



Министерство образования и науки
Российской Федерации
Государственное образовательное учреждение
высшего профессионального образования
«Рыбинский государственный авиационный
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УТВЕРЖДАЮ
Зав. кафедрой _____ Л.А.Петрова
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Экзаменационный билет

№ 1

1. Переведите оригинальный текст по специальности.
Время выполнения работы – 60 минут.

The Component Software Solution: OLE's COM

The Component Object Model provides a means to address problems of application complexity and evolution of functionality over time. It is a widely available, powerful mechanism for customers to adopt and adapt to a new style multi-vendor distributed computing, while minimizing new software investment.. COM is an open standard, fully and completely publicly documented from the lowest levels of its protocols to the highest. As a robust, efficient and workable component architecture it has been proven in the marketplace as the foundation of diverse and several application areas including compound documents, programming widgets, 3D engineering graphics, stock market data transfer, high performance transaction processing, and so on.

2. The Component Object Model is an object-based programming model designed to promote software interoperability; that is, to allow two or more applications or "components" to easily cooperate with one another, even if they were written by different vendors at different times, in different programming languages, or if they are running on different machines running different operating systems. To support its interoperability features, COM defines and implements mechanisms that allow applications to connect to each other as software objects. A software object is a collection of related function (or intelligence) and the function's (or intelligence's) associated state.

3. In other words, COM, like a traditional system service API, provides the operations through which a client of some service can connect to multiple providers of that service in a polymorphic fashion. But once a connection is established, COM drops out of the picture. COM serves to connect a client and an object, but once that connection is established, the client and object communicate directly without having to suffer overhead of being forced through a central piece of API code as illustrated in Figure .

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Europe's infobahn

The basic technical preconditions for the transmission of moving images have been put in place over the last 10 years. These include advances in the area of micro-electronics and the steadily increasing availability of a standardised Europe-wide ISDN net. This acts as an information highway, providing the necessary structural foundation for an extensive market in visual communications products.

Some of the products arrived at in the course of this rapid technological development have already established a firm foothold in the market. These can be roughly divided into three categories:

Goods sales are currently being achieved with videoconferencing systems, which facilitate real time moving image communication through broadband channels.

Stand-alone video telephones, which in Europe have been developed by firms such as Telenorma, Dornier, Alcatel/SEL and Philips among others, make do with the ISDN narrow band with 2*64 KBit. By comparison with video-conferencing systems, narrow band transmission suffers to a greater or lesser extent from poorer picture quality and repeat speeds. These systems will probably achieve real market acceptance only at a price of between 1,000 and 1,500 DM apiece, since what is on offer here is more or less straightforward video telephony.

The growing number of low-priced PCs both in industry and in private households has led to PC-integrated multimedia visual communications products coming more and more to the forefront throughout the world. The last CeBIT in Hanover provided an opportunity to inspect the first multimedia products, which were then just beginning to appear.

Right from the start Wendt + Klütmann KG has specialised in the development of PC-integrated visual communication products for a variety of market sectors. One example is a solution developed for the security market sector, the IDIP® Security System, which uses visual communication to enhance security on site. By using ISDN as a carrier it became possible for the first time to carry out low cost transmission of video pictures over any distance in the event of an alarm.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.



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УТВЕРЖДАЮ
Зав. кафедрой _____ Л.А.Петрова
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Экзаменационный билет
№ 2

1. Переведите оригинальный текст по специальности. Время выполнения работы – 60 минут.

Nickel Base Alloys (Superalloys)

Nickel base alloys (Superalloys) are the typical materials for the hot parts of the engine, starting with the rear stages of the HPC being too hot for Ti-alloys. For combustors special sheet alloys (e.g. HastelloyX, C263) have been developed with relative low strength, high oxidation resistance, good formability and suitable wetdability. For turbine applications there are basically two groups of superalloys, one for wrought disks and rings and the other one for cast blades and vanes. Both owe their elevated temperature properties to two different strengthening mechanisms

- Solid solution strengthening by cobalt, chromium and refractory metals such tungsten and molybdenum.
- Precipitation hardening by the intermetallic γ' - phase $Ni_3(Al,Ti)$ or f' - phase Ni_3Nb . Therefore the most heat resistant superalloys contain up to 10 weight-% (Al+Ti) or some % Nb.

Superalloys for disk applications are tailored for high static and dynamic strength properties at temperatures below 750 °C. Special emphasis is laid on optimum low-cycle fatigue (LCF)-properties being most important for disk design.

Table 2 shows some of the most important Ni-alloys for disks and rotating rings. The most widespread alloy is IN 718. It covers a wide range of applications both in the rear section of the HP-compressor and in the turbine.

Waspaloy has a higher temperature capability as compared to IN 718. Waspaloy, however, is very critical concerning metallurgical behaviour. It is difficult to achieve a uniform fine grained structure in forging. Therefore both machining and welding of Waspaloy is critical. For many years disk alloys with higher temperature properties than Waspaloy could be manufactured only via

powder metallurgy, e.g. Udimet 700, Rene 95 or IN 100. Some of them have very high strength even at high temperatures, however, fracture mechanical properties are critical. Since about one decade it is possible to produce similar alloys like Gatorized Waspaloy or Udimet 720 Li (Li = low interstitial) via the conventional route casting plus forging”, in a quality level being sufficient for disk applications

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Materials Technology Leads AFRL Space Initiative

The U.S. Air Force is developing a new array of advanced aerospace materials and manufacturing technology on which to base a whole new class of sensors, structures and optics needed for development of advanced launch and military satellite systems.

This aerospace materials revolution is being led by the Materials Directorate of the Air Force Research Laboratory (AFRL) here. Work underway includes new efforts on composites, ceramics, thin films, advanced detector materials, and unique polymer and biotechnology options. Low-observable spacecraft materials are also being developed, although AFRL engineers cannot discuss them because of security restrictions.

The organization, which coordinates USAF manufacturing technology development, is funded at about \$250 million per year and already has an extensive history in space materials work, said Charles E. Browning, who heads the Materials Directorate.

The directorate has been directly involved in 35 years of reentry vehicle materials development and earlier Strategic Defense Initiative work, Browning said.

Anticipating USAF's "migration to space," the directorate in 1993 designated space a "special emphasis area." It is increasing that focus and gearing to devote about 30% of its resources to space by 2005, compared with about 20% now. Conversely, new aircraft materials work is to drop to about 25% by 2005, from 34% now.

A major objective will be increased materials partnering with industry, other AFRL directorates and federal agencies, especially NASA, said Michael Stropki, who heads the Space Materials Office. An example is the cochairmanship the directorate shares with NASA on the critical materials board for the Marshall Integrated High-Performance Rocket Technology Effort.

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УТВЕРЖДАЮ
Зав. кафедрой _____ Л.А.Петрова
«__» _____ 20__ г.

Экзаменационный билет
№ 3

1. Переведите оригинальный текст по специальности. Время выполнения работы – 60 минут.

Aircraftnoisesources

A gas turbine engine is characterized by a unique noise spectrum which unequivocally results from its specific design. Basically, all components of the engine contribute to engine noise, i.e. fan, compressor, combustion chamber, turbine, exhaust section. The relative magnitude of different noise sources can vary not only from engine to engine, but also with operating conditions.

Typically for the plain turbojet engines of the past were a small cross-section, relatively small air mass flow rate, but a very high exhaust velocity (600 m/s and more). The dominant noise source was clearly the exhaust system and the mixing of the jet with the ambient air.

The low bypass-ratio turbofan engine of the sixties, with a bypass-ratio of about 1.5, featured a higher air mass flow intake rate, but a lower exhaust velocity of the propelling jet. This made possible somewhat lower jet noise, but at the same time the turbo machinery noise increased. Typical transport aircraft using such engines were the B-727, B-707, DC-9, DC-8.

High bypass-ratio engines (with bypass-ratios of up to eight) process most of the intake air stream by the fan, with only a small portion passing to the core engine. Exhaust velocities of 300 m/s of the fan flow, and 400 m/s of the core engine flow are low enough to place jet noise second to fan turbo machinery noise, which is now the dominant noise source.

Gas turbine engine noise can be divided into two general categories: internally generated noise, usually associated with the rotating machinery, and externally generated noise, or jet noise.

Primary sources for internally generated noise are fan, compressor, and turbine. In most high bypass-ratio engines, the fan is the the fan discharge duct.

Compressor noise also propagates out of the inlet, whereas turbine noise exits through the exhaust nozzle of the core engine.

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Thermal analysis was accomplished by solving the energy conservation principle applied to proper control envelopes and by adopting suitable heat transfer coefficient correlations for wall-to-coolant and steam-to-wall heat exchange.

Two cooling designs were considered for the blades and disks in the present application, i.e. a single- and a multiple-blade circuit. The single-blade circuit collects the cooling water in its inward-outward motion row by row and discharges it at the periphery of each disk. This solution is modeled by dividing the disks into concentric portions composed of two facing rings of discs, the blade row protruding out of one of the discs, the cooling channels and the steam flow contained in the ideal envelope; each annulus corresponds to a turbine row.

The resulting cooling network consists of four sets of channels: two are dedicated to cooling the discs, the other two to cooling the blade rows, in fact, because the blade rows are arranged so as to alternate with one of the discs, the blade cooling channels alternately pass through the blades and the disc. Simulations have shown that this arrangement could cause the disc temperature to change abruptly between two subsequent rings: a second set of channels was adopted to keep the disc temperature profile smoother and lower.

Every blade needs its own cooling channel so, for each annulus, the number of blade cooling channels is the same as the number of blades. For usual solidity values, the space between two adjacent blades will contain just one duct, so the number of disc cooling channels will also equal the number of blades. Because of the radial flux configuration, the number of blades increases with radius, so that tangential channels have to be adopted between two subsequent rings to collect the incoming water from the zn channels and deliver the flow to the channel of the subsequent stage.

The multiple-blade circuit considers that each blade row is cooled by an independent circuit, thus generating a number of row-dedicated circuits corresponding to the numbers of rows. The thermal model is identical to the one adopted for the single-blade circuit, except that the water feed conditions at the i -row inlet are not the same as at the $i-1$ row outlet.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.



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УТВЕРЖДАЮ
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Экзаменационный билет

№ 4

1. Переведите оригинальный текст по специальности.
Время выполнения работы – 60 минут.

Information is not, of course, an end in itself; it is the basic input to decision making. One thing is clear in the study of managerial work: the manager plays the major role in the unit's decision-making system. As its formal authority, only the manager can commit the unit to important new courses of action; and as its nerve center, only the manager has full and current information to make the set of decisions that determines the unit's strategy. Four roles describe the manager as decision maker.

As entrepreneur, the manager seeks to improve the unit, to adapt it to changing conditions in the environment. In the monitor role, a president is constantly on the lookout for new ideas. When a good one appears, he initiates a development project that he may supervise himself or delegate to an employee (perhaps with the stipulation that he must approve the final proposal).

There are two interesting features about these development projects at the CEO level. First, these projects do not involve single decisions or even unified clusters of decisions. Rather, they emerge as a series of small decisions and actions sequenced over time. Apparently, chief executives prolong each project both to fit it into a busy, disjointed schedule, and so that they can comprehend complex issues gradually.

Second, the chief executives I studied supervised as many as 50 of these projects at the same time. Some projects entailed new products or processes; others involved public relations campaigns, improvement of the cash position, reorganization of a weak department, resolution of a morale problem in a foreign division, integration of computer operations, various acquisitions at different stages of development, and so on.

Chief executives appear to maintain a kind of inventory of the development projects in various stages of development. Like jugglers, they keep a number of

projects in the air; periodically one comes down, is given a new burst of energy, and sent back into orbit. At various intervals, they put new projects on-stream and discard old ones.

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Organizing is very important for an organization. There are different ways of organizing a company. A good idea for companies is to have an organization chart. An organization will show the structure of the organization who is in charge of which department and how the department's organization work from within. We will see how the human resources department, the assets, finance and technology department are organized and their functions within the organization.

Large organizations are structured by department. One important department is the human resource department. The human resource department is responsible for staffing the organization's need. The staffing process involved different stages. An organization can staff the organization through recruitment. "Recruitment is the development of a pool of applicants for jobs in an organization." An organization can perform an internal recruiting. Internal recruiting is moving or promoting employees within the organization. It is an opportunity for the employees to be promoted and also to look at the employees skills. The skills inventory can allow the recruiter to give the employees a better opportunity in another department. A downside of internal recruiting is if an employee is lacking of skills. An organization can perform an external recruiting. External recruiting consists of recruiting applicants through news paper ad, job fair, internet job search site. It is sometimes difficult to hire people from outside when we do not know them. Although most organizations are required now to perform background check, reference check, drug test. However it still does not guarantee that the candidate will be good for the organization. In another hand a candidate from outside the company can bring new ideas to the company but it can takes them longer to get accustomed to the organization mission statement if the candidate is not familiar with the environment.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.



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УТВЕРЖДАЮ
Зав. кафедрой _____ Л.А.Петрова
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Экзаменационный билет
№ 5

1. Переведите оригинальный текст по специальности. Время выполнения работы – 60 минут.

Stressanalysis

Advanced composite materials having high strength and low density characteristics such as Carbon/Epoxy appears to be candidate material for a fan stage to exploit aerodynamic advantage of blade configuration having forward sweep and lean. Such blade configurations are expected to experience high stresses due to its complex shape under high rotational speed. Composite materials can be designed to have desired properties without compromising on strength.

The blade geometry was to be finalised based on aerodynamic performance in conjunction with the mechanical integrity of the blade. Finite Element analysis was carried out to evaluate stress and deformation on the proposed fan stage with each blade configuration to assess mechanical integrity. Stress analysis was carried out using a simplified finite element model so that disk, blade and shroud were simulated in it achieving yet reasonably good results, hi order to bring down the stress level in the final stages of stress analysis, the blade sections were shifted circumferentially with reference to stacking line. This was further modified to incorporate thickened leading and trailing edges as required for Carbon Fiber Composite (CFC) blade fabrication. The resulting configuration was "TTT98-29". Stress analysis carried out on this blade is briefly presented as below.

The fan stage blade was scaled down to 79% to match the available drive motor power. The blade tip diameter of full scale model 400mm becomes 316 mm after scaling. The blade thickness at the mid chord of the root and tip are about 5.5 and 2.1 mm respectively and taper off to the edges on either side. Suitable hub and shroud are to be added as part of the analysis. A constant thickness 2.25mm is chosen for the shroud. The blade has dovetail root and is inserted into the slot of the disk. The schematic of bladed disk with shroud is shown in figure-12a and the same in 3D view is shown in figure-12b. The hub was extended so that it can be

attached to drive shaft with spline. The fan stage rotates at 28,400 rpm to achieve 470m/s tip speed.

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

The Hobbing Process. — The hobbing process as applied to straight-cut gears has proved very successful, and it is not difficult to understand why this process has sprung into prominence in a comparatively short time. It is essentially a rational process. The shape of the teeth is generated from spiral hobs, the threads of which are cut to a plain rack section. One hob will cut any gear or pinion of one pitch. This feature alone eliminates a great many errors, which are characteristic of gears produced by milling methods. The hob revolves continuously while cutting, as does the gear blank. The feed is also continuous. There are no cutting and return strokes, and no intermittent starting and stopping of gear blanks, as in other generating processes. These features do not necessarily insure the production of accurate gears, but they offer greater facilities to the designer for the achievement of the desired result.

The hob is a substantial tool with plenty of wearing and cooling surface, and can be made to meet the demands of rapid production and to last for a long time. The continuous nature of all motions used in hobbing a gear blank enables this process to be used for the production of the heaviest gears. The limit to the size of a hobbing machine is set by the dimensions of the largest gears, which are required in sufficient quantities to pay for the investment.

Nevertheless, there are some defects in the hobbing process as applied to the production of straight-cut spur gears. A hob is a worm thread, and as such must have a spiral angle depending on the relationship between the pitch of the thread

and the diameter of the hob. A straight-cut gear has no spiral angle hence the spiral hob must be inclined, more or less, to bring the cutters-in line with the tooth spaces to be cut. In order to cut correct teeth, the axis of the hob should be perpendicular to the axis of the gear blank. In such case the hob will generate involute teeth if its threads are cut to the same axial section as the straight-sided parent rack for the required pitch. Since the hob must be inclined to cut a spur gear, the teeth are not generated from the axial or rack section, but from a diagonal section. The axial pitch of a hob for cutting spur gears is not the same as the pitch of the gears, which it cuts. The normal pitch of the hob threads must be the same as the gear pitch.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.



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УТВЕРЖДАЮ
Зав. кафедрой _____ Л.А.Петрова
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Экзаменационный билет

№ 6

1. Переведите оригинальный текст по специальности.
Время выполнения работы – 60 минут.

The evolving U.S. system of corporate governance and finance exhibits many characteristics of the postwar Japanese system. LBO partnerships act much like the main banks (the real power center) in Japan's keiretsu business groupings. The keiretsu make extensive use of leverage and intercorporate holdings of debt and equity. Banks commonly hold substantial equity in their client companies and have their own executives help them out of difficulty. (For years, Nissan has been run by an alumnus of the Industrial Bank of Japan, who became CEO as part of the bank's effort to keep the company out of bankruptcy.) Other personnel, including CFOs, move frequently between banks and companies as part of an ongoing relationship that involves training, consulting, and monitoring. Japanese banks allow companies to enter formal bankruptcy only when liquidation makes economic sense-that is, when a company is worth more dead than alive. Japanese corporate boards are composed almost exclusively of insiders.

Ironically, even as more U.S. companies come to resemble Japanese companies, Japan's public companies are becoming more like U.S. companies of 15 years ago. Japanese shareholders have seldom had any power. The banks' chief disciplinary tool, their power to withhold capital from high-growth, cash-starved companies, has been vastly reduced as a result of several factors. Japan's victories in world product markets have left its companies awash in profits. The development of domestic and international capital markets has created ready alternatives to bank loans, while deregulation has liberalized corporate access to these funds. Finally new legal constraints prevent banks from holding more than 5% of the equity of any company which reduces their incentive to engage in active monitoring.

Many of Japan's public companies are flooded with free cash flow far in excess of their opportunities to invest in profitable internal growth. In 1987, more than 40% of Japan's large public companies had no net bank borrowings-that is, cash balances larger than their short- and long-term borrowings. Toyota, with a

cash hoard of \$10.4 billion, more than 25% of its total assets, is commonly referred to as the Toyota Bank.

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Changes in the political environment and the technological development are factors that both have changed the opportunity for countries to trade services and products. It is easier for us to transfer information and transport the services and products around the world.

Fisher slightly describes advantages and disadvantages of globalization. He talks about different benefits and changes such as the new technology and its effects in the business world of today, and he also mentions that the markets are more open than before. He describes that the opponents of globalization claims different disadvantages, such as companies moving their production to countries where it is easier for them to produce without caring about labour laws, and that WTO and other organizations are undemocratic and that underprivileged people's interests are neglected.

One section in Australia that has benefited by the globalization is the wine industry. It is a huge business and Australia is famous all over the world for the different wines the domestic companies produce. Since Australian wine is as popular as it is, the industry is benefited when the trade barriers and tariffs are reduced. It is easier for the different wine companies to enter new markets and to increase the sales. According to facts from the Australian government website Australia is "one of the top wine-producing countries in the world". They exported almost the double volume of wine compared to what was sold domestically. The government helps the entire wine industry in Australia in forms of reducing barriers of trade. Countries that Australia exported the largest volumes of wine to 2006/2007 were United Kingdom and United States but also Canada, Germany and New Zealand were all large markets.

A section that has been disadvantaged by the globalization could be all the workers in the different domestic industries that choose to move the production overseas. If Australian companies expand overseas and move their production these workers will compete even more when it comes to all the jobs available within the country. The domestic supply of labour will be higher than the companies demand and this will increase the unemployment. According to Homan domestic companies will look at the opportunities overseas and come to establish their production in other countries. The wages domestically will decrease since there are fewer jobs than usual for the workers to apply.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.



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Экзаменационный билет

№ 7

1. Переведите оригинальный текст по специальности. Время выполнения работы – 60 минут.

Processes And Technique

The fundamental principles of forging are much the same regardless of the method employed. The steel is heated to a temperature at which its elastic properties entirely disappear and it obeys the laws of plastic flow, following the direction of least resistance, when deformed by pressure.

Theoretically a length of round bar pressed from both ends would bulge equally in all directions and along its whole length. In actual practice there is friction between the ends and the surfaces applying the pressure, and a chilling effect by contact with them, so that the increase in diameter is not uniform but is a maximum at the centre and practically nothing on the end faces.

Forging can be performed by either steady pressure or impact pressure, and although the frictional effect is present in both cases, it is more marked in the former, due to the longer period of contact. Its influence is taken into account when designing forging tools for the purpose of controlling the direction of flow of the metal. With impact pressure the energy of the blow is transmitted throughout the material more rapidly and completely and will manifest itself even in a reverse direction. Thus a downward blow can be used to force the plastic metal upwards into a die cavity more readily than by steady pressure.

Methods of Forging. The methods of forging steel can be divided into two main groups:

1. Forging with simple tools of more or less standard forms in which only a portion of the material is worked at a time. The tools are used in conjunction with a press, in which case the action is one of steady squeezing, or a hammer which imparts a blow or impact pressure.

2. Die-forging, in which the material is formed between two dies having impressions corresponding to the finished shape of the article. In this case the whole surface is under pressure at once during the final stages of forming.

The commonest method of die-forging is drop-stamping, which, like hammer-forging, gives an impact pressure.

2. Просмотрите оригинальный текст по специальности и передайте его содержание в форме резюме. Время выполнения – 2–3 минуты.

Modern workshop technology

Steel castings to be used in plant and equipment which operate at high temperatures and pressures should be made from carbon-molybdenum steel conforming to B.S. 1398: 1957. This specification covers steels which operate at temperatures up to 4500 C. (8420 F.), and also exhibit a good measure of resistance to creep. Alternatively, the 1.25 per cent chromium-molybdenum steel (B.S. 1504-621: 1958), the 3 per cent chromium-molybdenum steel (B.S. 1461: 1957), the 9 per cent chromium-molybdenum steel (B.S. 1463: 1957) should be used for progressively increasing severity of conditions.

When a casting must exhibit both a high yield strength as well as a high ductility a 1.5 per cent manganese steel conforming to B.S. 1456: 1957 should be used.

Components such as dredger and excavator buckets, jaw crushers, etc., which are subject to very severe abrasive conditions in service should be made from austenitic manganese steels conforming to B.S. 1457: 1957. Alternatively, in the case of such applications as rolling and cement-crushing plant a 1 per cent chromium steel is more suitable such as that conforming to B.S. 1956: 1957 (Grade C).

Where castings have to encounter severe corrosive conditions a 13 per cent chromium steel should be used such as that laid down in B.S. 1630: 1957. In the case of those applications in which a steel casting must exhibit corrosion-resisting characteristics as well as resistance to creep and corrosion at temperatures above 400° C. (7500 F.) either an austenitic chromium-nickel steel (B.S. 1631: 1957), or an austenitic chromium-nickel-molybdenum steel (B.S. 1632: 1957) should be employed. When resistance to scaling at high temperatures is of importance the steel should comply with B.S. 1648: 1957. Typical applications include furnace hearths, electric furnace heating elements, economizer parts, and many types of chemical plant.

3. Дайте ответы экзаменатору на иностранном языке по вопросам, связанным со специальностью и научной работой.