics Institute at Carnegie Mellon University, in Pittsburgh, the robot totes a 1-meter-long drill for taking geological samples.

16- Why were the tests performed near the Moses Lake?

1) Because the area was nearest to Washington D.C.
2) Because there were enough sand dunes to stretch your legs.
3) Because robotic engineers thought the robots were moon-worthy.
4) Because the widely-spanned sand-covered area resembled the moon surface.

17- The Chariot ----------.

1) is a 4 wheel drive, 4 astronaut carrying truck
2) has been built using a 5 minute design review
3) is a vehicle which can carry a few astronauts with 6 independently suspended wheels
4) is a 4 wheel drive vehicle built in 12 months at Carnegie Mellon University

PASSAGE 2:

The PRICEY MacBook Air you covet, with its small, light weight, shock-resistant solid-state drive (SSD), may have a secret. Despite their advantages, solid-state drives suffer not just from enormous price tags but also from slow performance during certain key operations. Now Korean engineers report that through a clever mix of two types of memories, they can give solid-state drives a boost without also jacking up their price.

Unlike a traditional hard-disk drive, which can write new data directly over recorded data, the NAND flash memory that makes up solid-state drives requires free memory space in which to write. That's usually not a problem when you have to write large chunks of sequential data, such as a video clip. But it is a problem when you have to make frequent small additions and changes to existing data. If , for instance, you need to update a file, the original data must be copied to a fresh memory block so that the first block can be erased. The new data can then be merged with the original and written back to the first block.

But as engineers at Seoul National University in South Korea report in a recent issue of IEEE Computer Architecture Letters, there's a better way. They developed a prototype solid-state drive, dubbed Chameleon that employs a small amount of ferroelectric RAM (FRAM), a comparatively expensive niche nonvolatile memory, to more efficiently deal with such small data changes.

18- Solid-state drives ----------.

1) are widely used in present days
2) are very efficient in replacing data
3) benefit from low price tag to replace hard-disk drives
4) suffer from the incapability to rewrite data over recorded ones

19- The Korean researchers ----------.

1) have basically developed MacBook Air
2) have reduced the price of ferroelectric RAM's
3) have made a new SSD using ferroelectric material
4) have developed a new type of FRAM

PASSAGE 3:

The First commercial ocean energy project is scheduled to launch this summer off the coast of Portugal. Three snakelike wave-power generators built by Edinburgh's Pelamis Wave Power will deliver 2.25 megawatts through an undersea cable to the Portuguese coastal town of Agucadoura. Within a year, another 28 generators should come online there, boosting the capacity to 22.5 MW. That may be a trickle of power, but the project represents a new push into wave and tidal power as governments eye the oceans as a way to meet their renewable energy targets.

Engineers have come up with a variety of schemes to harness the power of waves, the flow of currents, and the motion of the tides. The Pelamis generators, part of a class of wave-energy converters called linear absorbers, each comprise three long canisters that look like giant oxygen tanks. Hinged joints link the canisters; when the waves change the segments' positions relative to one another, the joints push hydraulic rams, which pump high pressure oil through the turbines inside the canisters.

Though Portugal may be the site of the first commercial installation, the UK-Scotland in particular-leads in the research and development of ocean energy and is expected to end up with the most installed capacity in the coming years, say experts. Pelamis's generator was first tested at the European Marine Energy Center (EMEC), which is located amid the Orkney Islands off Scotland's northeastern coast.

20- How the electric power is generated in the tidal wave generators?

1) Turbines are rammed by the oxygen tanks.
2) Hydraulic pistons pressure the oil inside the turbines.
3) Hinged joints in the canisters are pulled by the rams.
4) Giant oxygen tanks pressure the oil through the turbines.

21- It is expected that ----------.

1) United Kingdom will lead long canister fabrication
2) Portugal will lead the research in the development of ocean energy
3) Portugal will have the highest capacity of tidal waves energy use in the long run
4) in the long run Scotland will have the largest installations of the ocean energy harvest

PASSAGE 4:

Our goal is to develop an underwater vehicle that can autonomously explore and collect data in aquatic environments while surviving the harsh saltwater conditions and often turbulent waters of the open sea. In building Aqua, we are tacking one of the most challenging topics in robotics: integrating vision and locomotion into an amphibious machine that can determine what it is "seeing," where it is, and where it is going. Unlike many earlier UVs (under water vehicles), Aqua is intended for shallower waters, and its design reflects this. Although the majority of UVs are large and unwieldy-some require a crane to lower them into the water-Aqua measures only 50 by 65 by 13 centimeters and weighs just 18 kilograms. Aqua is thus easier to deploy: you can literally throw it into the water, or it can launch itself from the beach.

Even though Aqua's compact size and amphibious locomotion make it ideal for operating around coral reefs, some of our collaborators have other ideas for the robot. They believe Aqua could serve as the basis for other robotic machines that could do environmental inspections in deep water or near shore lines; perform routine monitoring in aquacultures; and also help human divers with predive safety checks and physical tasks underwater.

Aqua, which releases no bubbles and is much smaller than a human, can collect similar data using its underwater cameras while being less intrusive to the fish. True, Aqua can't yet recognize coral or other stationary marine life, let alone moving fish. But the video data the robot collects can be analyzed by an expert.

22- Why was Aqua built?

1) To understand "What is seeing?"
2) To prove that an amphibious machine can be built.
3) To find a solution for one of the most challenging topics in robotics.
4) To independently and safely collect data from harsh under water environments.

23- Which statement is true?

1) Aqua is as big as many other UVs.
2) It is hard to throw Aqua into water.
3) UVs usually can launch themselves into water.
4) Many earlier UVs were made for exploring deep waters.

24- The text implies that the designers of Aqua think that in the future the machine ----------.

1) can be less intrusive to the fish
2) can send better video data
3) will be able to work with human beings
4) might be able to recognize stationary marine life

PASSAGE 5:

Cost overruns and project delays have led to a cloudy forecast for the United States' new polar-orbiting weather satellites, which were originally supposed to start circling the North and South Poles in 2008. The greatly upgraded satellites, to consist of a group of three with three replacements, are meant to beam back weather data that would enable scientists to better predict hurricanes such as Katrina. But development of the satellites is far behind schedule and their total estimated cost has ballooned from US $6.5 billion to more than $10 billion. Consider that the whole annual budget for Earth observation from space is about $3 billion.

The new satellites would improve long-term weather prediction by producing more detailed images of ocean surface temperatures and winds, ocean color, land surface temperatures, terrestrial vegetation, and land cover characteristics. They also transmit that information at much higher speed than is currently possible. The 22-channel VIIRS will provide complete global coverage of Earth in one day, based on infrared imaging, yielding the first-ever color pictures to be seen from a satellite in real time. This improved fidelity will allow a closer look at the intensity of particular weather patterns, because the cameras won't just look at the top of the clouds but will be able to peer into hurricanes and drag out data on their interior temperature and moisture, information U.S. forecasters now get from less-capable sensors mounted on aircraft.

25- The new polar-orbiting satellites project has (a) ---------- problem(s).

1) financial
2) technical
3) financial and schedule
4) financial and technical

26- The color pictures sent by new satellites will be notable because ----------.

1) of their real-time operation
2) of their long-term weather prediction
3) it will be the first time that a satellite sends high fidelity pictures
4) they provide complete global coverage of the Earth for the first time

PASSAGE 6:

The last half of the 20th century could be called the microelectronics era. During that 50-year period, the world witnessed a revolution based on a digital logic of electrons. From the earliest transistor to the remarkably powerful microprocessor in your desktop computer, most electronic devices have employed circuits that express data as binary digits, or bits. Furthermore, the communication between microelectronic devices occurs by the binary flow of electric charges.

Recently, investigators have been eager to exploit another property of the electron–a characteristic known as spin. Spin is a purely quantum phenomenon roughly akin to the directional behavior of a compass needle. Electrons have spin of a sort in which their compass needles can point either "up" or "down" in relation to a magnetic field. Spin therefore lends itself elegantly to a new kind of binary logic of ones and zeros. The movement of spin, like the flow of charge, can also carry information among devices. One advantage of spin over charge is that spin can be easily manipulated by externally applied magnetic fields, a property already in use in magnetic storage technology. Another more subtle (but potentially significant) property of spin is its long coherence, or relaxation, time–once created it tends to stay that way for a long time, unlike charge states, which are easily destroyed by scattering or collision with defects, impurities or other charges.

These characteristics open the possibility of developing devices that could be much smaller, consume less electricity and be more powerful for certain types of computations than is possible with electron-charge-based systems. Those of us in the spintronics (short for spin electronics) community hope that by understanding the behavior of electron spin in materials we can learn something fundamentally new about solid state physics that will lead to a new generation of electronic devices based on the flow of spin in addition to the flow of charge. In fact, the spintronics dream is a seamless integration of electronic, optoelectronic, and magnetoelectronic

multifunctionality on a single device that can perform much more than is possible with today's microelectronic devices.

27- **The comparison made between the spin and the compass needle ----------.**

1) clarifies the subject matter
2) notifies the electron properties
3) exemplifies the magnetic field
4) clarifies the movement of a compass needle

28- **The information in the last paragraph supports which of the following conclusions?**

1) Spintronics is based on the flow of spins.
2) Spintronics can lead to the development of more powerful microelectronic devices.
3) It is not realistic to understand the behavior of electrons in materials.
4) Smaller devices are now made by the integration of electronic, optoelectronic, and magneto-electronic multifunctionality on a single chip.

PASSAGE 7:

Capacitors are one of the crucial elements in integrated circuits and are used extensively in many applications such as data converters, sample and holds, switched – capacitor circuits, radio-frequency oscillators, and mixers. Capacitors can occupy a considerable area in integrated circuit designs. Therefore, an area-efficient capacitor is highly desirable. The problem is more pronounced in modern process technologies where the vertical spacing of the metal layers does not scale much, if at all. There are four types of capacitors which have been commonly used in IC design. They are gate capacitors, junction capacitors, conventional metal-to-metal/poly capacitors, and thin-insulator capacitors. Gate capacitors have a high density - i.e. high capacitance per unit area. However, they are nonlinear and require a dc bias voltage to operate. Moreover, gate capacitors have a low breakdown voltage due to the thin gate oxide, and also have a medium quality factor. Junction capacitors suffer from some of the above problems as well. They are highly nonlinear, and need a dc bias voltage. In addition, factors such as their sensitivity to process variations, poor quality factor, and large temperature coefficient limit their use in many applications. Metal-to-metal and metal-to-poly capacitors, on the other hand, are linear and have high Q. They also exhibit very small temperature variations. Unfortunately, the density of a traditional metal to metal capacitor is very low due to the relatively thick inter-level oxide layers. The problem becomes more severe with scaled technologies since the vertical spacing of the metal layers stays relatively constant. As a result, standard parallel plate capacitors consume a larger percentage of the die area as technology scales down. There has been a recent growth in the use of thin-insulator capacitors in IC applications. Double-poly capacitors and metal-insulator-metal (MIM) capacitors use a thin oxide to achieve high density. The capacitance density is much higher than the density of a standard metal-to-metal capacitor, but it is lower than the density of a gate capacitor built in the same technology. The need for additional masks and process steps makes these capacitors more expensive compared to other types of capacitors. Double-poly capacitors and MIM capacitors are highly linear and have high quality factors, but due to the cost overhead, they are generally not available in standard digital processes.

29- **According to the text, ---------- are linear and possess high Q factor.**

1) gate capacitors
2) junction capacitors
3) switched capacitors
4) metal-to-metal capacitors

30- **What makes MIM capacitors unsuitable for standard digital processes?**

1) Their nonlinearity.
2) Higher mask and processing cost.
3) Use of a thicker oxide to achieve the desired density.
4) Low capacitor density compared to standard metal-to-metal capacitors.

دفترچه شماره ۲

عصر جمعه
۸۷/۱۱/۲۵

اگر دانشگاه اصلاح شود مملکت اصلاح می‌شود.
امام خمینی (ره)

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

A
کد دفترچه

آزمون ورودی
دوره‌های کارشناسی ارشد ناپیوسته داخل
سال ۱۳۸۸

مجموعه مهندسی برق
(کد ۱۲۵۱)

نام و نام خانوادگی داوطلب: شماره داوطلبی:

تعداد سؤال: ۳۰ مدت پاسخگویی: ۹۰ دقیقه

عنوان مواد امتحانی، تعداد و شماره سؤالات

ردیف	مواد امتحانی	تعداد سؤال	از شماره	تا شماره
۱	ریاضیات	۱۵	۳۱	۴۵
۲	مدارهای الکتریکی ۱ و ۲	۱۵	۴۶	۶۰

بهمن ماه سال ۱۳۸۷

استفاده از ماشین حساب مجاز نمی‌باشد.

۳۱- جواب معادله دیفرانسیل $\cos(x+y)dx = x\sin(x+y)dx + x\sin(x+y)dy$، کدام‌یک از موارد داده شده می‌باشد؟

۱) $x\cos(x+y) = c$
۲) $y\cos(x+y) = c$
۳) $x\sin(x+y) = c$
۴) $y\sin(x+y) = c$

۳۲- جواب معادله زیر با شرایط اولیه داده شده کدام است؟

$$y' = \frac{xy^2 - \sin x\cos x}{y(1-x^2)}; \quad y(0) = 2$$

۱) $y^2(1-x^2) + \sin^2 x = 2$
۲) $y^2(1-x^2) + \cos^2 x = 3$
۳) $y^2(1-x^2) + \sin^2 x = 4$
۴) $y^2(1-x^2) - \cos^2 x = 5$

۳۳- کدام گزینه جواب معادله دیفرانسیل $y'' + y'^3 e^{2y} = 0$ است؟

۱) $x = y + c_1 e^{2y} + c_2$
۲) $y = c_1 x + \frac{1}{4}e^{2y} + c_2$
۳) $y = x + c_1 e^{2y} + c_2$
۴) $x = c_1 y + \frac{1}{4}e^{2y} + c_2$

۳۴- تبدیل لاپلاس جواب معادله زیر کدام است؟

$$t\frac{d^2y}{dt^2} + (1-t)\frac{dy}{dt} + y = 0 \; ; \quad t > 0 \, , \; y(0) = 1 \, , \; y'(0) = -1$$

۱) $\frac{s-1}{s^2}$
۲) $\frac{1}{s^2}$
۳) $\frac{s}{s^2-1}$
۴) $\frac{1}{s^2-1}$

۳۵- هرگاه $f(x)$ تابعی زوج باشد و $f(x) = x + \cos 2x$ به ازای $0 \le x \le \pi$، آنگاه در سری فوریه مثلثاتی تابع $f(x)$ بربـازه‌ی $[-\pi, \pi]$ ضریب $\cos 2x$ کدام است؟

۱) ۰
۲) ۱
۳) $1 - \frac{1}{2\pi}$
۴) $1 + \frac{1}{2\pi}$

۳۶- معادله‌ی غیرهمگن یک بعدی حرارت در ناحیه $0 < x < 1$ و برای $t > 0$ به صورت زیر است:

$$\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 1 \; ; \quad 0 < x < 1 \quad , \quad t > 0$$

شرایط مرزی و اولیه عبارت‌اند از:

$$u(0,t) = u(1,t) = 0$$
$$u(x,0) = f(x)$$

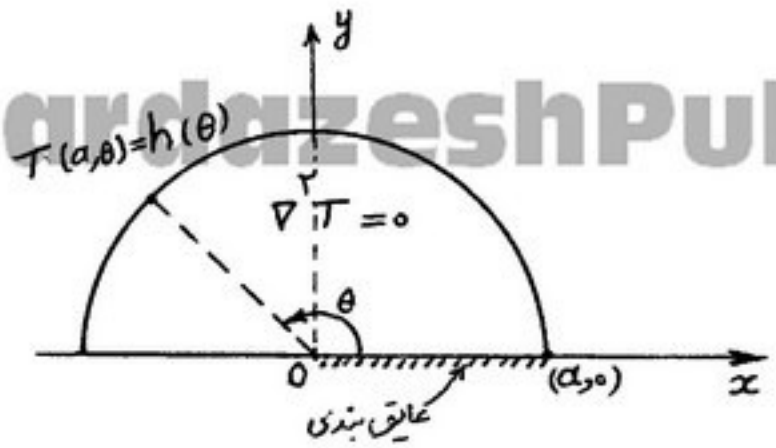
در این‌صورت پاسخ حالت پایدار $(t \to \infty)$ در $x = \frac{1}{2}$ برابر کدام است؟

۱) $-\frac{1}{4}$
۲) $-\frac{1}{8}$
۳) $-\frac{1}{2}$
۴) $\frac{1}{4}$

۳۷- معادله $u_{xx} - u_{yy} = 0$ با کدام تغییر متغیرهای زیر به معادله $u_{rs} = 0$ تبدیل می‌شود؟

۱) $r = y - x$, $s = y$
۲) $r = x + y$, $s = x$
۳) $r = y - x^2$, $s = y + x^2$
۴) $r = x + y$, $s = y - x$

۳۸- در مسئله مقدار مرزی زیر در داخل یک نیم‌دایره به شعاع a حل معادله لاپلاس مورد نظر است. بر پیرامون نیم‌دایره، $h(\theta)$ تکه‌ای هموار فرض می‌شود. بر روی نیمه راست قطر عایق‌بندی داریم و بر روی نیمه چپ آن $T(r,\pi) = 0$. پایه (مبنای) متعامد بسط فوریه تابع $h(\theta)$ در این مسئله کدام است؟



۱) $\{\cos k\theta\}_{k=0}^{\infty}$

۲) $\left\{\cos\left(\frac{2k-1}{2}\right)\theta\right\}_{k\in Z}$

۳) $\left\{\cos\left(k-\frac{1}{2}\right)\theta\right\}_{k\in N}$

۴) $\left\{\sin\left(k-\frac{1}{2}\right)\theta\right\}_{k\in N}$

۳۹- نگاشت $w = \cos \pi z$، نیم‌نوار $0 \le x \le 1$ و $y \ge 0$ از صفحه‌ی z را به چه ناحیه‌ای از صفحه‌ی w تبدیل می‌کند؟

۱) $y \le 0$

۲) $x \le 0$

۳) $y \ge 0$

۴) $x \ge 0$

۴۰- در بسط تابع $f(z) = \frac{z}{(z-1)(z+2)}$ در ناحیه $0 < |z-1| < 3$، ضریب جمله $(z-1)^2$ کدام است؟

۱) $\frac{-1}{27}$

۲) $\frac{2}{27}$

۳) $\frac{2}{81}$

۴) $\frac{1}{9}$

۴۱- حاصل انتگرال $I = \oint z^2 e^{\frac{1}{z-1}} dz$ حول دایره‌ی $|z| = 2$ و در جهت مثلثاتی کدام است $(i = \sqrt{-1})$؟

۱) $\frac{\pi i}{3}$

۲) $\frac{7\pi i}{3}$

۳) $\frac{13\pi i}{3}$

۴) $4\pi i$

۴۲- مقدار انتگرال $\oint_{|z|=4} \frac{z}{\sin z} dz$ برابر کدام است؟

۱) $-2\pi i$

۲) 0

۳) $2\pi i$

۴) $4\pi i$

۴۳- در یک توزیع پواسن داریم $P(2) = P(4)$. در این صورت $P(3)$ کدام است؟

۱) $4\sqrt{3}\, e^{2\sqrt{3}}$

۲) $2\sqrt{3}\, e^{-2\sqrt{3}}$

۳) $2\sqrt{3}\, e^{2\sqrt{3}}$

۴) $4\sqrt{3}\, e^{-2\sqrt{3}}$

۴۴- اگر X_1 ، X_2 ،...، X_n یک نمونه تصادفی n تایی $(n \geq 30)$ از جامعه‌ای با تابع مولد گشتاور $M_X(t) = \frac{1}{\sqrt{1-2t}}$; $(t < \frac{1}{2})$ باشد، آنگاه میانگین و واریانس متغیر تصادفی $\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$ کدام است؟

۱) $\mu_{\overline{X}} = 1$ ، $\sigma^2_{\overline{X}} = \frac{1}{n}$

۲) $\mu_{\overline{X}} = 1$ ، $\sigma^2_{\overline{X}} = \frac{2}{n}$

۳) $\mu_{\overline{X}} = n$ ، $\sigma^2_{\overline{X}} = \frac{2}{n}$

۴) $\mu_{\overline{X}} = \frac{1}{n}$ ، $\sigma^2_{\overline{X}} = \frac{2}{n}$

۴۵- تابع چگالی احتمال توام متغیرهای تصادفی x و y بصورت $f_{x,y}(x , y) = \begin{cases} 2 & ; x+y<1 , x>0 , y>0 \\ 0 & \text{در جاهای دیگر} \end{cases}$ است، مقدار امید ریاضی شرطی $E(Y \mid X = x)$ کدام است؟

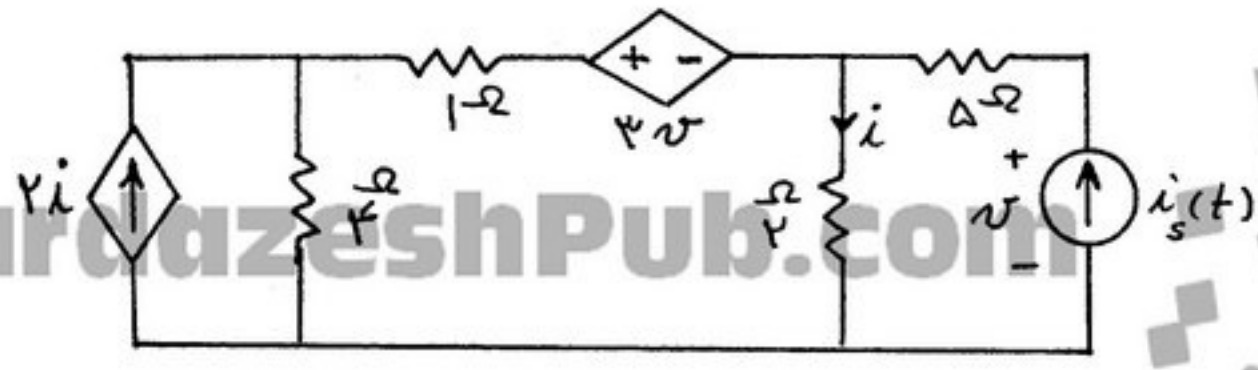
۱) $\frac{1-x}{2}$

۲) $\frac{1+x}{2}$

۳) $\frac{1}{2} - x$

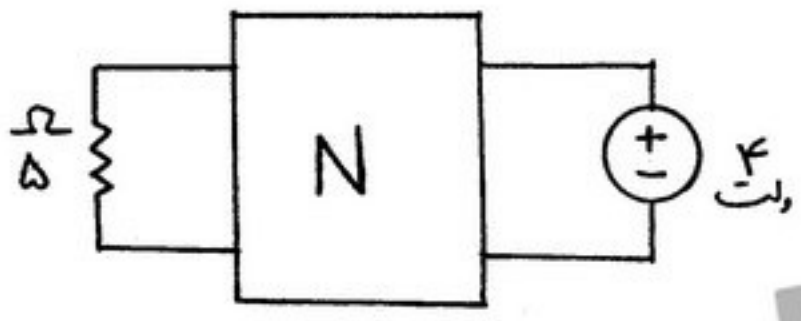
۴) $\frac{1}{2}$

۴۶- اگر $i_s(t) = ۱ + \frac{۲}{۳}\cos t$ باشد توان متوسط منبع ولتاژ وابسته چند وات است؟



۱) ۱۱+
۲) ۱۱-
۳) ۱۳
۴) ۱۳-

۴۷- مدار داده شده در شکل مقابل مقاومتی، خطی و تغییر ناپذیر با زمان است. ۸۰ درصد توان متوسط منبع توسط N جذب می‌شود. اندازه منبع ولتاژ ثابت را چند برابر کنیم تا ۳۰ درصد توان آن به مقاومت ۵Ω برسد.



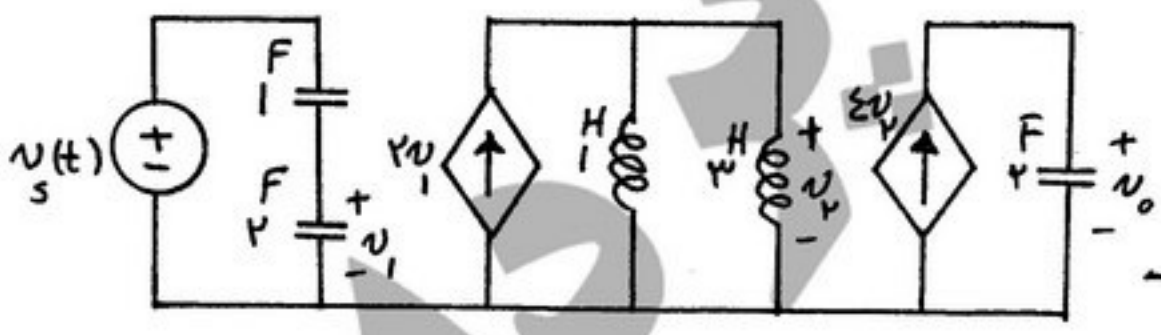
۱) $\frac{۳}{۲}$ برابر

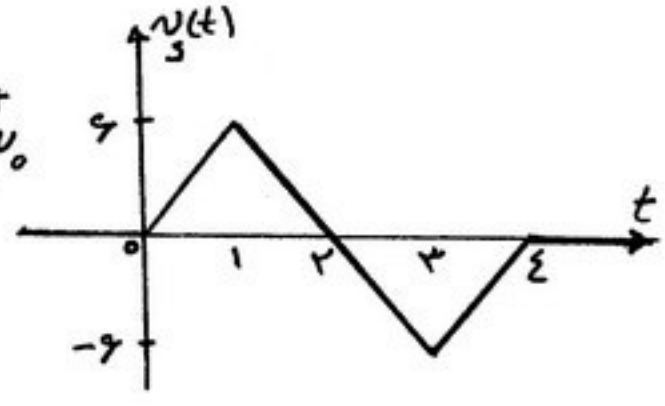
۲) $\frac{۹}{۴}$ برابر

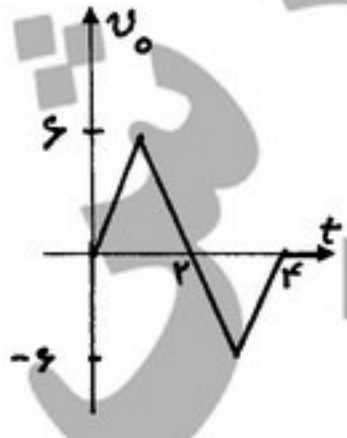
۳) درصد توان جذب شده توسط ۵Ω فقط به مقدار مقاومت بستگی دارد و مستقل از منبع ولتاژ است.

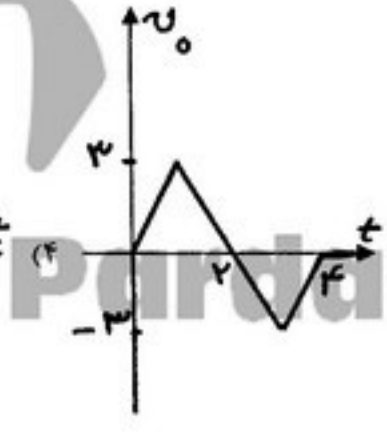
۴) درصد توان جذب شده توسط ۵Ω به مقدار مقاومت و N بستگی دارد و مستقل از اندازه‌ی منبع ولتاژ است.

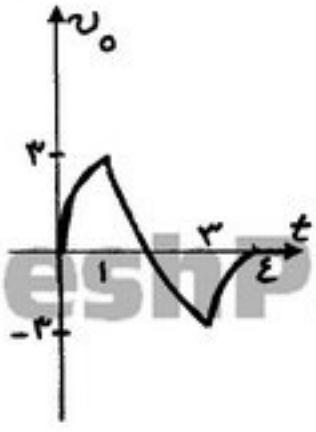
۴۸- شکل موج $v_s(t)$ مدار شکل مقابل به صورت زیر داده شده است. شکل موج ولتاژ خروجی v_o کدام است؟ (شرایط اولیه صفر)

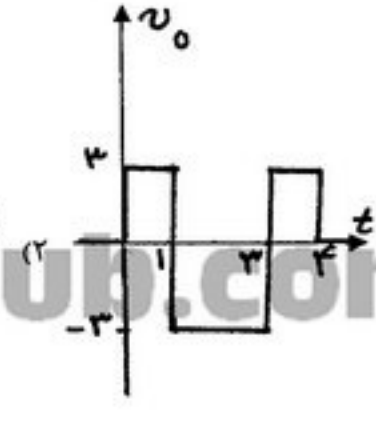




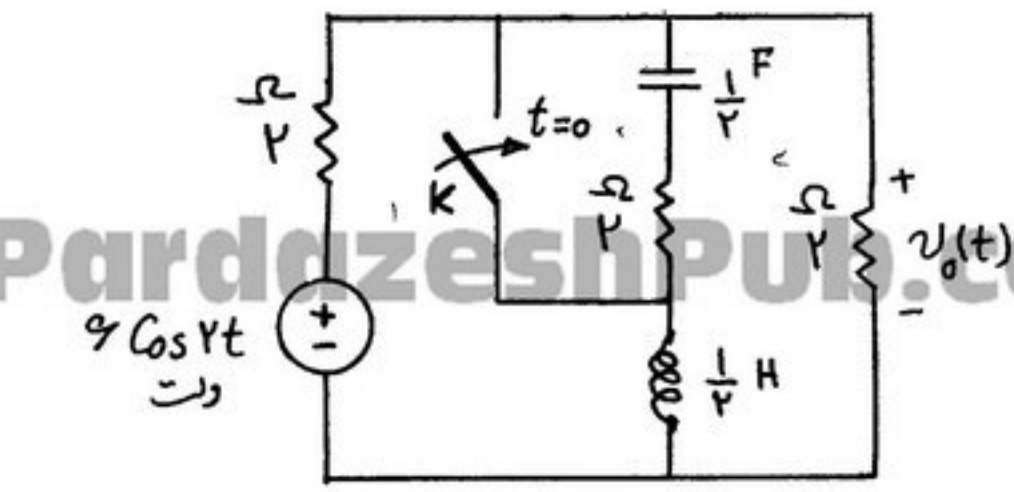
۱)


۲)


۳)


۴)


۴۹- در مدار شکل زیر که در حالت دائمی قرار دارد، کلید K در لحظه‌ی $t = 0$ بسته می‌شود. بخش‌گذرای پاسخ $v_0(t)$ برای $t \geq 0$ کدام است؟



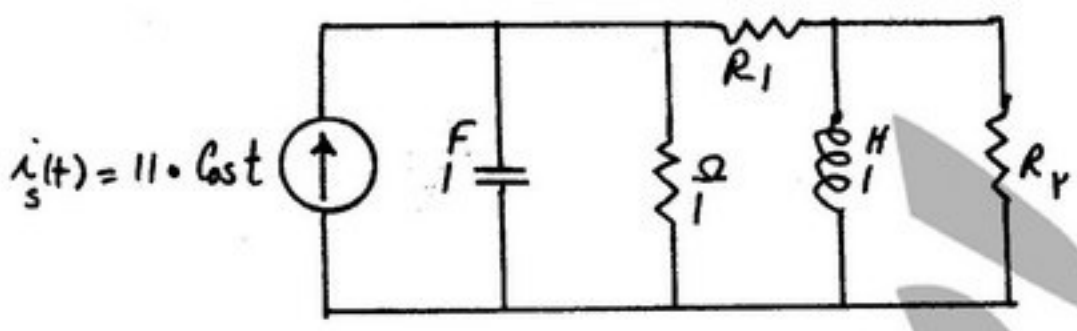
۱) $-e^{-2t}$

۲) $-\frac{3}{2}e^{-2t}$

۳) $\frac{1}{2}e^{-2t}$

۴) $\frac{5}{4}e^{-2t}$

۵۰- د رمدار شکل مقابل توان متوسط (یا توان مصرفی) مقاومت R_1 برابر P_1 وات و توان متوسط (یا توان مصرفی) مقاومت R_2 برابر P_2 وات است. مقاومت‌های R_1 و R_2 به ترتیب چند اهمی باشند تا $P_1 + P_2$ حداکثر باشد؟



۱) $R_1 = \frac{1}{2}$, $R_2 = \frac{1}{2}$

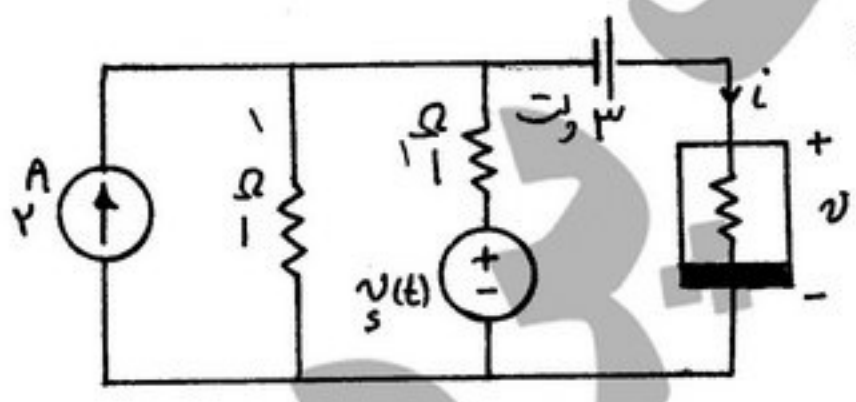
۲) $R_1 = 1$, $R_2 = 0$

۳) $R_1 = 0$, $R_2 = 1$

۴) $R_1 = 2$, $R_2 = 2$

۵۱- در مدار شکل زیر، ولتاژ $v(t)$ دو سر مقاومت غیرخطی به کدام جواب نزدیک‌تر است؟ $(v_s(t) = 0/18\cos 2t)$

مشخصه مقاومت غیرخطی: $i = \begin{cases} v^2 & , \quad v \geq 0 \\ 0 & , \quad v < 0 \end{cases}$



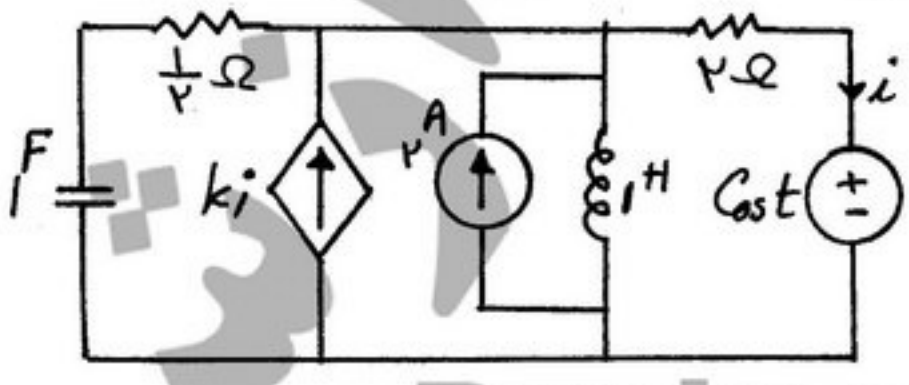
۱) ولت $v(t) = 2 + (0/03\cos 2t)$

۲) ولت $v(t) = 2 + (0/06\cos 2t)$

۳) ولت $v(t) = 4 + (0/018\cos 2t)$

۴) ولت $v(t) = 4 + (0/036\cos 2t)$

۵۲- در مدار شکل زیر با فرض $k = 2$، حالت دائمی جریان $i(t)$:



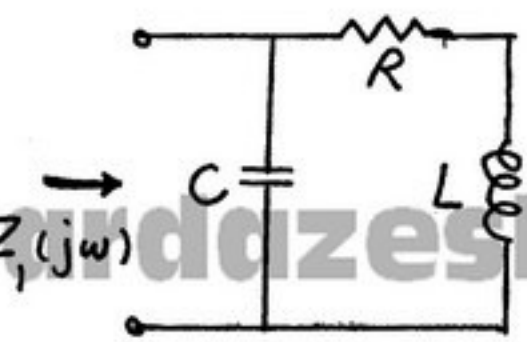
۱) فرکانس‌های $\omega = 1$ و $\omega = \frac{2\sqrt{3}}{3}$ دارد.

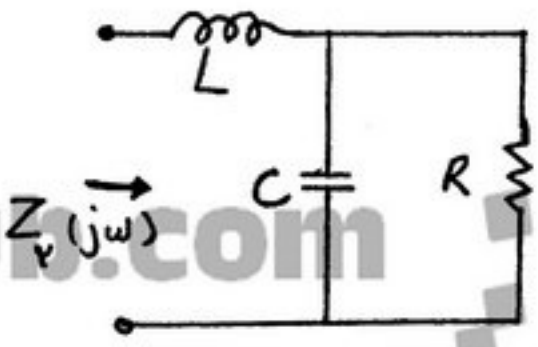
۲) فرکانس‌های $\omega = 1$ و $\omega = 2\sqrt{3}$ دارد.

۳) فرکانس‌های $\omega = 1$ و $\omega = 0$ و $\omega = \frac{2\sqrt{3}}{3}$ دارد.

۴) حالت دائمی ندارد.

۵۳- برای آن‌که فرکانس تشدید دو مدار شکل زیر یکسان باشند، کدام شرط باید برقرار باشد؟





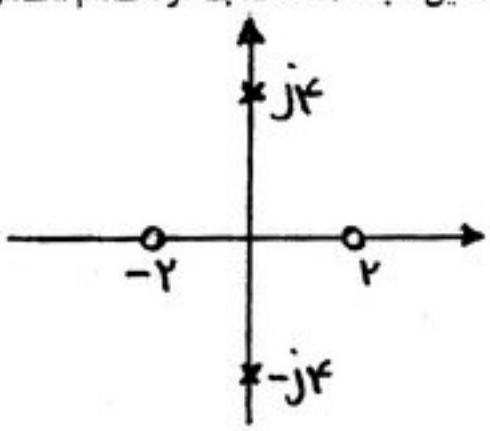
۱) $R = \frac{L}{C}$

۲) $R = \frac{C}{L}$

۳) $R = \sqrt{\frac{L}{C}}$

۴) $R = \sqrt{\frac{C}{L}}$

۵۴- محل صفرها و قطب‌های یک تابع شبکه در شکل زیر نشان داده شده است. اگر بدانیم بهره dc این شبکه ۱- است، بـه ازء کـدام مقـدار $a > 0$ ، ورودی به صورت $e^{-at}u(t)$ پاسخی به صورت $ke^{-at}u(t)$ ایجاد نخواهد کرد؟



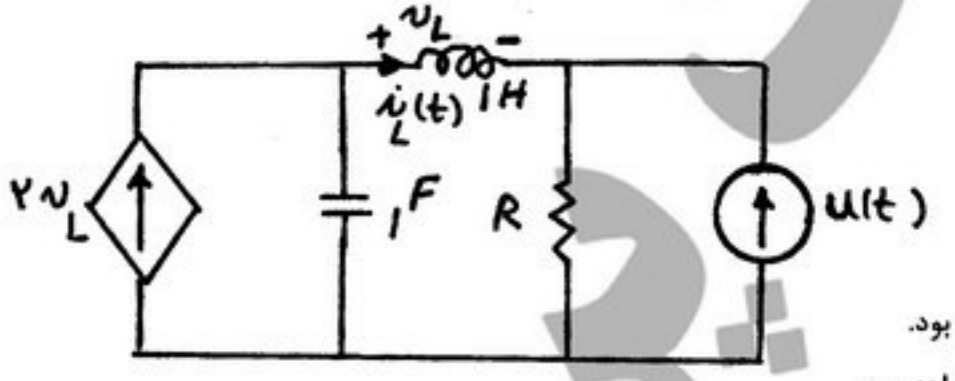
۱) ۱

۲) ۲

۳) ۴

۴) یافتن چنین مقدار a ممکن نیست.

۵۵- در مدار مرتبه دوم شکل مقابل پاسخ حالت صفر $i_L(t)$ به ورودی پله‌ی واحد کدام مشخصه زیر را دارد؟



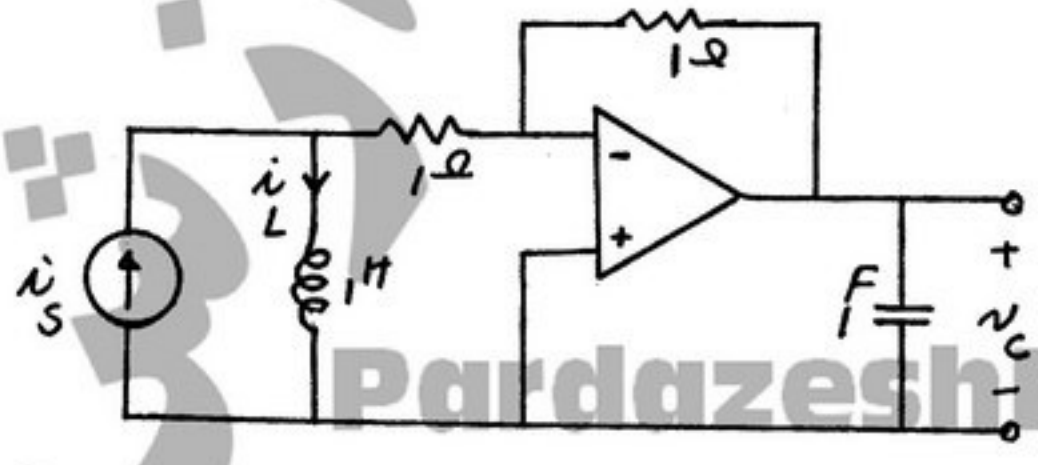
۱) به ازای $R = 2\Omega$ پاسخ مدار بی اتلاف خواهد بود.

۲) به ازای $R = 2\Omega$ پاسخ مدار میرائی بحرانی خواهد بود.

۳) به ازای $R = 4\Omega$ پاسخ مدار میرائی شدید خواهد بود.

۴) به ازای $R > 4\Omega$ پاسخ مدار میرائی ضعیف خواهد بود.

۵۶- درمدار شکل زیر آپ امپ ایده‌آل است. اگر i_s ورودی و $v_C(t)$ پاسخ باشد، پاسخ حالت صفر به ورودی ضربه‌ی واحد کدام مورد خواهد بود؟



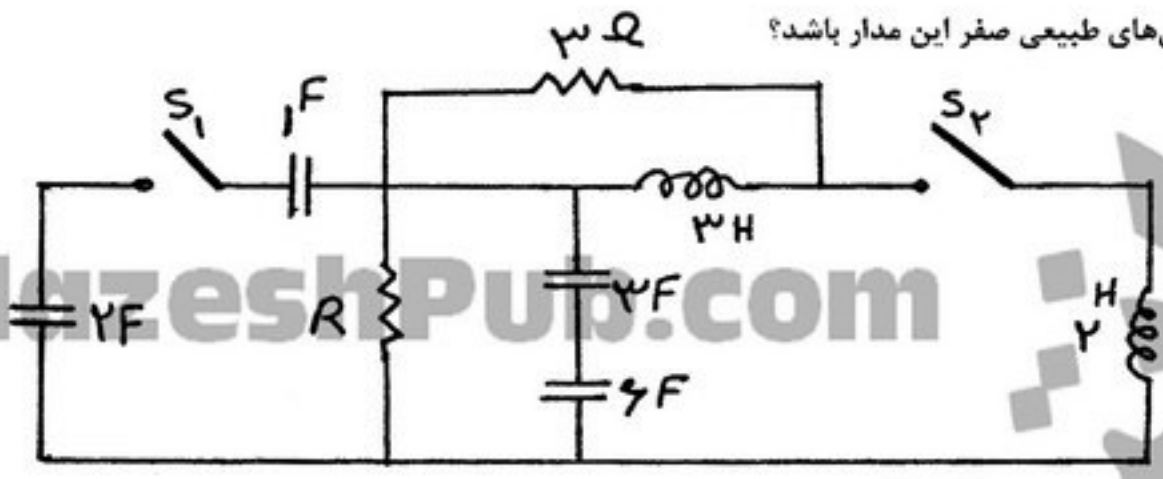
۱) $v_C(t) = e^{-1}u(t)$

۲) $v_C(t) = \delta(t) - e^{-1}u(t)$

۳) $v_C(t) = e^{-1}u(t) - \delta(t)$

۴) $v_C(t) = e^{-1}u(t) + \delta(t)$

۵۷- در مدار شکل مقابل مقدار R بر حسب Ω چقدر باشد تا در حالت بازبودن کلیدها مقدار یکی از فرکانس‌های طبیعی مخالف صفر برابر $\frac{۱}{۱۰}$ تعداد فرکانس‌های طبیعی صفر این مدار باشد؟



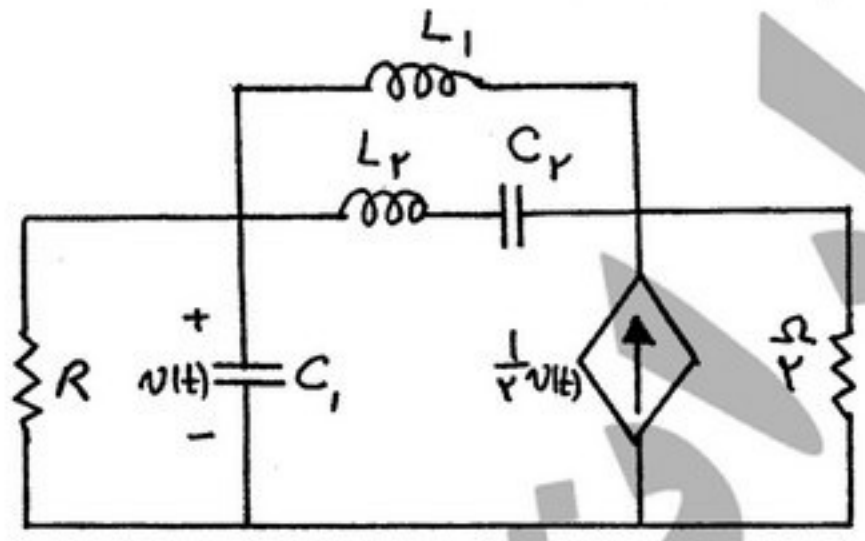
۱) $\frac{۵}{۲}$

۲) $\frac{۵}{۳}$

۳) ۱

۴) $\frac{۱۰}{۲۷}$

۵۸- در مدار شکل زیر اگر $[i_{L۱}, i_{L۲}, v_{C۱}, v_{C۲}]$ بردار شرایط اولیه باشد، کدام‌یک از مقادیر داده شده برای این بردار، یک بردار ویژه ماتریس حالت خواهد بود؟



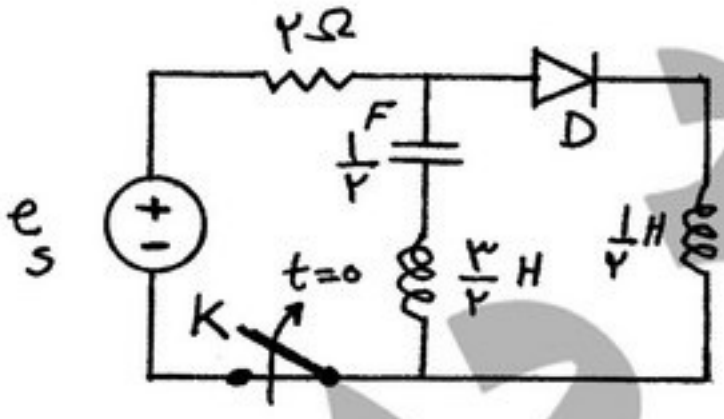
۱) [۲ ۰ ۰ ۰]

۲) [۰ ۲ ۰ ۰]

۳) [۰ ۰ ۲ ۰]

۴) [۰ ۰ ۲ −۲]

۵۹- در مدار شکل مقابل $e_s = u(-t)$. اگر کلید K را در لحظه‌ی $t = ۰$ باز کنیم حداکثر انرژی ذخیره شده در خازن چقدر خواهد بود؟



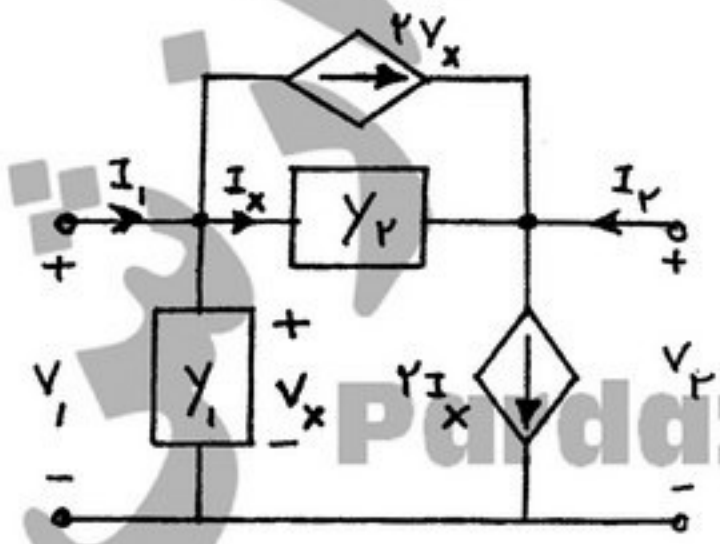
۱) فقط در لحظه $t = \frac{\pi}{۲}$ ثانیه انرژی خازن حداکثر بوده و برابر با $\frac{۱}{۲}$ ژول است.

۲) فقط در لحظه $t = \frac{\pi}{۲}$ ثانیه انرژی خازن حداکثر بوده و برابر با $\frac{۱}{۱۶}$ ژول است.

۳) برای $t \geq \frac{\pi}{۲}$ ثانیه انرژی ذخیره شده در خازن ثابت و برابر با $\frac{۱}{۳۲}$ ژول است.

۴) برای $t \geq \frac{\pi}{۲}$ ثانیه انرژی ذخیره شده در خازن ثابت و برابر با $\frac{۱}{۶۴}$ ژول است.

۶۰- پارامترهای y دو قطبی شکل مقابل کدام است؟



۱) $\begin{bmatrix} y_۱ + y_۲ & -y_۲ \\ y_۲ - y_۱ & -y_۲ \end{bmatrix}$

۲) $\begin{bmatrix} y_۱ + y_۲ + ۲ & -y_۲ \\ y_۲ + ۲ & -y_۲ \end{bmatrix}$

۳) $\begin{bmatrix} y_۱ + y_۲ - ۲ & -y_۲ \\ y_۲ - ۲ & -y_۲ \end{bmatrix}$

۴) $\begin{bmatrix} y_۱ + y_۲ + ۲ & -y_۲ \\ -۲ + y_۲ & -y_۲ \end{bmatrix}$